MTPE- 101A	PWM Converters and Application						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	Understand the concepts and basic operation of PWM converters, including basic circuit operation and design. Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	Knowledge concepts and basic operation of PWM converters, including basic circuit operation and design.						
CO2	Learn the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality						
CO3	Able to recognize and use the following concepts and ideas: Steady-State and transient modeling and analysis of power converters with various PWM techniques.						
CO4	Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.						

UNIT1

AC/DC and DC/AC power conversion Overview of applications of voltage source converters and current source converters. DC to AC Converters: Classification of inverters, operation of each type, design of commutating circuits, Analysis of voltage and current waveforms, voltage and frequency control, current source inverter and pulse width modulated inverter.

UNIT2

Pulse width modulation techniques for bridge converters Bus clamping PWM. Space vector based PWM. Advanced PWM techniques.. DC to DC Converters: Classification of choppers, operating principle and control circuits for each type. Analysis of voltage and current waveforms.

UNIT3

Practical devices in converter. Calculation of switching and conduction power losses. Characteristics of different solid state devices namely power diodes, SCR, Diac, Triac UJT, FET, Power transistor, SCS. Firing circuits using-operations amplifiers, UJT and logic gates protection of SCR against-over voltage, over current, dv/dt, di/dt, Temperature calculation, Heat sink design, Methods of commutation of SCR's, Series and Parallel operation of Thyristors.

UNIT4

Compensation for dead time and DC voltage regulation. Dynamic model of PWM converter. Multilevel converters. Constant V/F induction motor drives

Suggested Books:

1. Ned Mohan, Undeland and Robbins, “Power Electronics: Converters, Applications and Design”, John’s Wiley and Sons.
2. Erickson RW, “Fundamentals of Power Electronics”, Chapman and Hall
3. Vithyathil. J, “Power Electronics: Principles and Applications”, McGraw Hill.
4. M.H.Rashid, “Power Electronics”, Prentice Hall of India

MTPE- 103A	Power Quality						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	Understand the different power quality issues to be addressed. Understand the recommended practices by various standard bodies like IEEE, IEC, etc. on voltage & frequency, harmonics. Understanding STATIC VAR Compensators						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	Acquire knowledge about the harmonics, harmonic introducing devices and effect of harmonics on system equipment and loads						
CO2	develop analytical modelling skills needed for modelling and analysis of harmonics in networks and components.						
CO3	To introduce the student to active power factor correction based on static VAR compensators andits control techniques.						
CO4	To introduce the student to series and shunt active power filtering techniques for harmonics.						

Unit 1

Introduction: - power quality-voltage quality-overview of power. Quality phenomena classification of power quality issues. Power quality measures and standards-THD-TIF-DIN-C-message weights. Flicker factor transient phenomena-occurrence of power quality problems. Power acceptability curves-IEEE guides. Standards and recommended practices.

. **Unit 2**

Harmonics: - individual and total harmonic distortion. RMS value of a harmonic waveform Triplex harmonics. Important harmonic introducing devices. SMPS. Three phase power converters-arcing devices saturable devices. Harmonic distortion of fluorescent lamps-effect of power system harmonics on power system equipment and loads.

Unit 3

Modelling of equipments:- Modelling of networks and components under non-sinusoidal conditions. Transmission and distribution systems. Shunt capacitors-transformers. Electric machines. Ground systems loads that cause power quality problems. Power quality problems created by drives and its impact on drive.

Unit 4

Power factor improvement: - Passive Compensation. Passive Filtering. Harmonic. Resonance. Impedance Scan Analysis. Active Power Factor Corrected Single Phase Front End, Control Methods for Single Phase APFC. Three Phase APFC and Control Techniques. PFC based on Bilateral Single Phase and Three Phase Converter

Suggested Books:

1. Donald E. Kirk, “Optimal Control Theory, An introduction”, Prentice Hall Inc.,
2. A.P. Sage, “Optimum Systems Control”, Prentice Hall,
3. HSU and Meyer , “Modern Control, Principles and Applications”, McGraw Hill,
4. Yoan D. Landu, “Adaptive Control (Model Reference Approach)”, Marcel Dekker.
5. K.K.D. Young, “Design of Variable Structure Model Following Control Systems”, IEEE Transactions on Automatic Control, Vol. 23,.

MTEL-105A	Renewable Energy Resources						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of renewable energy resources and different factors related to them.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about renewable energy resources and solar power system.						
CO2	To acquaint students with the phenomenon of wind power system and its applications with grid.						
CO3	To impart knowledge to students about geothermal and ocean power system.						
CO4	To let student understand fuel cell, hydrogen and hybrid energy system.						

Unit 1

ENERGY RESOURCES: Renewable energy sources, distributed energy systems and dispersed generation, atmospheric aspects of electric energy generation, Impact of renewable energy generation on environment

SOLAR ENERGY: Solar Radiation and its Measurement, Solar Thermal Energy Collectors: different types of collectors and their performance analysis, Solar Thermal Energy Conversion System: solar water heater, solar distillation, slat thermal power plant and various applications of solar system, Solar Photovoltaic System: solar cell, VI characteristics, solar electricity and grid and off-grid solar system.

Unit 2

WIND ENERGY: Wind turbines and rotors, Wind Energy Extraction, Wind Characteristics, Power Density Duration Curve, Design of Wind Turbine Rotor, Design of Regulating System for Rotor, Wind Power Generation Curve, Sub-systems of a Horizontal Axis Wind Turbine Generator, Modes of Wind Power Generation, Estimation of Wind Energy Potential, Selection of Optimum Wind Energy Generator (WEG), Grid Interfacing of a Wind Farm, Methods of Grid Connection, Grid System and Properties, Capacity of Wind Farms for Penetration into Grid, Control System for Wind Farms, Economics of Wind Farms

Unit 3

GEOTHERMAL ENERGY: Structure of the Earth's Interior, Plate Tectonic Major Test, Geothermal Sites, Geothermal Field, Geothermal Gradients, Geothermal Resources, Geothermal Power Generation, Geothermal Electric Power Plant, Geothermal-Preheat Hybrid with Conventional Plant

OCEAN ENERGY: Development of a Tidal Power Scheme, Grid Interfacing of Tidal Power, Wave Energy, Mathematical Analysis of Wave Energy, Empirical Formulae on Wave Energy, Wave Energy Conversion, Principle of Wave Energy plant, Wave Energy Conversion Machines.

Unit 4

FUEL CELLS: Principle of Operation of Fuel Cell, Fuel Processor, Fuel Cell Types, Energy Output of a Fuel Cell, Efficiency, and EMF of a Fuel Cell, Operating Characteristics of Fuel Cells, Thermal Efficiency of Fuel Cell

HYDROGEN ENERGY SYSTEM: Hydrogen Production, Hydrogen Storage, Development of Hydrogen Cartridge, Gas Hydrate

HYBRID ENERGY SYSTEMS: Hybrid Systems AND ITS Types, Electric and Hybrid Electric Vehicles, Hydrogen-Powered-Electric Vehicles.

Suggested Books:

1. Kothari DP, Singal KC, Ranjan Rakesh, "Renewable energy sources and emerging technologies, 2nd ed, Prentice Hall (India)
2. Rai G D, "Non-Conventional Sources of Energy, Khanna Publishers.
3. Bansal N K, Kleemann M, Heliss M, "Renewable energy sources and conversion technology", McGraw Hill Education.
4. Abbasi S A, Abbasi N, "Renewable energy sources and their environmental impact", PHI.
5. Mittal KM, "Renewable energy Systems", Wheelar Publishing.
6. Mukherjee D, "Renewable energy Systems", New Age International.

MTEL-107A	Power Electronics Applications in Renewable Energy						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the application of power system in renewable energy resources.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about power electronics devices and DC-DC converters.						
CO2	To acquaint students with the modern power electronics converters.						
CO3	To impart knowledge to students about power electronics interface devices for solar energy.						
CO4	To let student understand wind energy interfacing devices.						

Unit1

Review of Power Devices: SCR, BJT, MOSFET, IGBT, GTO, Safe operating Limits, Selection of devices for various applications.

Phase controlled Converters: **(**1-φ&3-φ) thyristor fed half controlled, fully controlled and Dual converters with inductive and motor load.

DC to DC converters: Analysis of various conduction modes of Buck, Boost, Buck-Boost.

Unit2

Modern Power Electronic Converters: Basic concepts of VSI, single phase half bridge, full bridge and three phase bridge inverters, PWM modulation strategies, Sinusoidal PWM, Space vector modulation, Selective Harmonic Elimination method, other inverter switching schemes, blanking time, Current source inverters.

Unit3

Design of Power Electronics Interfaces for Solar PV: Solar PV technologies, MPPT, Design of DC-DC converters for MPPT, MPPT algorithms, Implementation of MPPT control through DSP controllers. Topologies for grid connected and standalone applications: single phase and three phase systems, Single stage and multistage, isolated and non-isolated.

Unit4

Power Electronics Interfaces for WES: Topologies of WES, design considerations for wind energy Switch rectifier/inverter system, Power Converters for Doubly Fed Induction Generators (DFIG) in Wind Turbines.

Power Electronics Interfaces for Fuel Cells: Types of fuel cells, Proton Exchange Membrane (PEM) fuel cell: features and operational characteristics, Design of DC-DC converters for PEM fuel cell, MPPT in Fuel Cell.

Suggested Books:

1. Mohan N, Undel and T M, Robbins W P, "Power Electronics, Converters, Applications & Design", Wiley India Pvt. Ltd.
2. Bose B K, "Modern Power Electronics and AC Drives", Pearson Education.
3. Joseph Vithayathil,"Power Electronics", Tata McGraw Hil.
4. Amirnaser Yezdani, and Reza Iravani, "Voltage Source Converters in Power Systems: Modelling, Control and Applications", IEEE John Wiley Publications.
5. Solanki C S, "Solar Photo Voltaic", PHI learning Pvt Ltd.

MTEL-109A	Smart Grid						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of smart Grid and its advantages over conventional grid						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about Smart Grids and Appreciate the difference between smart grid & conventional grid						
CO2	To acquaint students with the phenomenon of smart metering concepts to industrial and commercial installations						
CO3	To impart knowledge to students about Formulate solutions in the areas of smart substations, distributed generation and wide area measurements						
CO4	To let student understand microgrid and related issues..						

UNIT-1

Introduction to Smart Grid, Evolution of Electric Grid Concept of Smart Grid, Definitions Need of Smart Grid, Concept of Robust & Self-Healing Grid, Present development & International policies in Smart Grid. Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources Power Quality Conditioners for Smart Grid

UNIT-2

Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS) Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation. Cyber Security for Smart Grid

UNIT-3

Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit(PMU)

UNIT-4

Concept of micro-grid, need & applications of micro-grid, formation of micro-grid, Issues of interconnection, protection & control of Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel-cells, micro-turbines Captive power plants, Integration of renewable energy sources

Suggested Books:

1. Keyhani A, “Design of smart power grid renewable energy systems”, Wiley IEEE.
2. Berger L T, Iniewski K, “Smart Grid: Applications, Communications and Security”, Wiley.
3. Gellings C W., “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press.
4. Ekanayake J B, Jenkins N, Liyanage K, Yokoyama A, “Smart Grid: Technology and Applications”, Wiley.
5. Borlase S, “Smart Grid: Infrastructure, Technology and solutions”, CRC Press.
6. Phadke A G, “Synchronized Phasor Measurement and their Applications”, Springer.

MTEL-111A	Bio-Medical Signal & Image Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	This course will look at Biomedical signal and Image for understanding and their processing assessing						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	Understand different types of biomedical signal and Identify and analyse different biomedical signals.						
CO2	Understand basics of Image processing and its methods						
CO3	To emphasize and analysis of Clustering and Classification						
CO4	To study different types of bio signals and their processing						

Unit-1

Signals and Biomedical Signal Processing: Introduction and overview, Analog, discrete and digital signals, Processing and transformation of signals, Signal processing for feature extraction, Characteristics of digital Images, Fourier transform: Properties of One-Dimensional Fourier Transform, Discrete Fourier Transform.

. **Unit-2**

Image Processing: Image filtering Enhancement and Restoration, Point processing, Mask processing: linear filtering in Space domain, Frequency-domain filtering, Smoothing and sharping filters in frequency domain, Wavelet transform, FFT to STFT, One-Dimensional Continuous and discrete Wavelet Transform, Image processing methods.

Unit-3

Clustering and Classification: Clustering versus Classification, Feature extraction, Biomedical and. Biological features, Signal and Image processing features, K-means: A Simple Clustering Method, study of different types of Classifiers for signal processing.

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Unit-4

Processing of Biomedical Signals: Electric activities of Cell, Electric data acquisition, Electrocardiogram: Signal of Cardiovascular system, Processing and feature extraction of ECG, Electroencephalogram, Signal of the brain, Processing and feature extraction of EEG, Electromyogram: Signal of muscles, Processing and feature extraction of EMG. Frequency and wavelet-domain analysis.

Suggested Books:

1.KayvanNajarian& Robert Splinter, “Introduction to Biomedical signal and Image Processing”, CRC Press
2.MetinAkay “Time Frequency & Wavelets in Biomedical Signal Processing”, Wiley-IEEE Press.
3. Amine Nait-Ali, “Advanced Biomedical Signal Processing”, Springer.

MTEL-113A	Advanced Digital Signal Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of LTI system and designing of different types of Filters**.**						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about LTI system and DFT.						
CO2	To acquaint students with the study and design of FIR filters.						
CO3	To impart knowledge to students about study and design of IIR filters.						
CO4	To let student understand the concept and design of adaptive digital filters and power spectrum estimation.						

UNIT-1

Introduction of DSP: Introduction to Signal Processing, Discrete Linear Systems, superposition Principle, UNIT-Sample response, stability & causality Criterion.

Fourier Transform & inverse Fourier transform: Frequency domain design of digital filters, Fourier transform, use of Fourier transform in Signal processing. The inverse fourier transform, sampling continuous function to generate a sequence, Reconstruction of continuous -time signals from Discrete-time sequences.

UNIT-2

Digital Filter Structure & Implementation: Linearity, time invariance & causality, the discrete convolution, the transfer function, stability tests, steady state response, Amplitude & Phase Characteristics, stabilization procedure, Ideal LP Filter, Physical reliability & specifications. FIR Filters, Truncation windowing & Delays, design example, IIR Filters: Review of design of analog filters & analog frequency transformation. Digital frequency transformation. Design of LP filters using impulse invariance method, bilinear transformation, Phase equalizer, digital all pass filters.

UNIT-3

Implementation of Filters: Realization block diagrams, Cascade & parallel realization, effect of infinite-word length, transfer function of degree 1&2, Sensitivity comparisons, effects of finite precision arithmetic on Digital filters.

UNIT-4

DFT & FFT & Z transform with Applications: Discrete Fourier transform, properties of DFT, Circular Convolution, Fast Fourier Transform, Realizations of DFT. The Z-transform, the system function of a digital filter, Digital Filter implementation from the system function, the inverse Z- transform, properties & applications, Special computation of finite sequences, sequence of infinite length & continuous time signals, computation of Fourier series & time sequences from spectra.

Suggested Books:

1. J G Proakis, “Digital Signal Processing using Matlab”, Pearson Education.
2. Alam V. Oppenheim and Ronald W. Schafer, “Digital Signal Processing” Pearson Education.
3. Rabiner & Gold, “Major Test& application of digital Signal Processing”, Pearson Education
4. Roman kuc, “Introduction to Digital Signal Processing,” Tata McGraw Hill Edition.
5. Richard G. Lyons, “Understanding Digital Signal Processing”, Pearson Education.
6. Paulo S. R. Diniz, Eduardo A. B. da Silva, Sergio L. Netto, “Digital Signal Processing: System Analysis and Design”, Springer.
7. Manolakis G Demitries, “Applied Digital Signal Processing”, Cambridge Univ. Press.

MTEL-115A	Bio-Medical Instrumentation						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of different types of Biomedical Instruments with their controls.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	Understand the different types of biomedical transducer for signal measurement and recording.						
CO2	Understand basics of blood pressure, blood flow and respiratory system measurements.						
CO3	Understand the muscoskeletal and nervous system and their measurement.						
CO4	To emphasize and analysis of recent trends in biomedical Engg and safety measurement.						

Unit-1

Characteristics of Transducers and Electrodes for Biological Measurement: Introduction to human body, block diagram, classification, various physiological events and suitable transducer for their recording, bioelectric potentials.

Cardiac system: Cardiac musculature, Electro cardiography, ECG recording, phonocardiography, holter recording ECG lead system, Heart rate meter, vector cardiography, pacemakers,

Unit-2

Blood pressure and Blood flow measurement; Invasive and non-invasive methods of blood pressure, characteristics of blood flow and heart sound, Cardiac output measurement, Plethysmography.

Respiratory system: Mechanics or breathing, parameters of respiration, Respiratory system measurements, respiratory therapy instruments.

Unit-3

Muscoskeletal Systems; EMG, Clinical applications, Muscles stimulator, Instrumentation for measuring Nervous function; EEG signal, frequency band classification, Lead systems, EEG recording, Clinical applications of EEG signal, X-ray CT scan, MRI, PET.

Clinical Laboratory Instrumentation; Test on blood cell, Blood cell counter, Blood glucose monitors, auto analyzer, pulse-oximeter.

Unit-4

Recent Trends in Biomedical Engg: Patient care and monitoring, Non-invasive diagnostic instrumentation, biotelemetry, telemedicine, prosthetic devices, lie detector test, Application of lasers and ultrasonic in biomedical field.

Troubleshooting and Electrical safety of Biomedical instruments; Physiological effect of current and safety measurement.

Suggested Books:

1.W T Wester, J G Tompkins, “Design of Microprocessor based Medical Instrumentation”, Englewood cliffs
2.Tatsuo, Togato & Toshiya, “Biomedical transducers and instruments”, CRC Press
3. Joseph P Bronzino, “The Biomedical engineering handbook”, CRC Press

MTPE-117A	Electrical Drives Laboratory						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of programming for various types of Electric Drives appliances.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about mathematical, Boolean operations, half adder.						
CO2	Understand how to create the VI for decimal to binary conversion, array function, sequence structure. Also studying the properties and options of graphs/charts.						
CO3	To impart knowledge about measurement of temperature, strain and power using VI.						
CO4	Understand to create model for speed control of DC motor, analysis of PID controller.						

List of experiments:

1. Study of Thyristor controlled D.C Drive.
2. Study of Chopper Fed DC Motor.
3. Study of A.C single phase motor speed control using TRIAC.
4. PWM inverter fed three phase induction motor control using PSPICE/MATLAB/PSIM software.
5. VSI/CSI fed induction motor drive analysis using MATLAB/PSPICE/PSIM software.
6. Study of V/f control operation of three phase induction motor.
7. Study of permanent magnet synchronous motor drive fed by PWM inverter using software.
8. Regenerative/ Dynamic breaking operation for DC motor study using software.
9. Regenerative/ Dynamic breaking operation for AC motor study using software.
10. PC/PLC based AC/DC motor control operation.

MTPE-119A	Digital Signal Processing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of programming for various types of Digital Signal Processing operations.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about Code Composer Studio-I, Code Composer Studio-II and Addressing Modes.						
CO2	Understand FFT and Bit Reversal Operation, FFT and its Applications and Audio Codec and its Applications						
CO3	To impart knowledge about Real Time Data Exchange and IR filtering by interfacing Matlab with Code Composer Studio.						
CO4	To impart knowledge about Interrupts and Digital communication using Binary Phase Shift Keying						

List of experiments:

1. Introduction to Code Composer Studio-I
2. Introduction to Code Composer Studio-II
3. Introduction to the Addressing Modes
4. FFT and Bit Reversal Operation
5. FFT and its Applications
6. Audio Codec and its Applications
7. Real Time Data Exchange
8. IR filtering by interfacing Matlab with Code Composer Studio
9. Introduction to Interrupts
10. Digital communication using Binary Phase Shift Keying

MTRM-111A	Research Methodology and IPR						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*						
Course Outcomes (CO)							
CO1	Understand research problem formulation.						
CO2	Analyze research related information						
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.						
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.						

Unit 1

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'.
2. C.R. Kothari, "Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.

8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

MTPE- 102A	Power Electronic Converters						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	Understand the concepts and basic operation of PWM converters, including basic circuit operation and design. Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To give a systematic approach for transient and steady state analysis of all power electronic converters with passive and active loads.						
CO2	To know and carry out transient and steady state analysis of different power converters of different types of loads and switching sequences.						
CO3	Understand the concepts and basic operation of PWM converters, including basic circuit operation and design.						
CO4	Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.						

Unit-1

Analysis of power semiconductor switched circuits with R, L, RL, RC loads. D.C. motor load. Battery charging circuit. Design aspects of converters, Few practical applications.

Unit-2

Single-Phase and Three-Phase AC to DC converters. Half controlled configurations-operating domains of three phase full converters and semi-converters. Reactive power considerations.

Unit-3

Analysis and design of DC to DC converters. Control of DC-DC converters: Buck converters, Boost converters, Buck- Boost converters, Cuk converters. AC to AC power conversion using voltage regulators. Choppers and cyclo-converters. Consideration of harmonics, introduction to Matrix converters.

Unit-4

Single phase and three phase inverters. Voltage source and Current source inverters. Voltage control and harmonic minimization in inverters.

Suggested Books:

1. Ned Mohan, Undeland and Robbin, “Power Electronics: converters, Application and design”, John’s Wiley and sons. Inc, Newyork.
2. M.H.Rashid, “Power Electronics”, Prentice Hall of India.
3. Erickson RW, “Fundamentals of Power Electronics”, Chapman and Hall
4. Vithyathil. J, “Power Electronics: Principles and Applications”, McGraw Hill.

MTPE-104A	Digital Control of Power Electronics and Drive Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To understand different control strategies. To understand state space modelling of different converters. To perform simulation of different power converters						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To provide knowledge on modelling and simulation of power simulation circuits and systems.						
CO2	The candidate will be able to simulate power electronic systems and analyze the system response.						
CO3	Understand state space modelling of different converters.						
CO4	perform simulation of different power converters.						

Unit-1

Review of numerical methods. Application of numerical methods to solve transients in D.C. Switched R, L, R-L, R-C and R-L-C circuits. Extension to AC circuits.. Simulation of single and three phase inverters with thyristors and selfcommutated devices. Space vector representation. Pulse-width modulation methods for voltage control. Waveform control. Simulation of inverter fed induction motor drives

Unit-2

Modelling of diode in simulation. Diode with R, R-L, R-C and R-L-C load with AC supply. Modelling of SCR, TRIAC, IGBT and Power Transistors in simulation. Application of numerical methods to R, L, C circuits with power electronic switches. Simulation of gate/base drive circuits, simulation of snubber circuits.

Unit-3

State space modelling and simulation of linear systems. Introduction synchronous aspects. Simulation of converter fed DC motor drives. Simulation of thyristor choppers with voltage. Current and load commutation schemes. Simulation of chopper fed DC motor.

Unit-4

Simulation of single phase and three phase uncontrolled and controlled (SCR) rectifiers. Converters with self-commutated devices- simulation of power factor correction schemes.

Suggested Books:

1. Simulink Reference Manual, Math works, USA
2. Ned Mohan, Undeland and Robbin, “Power Electronics: converters, Application and design”, John’s Wiley and sons. Inc, Newyork.
3. M.H.Rashid, “Power Electronics”, Prentice Hall of India

MTEL-106A	HVDC Transmission & FACTS Devices						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of HVDC and FACTS devices.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about HVDC transmission system.						
CO2	To acquaint students with the interaction of AC and DC system and various links.						
CO3	To impart knowledge to students about facts devices.						
CO4	To let student understand compensation system and control techniques.						

Unit 1

HVDC Transmission: Development of HVDC Technology, Selection of converter configuration. Rectifier and Inverter operation. Control of HVDC converters and Systems.

Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters.

Unit 2

Interaction between HVAC and DC systems – Voltage interaction, over voltages on AC/DC side, Harmonic instability problems and DC power modulation.

Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

Unit 3

Introduction of Facts Concepts: Basic of flexible alternating current transmission system (FACTS) controllers, shunt, series, combined and other controllers, HVDC or FACTS, static VAR compensator (SVC) and static synchronous compensator (STATCOM), Static Synchronous Series Compensator (SSSC), Thyristor Controlled Series, Capacitor (TCSC). Solid State Contactors (SSC) and TSSC.

Unit 4

Combined Compensators: Introduction, Unified power flow controller (UPFC), conventional power control capabilities, real and reactive power flow control, comparison of UPFC to series compensators, control structure, dynamic performance. Interline power flow controller (IPFC) basic operating principles, control structure, application considerations.

Suggested Books:

1. Hingorani N.G, "Understanding FACTS (Concepts and Technology of Flexible AC Transmission System)", Standard Publishers.
2. Song Y.H. and Johns A.T., "Flexible AC Transmission Systems", IEEE Press.
3. Ghosh A. and Ledwich G., "Power Quality Enhancement using Custom Power Devices", Kluwer Academic Publishers.
4. Mathur R.M. and Verma R.K., "Thyristor based FACTS controllers for Electrical Transmission Systems", IEEE Press.
5. Bollen M.H.J., "Understanding Power Quality and Voltage Sag", IEEE Press.
6. Padiyar K.R., "FACTS Controllers in Power Transmission and Distribution", New Age International Publisher.
7. Miller T.J.E., "Reactive Power Control in Electric Systems", John Wiley.
8. Kamakshaiah S, Kamaraju V, "HVDC Transmission", McGraw Hill Education.

MTEL-108A	TRANSIENTS IN POWER SYSTEM						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of transients in power system.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about different types of factors effecting power quality.						
CO2	To acquaint students with the transients and lightning.						
CO3	To impart knowledge to harmonics.						
CO4	To let student understand about distributed generation and various issues related to power quality.						

UNIT-1

What is Power Quality, Power Quality is Equal to Voltage Quality, Why are we concerned about Power Quality, Voltage Imbalance, Waveform Distortion, Voltage Fluctuation, Power Frequency Variations, Power Quality Terms, Sources of Sags and Interruption, Estimating Voltage Sag Performance, Area of Vulnerability, Equipment Sensitivity of Voltage Sags, Transmission Systems Sag Performance Evaluation, Utility Distribution System Sag Performance Evaluation.

UNIT-2

Sources of Transient Overvoltage's: Capacitor Switching, Restrike during Capacitor De-energizing, Lightning, Ferro - resonance, Other Switching Transients. Principles of Overvoltage Protection.

Devices for Overvoltage Protection: Surge Arresters and Transient Voltage Surge Suppressor, Isolation Transformers, Utility System Lightning Protection, Shielding, Line Arresters, Low Side Surges, Cable Protection, Scout Arrester Scheme, Computer Tools for Transient Analysis.

UNIT-3

Fundamentals of Harmonics: Harmonic Distortion, Voltage vs Current Distortion, Harmonics vs Transients, Power System Quantities Under Non Sinusoidal Conditions, Active, Reactive and Apparent Power, Power Factor: Displacement and True, Harmonic Phase Sequences, Triplen Harmonics.

Harmonic Sources from Commercial Loads: Single Phase Power Supplies, Fluorescent Lighting, Adjustable Speed Drives for HVAC and Elevators.

Effects of Harmonic Distortion: Impact on Capacitors, Impact on Transformers, Impact on Motors, Impact on Telecommunications, Impact on Energy and Demand Metering.

UNIT-4

Distributed Generation and Power Quality: Resurgence of DG, Perspectives on DG Benefits, Perspectives on Interconnection, DG Technologies, Fuel Cells, Wind Turbines, Photovoltaic Systems, Interface to the Utility System, Synchronous Machines, Asynchronous Machines, Electronic Power Inverters, Power Quality Issues, Voltage Regulation, Harmonics, Voltage Sags, Operating Conflicts, Voltage Regulation Issues, Islanding, Transformer Connections.

Suggested Books:

1. R C Dugan, M F McGranaghan, S Santoso, H. Wayne Beaty, "Electrical Power System Quality", McGraw Hill.
2. Akihiro Ametani, Naoto Nagaoka, Yoshihiro Baba, Teruo Ohno, "Power System Transients: Theory and Applications", CRC Press.
3. L.V. Bewley, "Traveling waves in Transmission Systems", Dover.
4. R. Rudenberg, "Electric Stroke waves in Power Systems", Harvard University Press, Cambridge, Massachusetts.
5. Allan Greenwood, "Electric Transients in Power Systems", Wiley Interscience.
6. CS Indulkar and DP Kothari, "Power System Transients, Statistical Approach", PHI Pvt Ltd., New Delhi.
7. VA Venikov, "Transient phenomena in Electrical Power Systems", Pergamon Press, London.
8. Klaus Ragaller, "Surges in High Voltage Networks", Plenum Press, New York.
9. Pritindra Chowdhari, "Electromagnetic transients in Po r System", John Wiley and Sons Inc.
10. Naidu M S and Kamaraju V, "High Voltage Engineering", TMH Publishing Company Ltd., New Delhi.

MTEL-110A	Advanced Power Distribution & Automation						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of electricity distribution and automation.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about distribution automation.						
CO2	To acquaint students with the control and intelligent system in distribution automation.						
CO3	To impart knowledge to students about renewable energy resources and distribution management.						
CO4	To let student understand communication system implementation in distribution system.						

UNIT-1

Introduction: General Concept, Distribution of Power, Power Loads, Connected Loads.

Load Forecasting: Concept of Statistics, Regression Analysis, Correlation Theory, Factor in Power System Loading, Unloading the System, Forecast of System peak.

UNIT-2

System Planning: Planning Process, Basic Principle in system planning, System Development, Overview of Distributed generation, Different types of mapping: Global positioning System GPS, Automated mapping AM/Facility Management FM.

Introductory Methods in Power System Planning: Per Unit Calculation, Matrix Algebra, Symmetrical Components, Overview of Load Flow, Automated Planning: software needs, Data, solution techniques (Gauss Iterative method, Gauss seidel iterative method, Newton Raphson iterative method, Improved newton Raphson method) Effect of Abnormal Loads.

UNIT-3

Brief introduction of Distribution Automation, Role of PLC & SCADA in substation and distribution automation, Consumer information Service (CIS), Geographical information system GIS, Automatic meter Reading (AMR), Automation System.

UNIT-4

Metering System: Different types of Meter, Metering system component, Ferraris Meters, Solid state meters, Advance meter Infrastructure Systems (AMI).

Overview of Net metering, Meter current Rating, Prepaid Electricity meters, Meter selection and Location, testing methods.

Suggested Books:

1. A. S Pabla, “Electric Power Distribution”, McGraw Hill Education.
2. James A. Momoh, “Electric Power Distribution Automation Protection and Control”, CRC Press.
3. James N-Green and R Wilson, “Control and Automation of electric Power Distribution Systems”, CRC Press.
4. Turan Gonen,“Electric Power Distribution System Engineering”, CRC Press.
5. Abdelhay A. Sallam, “Electric Distribution Systems”,Wiley-IEEEPress.

MTEL-112A	Digital Control System						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of digital control system.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about signal processing in digital control system.						
CO2	To acquaint students with the control devices and systems.						
CO3	To impart knowledge to students about state variables, controllability and observability.						
CO4	To let student understand the various concepts of digital observers.						

Unit-1

Signal Processing in Digital Control: Basic digital control scheme, principle of signal conversion, basic discrete-time signal, time-domain model for discrete-time systems, z-transform, transfer function models, jury stability criterion, sample and hold systems, sample spectra and aliasing

Unit-2

Models of Digital Control Devices and Systems: Introduction, z-domain description of sampled continuous-time plants, z-domain description of systems with dead-time, implementation of digital controllers, digital PID controllers, digital temperature control system, stepping motors and their control, PLC

Unit-3.

Analysis using State Variable Methods: State variable representation-concepts, modeling, transformation, state diagrams, Jordan canonical form, Eigen values and Eigenvectors,

Solution of state equations, concepts of controllability and Observability,

Unit-4

Digital Observers: State regulator design-full order and reduced order state observer, design of state observers, compensator design by separation principle, state feedback with integral control , deadbeat control by state feedback and deadbeat observers

Suggested Books:

1. Ogata K," Discrete time Control Systems", Pearson Education.

2. Nagrath and Gopal, "Control System Engineering", New Age International.

3. Kuo B C, "Digital Control Systems", Oxford University Press.

4. Goapl, "Digital Control & State Variable Method", McGraw Hill Education.

MTEL-114A	Advanced Microprocessors						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of advanced microprocessor.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about 8086 microprocessors.						
CO2	To acquaint students with the interfacing converters etc.						
CO3	To impart knowledge to students about microcontrollers.						
CO4	To let student about application of microprocessor and various controllers related to it.						

UNIT-1

Architecture of 8086 microprocessor, Memory Addressing, Bus Timings for MN/MX mode, interrupt structure. Memory Interfacing and Addressed encoding techniques for 8086 microprocessor

UNIT-2

Addressing modes, Instruction set and application programs, Assembler Directives, Programming Techniques using TASM, Interfacing D/A and A/D converters using programmable I/O devices, Interfacing Stepper motor. Architecture of INTEL X86 Family: CPU block diagrams, Pin diagrams and internal descriptions of 80286, 386, 486 and Pentium Processor, Instruction formats.

UNIT-3

Introduction to micro controllers, Architecture of 8051microcontroller, basic Instruction set, programming, serial data communication, inter facing with D/A and A/D converters.

UNIT-4

Application of Microprocessors, A Microcomputer-based Industrial Process-control System, Hardware for Control Systems and Temperature Controller, Overview of Smart-Scale Operation.

Suggested Books:

1. Hall D V, “Microprocessors & Interfacing”, McGraw Hill Education.
2. Brey B, “The Intel Processors”, Pearson Education.
3.Gibson, “Microprocessors”,, Prentice Hall of India.
4. Jean Loup Baer, “Microprocessor Architecture”, Cambridge University Press.
5. Ayala K J, “Micro Controller”, Penram International

MTEL-116A	Reliability Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the concept of Reliability Engineering and its application in Engineering**.**						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To emphasize and analysis of basic of reliability engineering.						
CO2	To understand the concept of Fault tree analysis in reliability.						
CO3	To understand the concept of Maintainability Analysis in reliability.						
CO4	To study the concept of Artificial Intelligence in reliability engineering.						

Unit-1

Review of basic concepts in Reliability Engg., Reliability function, different reliability models, etc. Reliability evaluation techniques for complex systems; Tie set and cut set approaches, different reliability measures, Reliability allocation/apportionment, reliability improvement, redundancy optimization techniques.

Unit-2

Fault tree analysis: fault tree construction, simplification and evaluation, importance measures, modularization, applications, advantages and disadvantages of fault tree techniques.

Unit-3

Maintainability Analysis: measures of system performance, types of maintenance, reliability centred maintenance, reliability and availability, evaluation of engine ring systems using Markov models.

Unit-4

Applications of fuzzy Major Test and neural networks to Reliability Engineering. Reliability testing, design for reliability and maintainability. Typical reliability case studies.

Suggested Books:

1. R. Rama Kumar, “Engineering Reliability”, Prentice Hall.
2. K B Mishra, “Reliability Analysis & Prediction”.
3. K B Mishra, “New trends in System Reliability Evaluation”.
4. M L Shooman, “Probabilistic reliability–an engineering approach”, R E Krieger Pub.
5. K K Aggarwal, “Reliability Engineering”.
6. Roy & Billington, “Reliability Engineering”.
7. Balagurswami, “Reliability Engineering”, McGraw Hill Education.

MTPE-118A	Power Electronics Laboratory						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of various types of Power Electronics Devices.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about V-I characteristics of SCR and measure latching and holding currents, UJT trigger circuit for half wave and full wave control, phase controlled rectifier.						
CO2	Understand three-phase fully/half controlled bridge rectifier with resistive and inductive loads, single-phase ac voltage regulator with resistive and inductive loads,						
CO3	To impart knowledge about triggering of (i) IGBT (ii) MOSFET (iii) power transistor, operation of IGBT/MOSFET chopper circuit. MOSFET/IGBT based single-phase series-resonant inverter.						
CO4	To impart knowledge about MOSFET/IGBT based single-phase bridge inverter.						

List of experiments:

1. To study V-I characteristics of SCR and measure latching and holding currents.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6. To study single-phase ac voltage regulator with resistive and inductive loads.
7. To study single phase cyclo-converter.
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor.
9. To study operation of IGBT/MOSFET chopper circuit.
10. To study MOSFET/IGBT based single-phase series-resonant inverter.
11. To study MOSFET/IGBT based single-phase bridge inverter.

MTPE-120A	Microcontroller Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of programming of microcontroller.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about multiplication and division using MUL and DIV etc. operations.						
CO2	Understand 8051 INTERFACING						
CO3	To impart knowledge about ASSEMBLY PROGRAMMING						
CO4	To impart knowledge about different types of programmes in assembly language.						

List of experiments:

EXPERIMENTS ON ASSEMBLY PROGRAMMING

1. Write a program to multiplication and division using MUL and DIV instructions.
2. Write a program to transfer a block of data from internal memory to external memory.
3. Write a program to exchange two set of eight-byte data.
4. Write a program to find the sum of two numbers in decimal.
5. Write a program to convert decimal number to hexadecimal.
6. Write a program to add a number n, m number of times.
7. Write program to find the largest from a set of n numbers.
8. Write program for sorting the given set of numbers.

EXPERIMENTS ON 8051 INTERFACING

1. Write an assembly language program for generating a triangular wave.
2. Write a program to find the largest from a set of ten numbers and display it using LEDs.
3. Write a program to for displaying the decimal numbers in 7 Segment display.
4. Write a program to read the DIP switches for displaying the reading using 7 Segment display.
5. Write a program to rotate the given motor in clockwise direction.
6. Write a program to rotate the given motor in anticlockwise direction.
7. Write a program to generate a square wave.
8. Write a program to display a message in LCD display.

MTEL-201A	Distributed Generation						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**

3	0	0	3	60	40	100	3
Program Objective (PO)	To understand renewable energy sources. To gain understanding of the working of off-grid and grid-connected renewable energy generation schemes.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To understand the planning and operational issues related to Distributed Generation.						
CO2	Acquire Knowledge about Distributed Generation Learn Micro-Grids						
CO3	understand renewable energy sources						
CO4	Understanding of the working of off-grid and grid-connected renewable energy generation schemes.						

UNIT-1

Need for Distributed generation. Renewable sources in distributed generation and current scenario in Distributed Generation. Introduction to micro-grids. Types of micro-grids: autonomous and non-autonomous grids Sizing of micro-grids. Modelling & analysis of Micro-grids with multiple DGs. Micro-grids with power electronic interfacing units.

UNIT-2

Planning of DGs. Sitting and sizing of DGs optimal placement of DG sources in distribution systems. Grid integration of DGs Different types of interfaces, Inverter based DGs and rotating machine based interfaces. Aggregation of multiple DG units.

UNIT-3

Technical impacts of DGs. Transmission systems Distribution Systems De-Regulation Impact of DGs upon protective relaying. Impact of DGs upon transient and dynamic stability of existing distribution systems, Steady-state and Dynamic analysis...

UNIT-4

Economic and control aspects of DGs Market facts. Issues and challenges Limitations of DGs, Voltage control techniques. Reactive power control, Harmonics Power quality issues, Reliability of DG based systems.

Suggested reading:

1. H. Lee Willis, Walter G. Scott, "Distributed Power Generation – Planning and Evaluation", Marcel Decker Press.

2. M Godoy Simoes, Felix A. Farret, "Renewable Energy Systems – Design and Analysis with Induction Generators", CRC press.

3. Stuart Borlase. "Smart Grid: Infrastructure Technology Solutions" CRC Press

MTEL-203A	Electric Drives & Control						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of electric drives & control in electric system.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To study basic electric drives, types of loads, classes of motor duty.						
CO2	To study different types of DC drives, stability analysis, modern control techniques.						
CO3	To study mathematical modelling of induction motor drives, introduction to Cyclo-converter fed induction motor drive.						
CO4	To study different types of synchronous motor drives used in mills.						

UNIT 1

Introduction: Definition, Part of the electric drive, Types of loads, steady state & transient stability of Drive, state of art of power electronics and drives, thermal model of motor for heating and cooling, classes of motor duty, determination of motor rating.

UNIT 2

D.C. Drives: Review of braking and speed control of D.C. motors, multi-quadrant operation, loss minimization in adjustable speed drives. Mathematical modelling of dc drives, stability analysis, modern control techniques: variable structure, adaptive control, Chopper-Controlled DC Drives.

UNIT 3

Induction motor drives: Review of braking and speed control of induction motors, constant V/F, constant air gap flux, controlled voltage, controlled current and controlled slip operation. Mathematical modelling of induction motor drives, transient response and stability analysis Introduction to Cyclo-converter fed induction motor drive. Pulse Width Modulation for Electric Power Converters

UNIT 4

Synchronous motor drives: Adjustable frequency operation, voltage fed drive, current fed self-controlled drive. Application of electric drives in steel mills, paper mills, textile mills and machine tools etc. A. C. motor drives in transportation system and traction.

Suggested Books:

1. Dubey G K, “Fundamentals of Electrical Drives”, Narosa Publishing House, New Delhi.

2. S K Pillai, “A First Course on Electrical Drives”, New Age International (P) Ltd., New Delhi.

3. Krishan R, “Electric Motor Drives: Modeling Analysis and Control”, PHI Pvt Ltd. New Delhi-2001.

4. Bose B K, “Power Electronics and Variable Frequency Drives: Technology and Applications”, IEEE Press, 1997.

5. Bose B K , “Modern Power Electronics and AC Drives”, Pearson Educational, Delhi,

MTEL-205A	Power System Restructuring & Deregulation						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time(Hrs)**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of the course is to impart the students with the knowledge of restructuring and deregulation.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	To impart knowledge about restructuring and its various issues related to it.						
CO2	To acquaint students with the deregulation and market models.						
CO3	To impart knowledge to students about transmission pricing.						
CO4	To let student understand in detail about congestion management and experiences of various nations.						

Unit-1

Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.

Power System Restructuring: An overview of the restructured power system, Difference between integrated power system and restructured power system, Explanation with suitable practical examples.

Unit-2

Deregulation of Power Sector: Separation of owner ship and operation, Deregulated models, pool model, pool and bilateral trades model, multilateral trade model.

Competitive electricity market: Independent System Operator activities in pool market, Wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

Unit-3

Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, Postage stamp method, Contract Path method, Boundary flow method, MW-mile method, MVA-mile method, Comparison of different methods.

Unit-4

Congestion Management: Congestion management in normal operation, explanation with suitable example, total transfer capability (TTC), Available transfer capability (ATC), Different Experiences in deregulation: England and Wales, Norway, China, California, New Zealand and Indian power system.

Suggested Books:

1.LoiLei Lai, "Power System Restructuring and Deregulation", John Wiley & Sons Ltd.

2.K Bhattacharya, M H T Bollen and J C Doolder, " Operation of Restructured Power Systems", Kluwer Academic Publishers.

3.Lorrin Philipson and H Lee Willis, "Understanding Electric Utilities and Deregulation", Marcel Dekker Inc, New York.

4.Yong-Hua Song, Xi-Fan Wang, "Operation of market-oriented power systems" ,Springer, Germany.

MTOE-201A	Business Analytics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program	The main objective of this course is to give the student a comprehensive understanding						

Objective (PO)	of business analytics methods.
Course Outcomes (CO)	
CO1	*Able to have knowledge of various business analysis techniques.*
CO2	*Learn the requirement specification and transforming the requirement into different models.*
CO3	*Learn the requirement representation and managing requirement assests.*
CO4	*Learn the Recent Trends in Embedded and collaborative business*

Unit 1

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst.

Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.

Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Unit 2

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.

Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit 3

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.

Managing Requirements Assets: Change Control, Requirements Tools

Unit 4

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

References:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

MTOE-203A	**Industrial Safety**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**

3	0	0	3	60	40	100	3 Hrs.
Program Objective (PO)	*To enable students to aware about the industrial safety.*						
Course Outcomes (CO)							
CO1	*Understand the industrial safety.*						
CO2	*Analyze fundamental of maintenance engineering.*						
CO3	*Understand the wear and corrosion and fault tracing.*						
CO4	*Understanding that when to do periodic inceptions and apply the preventing maintenance.*						

Unit-1

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment. **Unit-2**

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-3

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-4

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205A	Operations Research						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**

3	0	0	3	60	40	100	3 Hrs.
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.						
Course Outcomes (CO)							
CO1	*Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.*						
CO2	*Students should able to apply the concept of non-linear programming*						
CO3	*Students should able to carry out sensitivity analysis*						
CO4	*Student should able to model the real world problem and simulate it.*						

Unit -1

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit -2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit- 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit -4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207A	Cost Management of Engineering Projects

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 Hrs.
Program Objective (PO)	*To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the strategic cost management process.*						
CO2	*Students should able to types of project and project team types*						
CO3	*Students should able to carry out Cost Behavior and Profit Planning analysis.*						
CO4	*Student should able to learn the quantitative techniques for cost management.*						

Unit-1

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-2

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-3

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. **Unit-4**

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209A	Composite Materials						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the composite materials and their properties.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification and characteristics of Composite materials.*						
CO2	*Students should able reinforcements Composite materials.*						
CO3	*Students should able to carry out the preparation of compounds.*						
CO4	*Student should able to do the analysis of the composite materials.*						

UNIT–1:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

UNIT – 2

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–3

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – 4

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS: Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.

1. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

MTOE-211A	Waste to Energy						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the generation of energy from the waste.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification of waste as a fuel.*						
CO2	*Students should able to learn the Manufacture of charcoal.*						
CO3	*Students should able to carry out the designing of gasifiers and biomass stoves.*						
CO4	*Student should able to learn the Biogas plant technology.*						

Unit-1

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-2

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-3

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-4

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

MTAD-101A	English For Research Paper Writing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Student will able to understand the basic rules of research paper writing.*						
Course Outcomes (CO)							
CO1	*Understand that how to improve your writing skills and level of readability*						
CO2	*Learn about what to write in each section*						
CO3	*Understand the skills needed when writing a Title*						
CO4	*Ensure the good quality of paper at very first-time submission*						

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit 4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

References:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

MTAD-103A	Disaster Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Develop an understanding of disaster risk reduction and management*						
Course Outcomes (CO)							
CO1	*Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*						
CO2	*Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*						
CO3	*Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*						
CO4	*critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in*						

Unit 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

References:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep &Deep Publication Pvt. Ltd., New Delhi.

MTAD-105A	Sanskrit for Technical Knowledge						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*						
Course Outcomes (CO)							
CO1	*To get a working knowledge in illustrious Sanskrit, the scientific language in the world*						
CO2	*Learning of Sanskrit to improve brain functioning*						
CO3	*Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*						
CO4	*The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*						

Unit –1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Unit – 2

Order, Introduction of roots,Technical information about Sanskrit Literature

Unit –3

Technical concepts of Engineering: Electrical, Mechanical

Unit –4

Technical concepts of Engineering: Architecture, Mathematics

References

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

MTAD-107A	Value Education						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*						

Course Outcomes (CO)	
CO1	*Knowledge of self-development*
CO2	*Learn the importance of Human values*
CO3	*Developing the overall personality*
CO4	*Know about the importance of character*

Unit 1

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

Unit 2

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature,Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

References

1.Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

MTAD-102A	**Constitution of India**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian*						

	intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
Course Outcomes (CO)	
CO1	*Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*
CO2	*Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*
CO3	*Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*
CO4	*Discuss the passage of the Hindu Code Bill of 1956.*

Unit I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

References

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MTAD-104A	**Pedagogy Studies**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**

2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*.						
Course Outcomes (CO)							
CO1	*What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*						
CO2	*What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*						
CO3	*How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*						
CO4	*What is the importance of identifying research gaps?*						

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Unit 2

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 3

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

Unit 4

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

References

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

MTAD-106A	**Stress Management by Yoga**

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress						
Course Outcomes (CO)							
CO1	*Develop healthy mind in a healthy body thus improving social health.*						
CO2	*Improve efficiency*						
CO3	*Learn the Yog asan*						
CO4	*Learn the pranayama*						

Unit – 1

Definitions of Eight parts of yog (Ashtanga).

Unit- 2

Yam and Niyam, Do`s and Don't's in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit- 3

Asan and Pranayam, Various yog poses and their benefits for mind & body,

Unit- 4

Regularization of breathing techniques and its effects-Types of pranayam.

References

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-108A	Personality Development through Life Enlightenment Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students						
Course Outcomes (CO)							
CO1	*Students become aware about leadership.*						
CO2	*Students will learn how to perform his/her duties in day to day work.*						
CO3	*Understand the team building and conflict*						
CO4	*Student will learn how to become role model for the society.*						

Unit – 1

Neetisatakam-Holistic development of personality: Verses: 19, 20, 21, 22 (wisdom); Verses: 29, 31, 32 (pride & heroism); Verses: 26, 28, 63, 65 (virtue); Verses: 52, 53, 59 (don's); Verses: 71, 73, 75, 78 (do's).

Unit – 2

Approach to day to day work and duties; Shrimad Bhagwad Geeta: Chapter-2: Verses: 41, 47, 48; Chapter-3: Verses: 13, 21, 27, 35; Chapter-6: Verses: 5, 13, 17, 23, 35; Chapter-18: Verses: 45, 46, 48.

Unit - 3

Statements of basic knowledge; Shrimad Bhagwad Geeta: Chapter-2: Verses: 56, 62, 68; Chapter-12: Verses: 13, 14, 15, 16, 17, 18.

Unit – 4

Personality of Role model; Shrimad Bhagwad Geeta: Chapter-2: Verses: 17; Chapter-3: Verses: 36, 37, 42: Chapter-4: Verses: 18, 38, 39; Chapter-18: Verses: 37, 38, 63.

References:

1. Srimad Bhagavad Gita, Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya), P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Dissertation Phase – I and Dissertation Phase - II

Teaching Scheme

Lab work : 20 and 32 hrs/week for Dissertation Phase- I (MTPE-207A)and Phase- II (MTPE-202A) respectively

Course Outcomes:

At the end of this course, students will be able to

a. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
b. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
c. Ability to present the findings of their technical solution in a written report. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

1. Relevance to social needs of society
   - Relevance to value addition to existing facilities in the
   - Relevance to industry need
2. Problems of national importance
3. Research and development in various domain
4. The student should complete the following:
   - Literature survey Problem Definition Motivation for study and Objectives
   - Preliminary design / feasibility / modular approaches
   - Implementation and Verification

Report and presentation

The dissertation phase- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

Design, fabrication, testing of Communication System.

The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – I and Phase-II

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referredliterature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

KURUKSHETRA UNIVERSITY, KURUKSHETRA

('A+' Grade, NAAC Accredited)

SCHEME OF EXAMINATIONS FOR MASTER OF TECHNOLOGY IN ELECTRONICS & COMMUNICATION ENGINEERING

(W. E. F. SESSION: 2018-19)

SEMESTER- I

S. No.	Course Code	SUBJECT	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	MTEC-101A	RF and Microwave Circuit Design	3	-	-	3	40	60	3	3
2	MTEC-103A	Wireless & Mobile Communications	3	-	-	3	40	60	3	3
3	*	Program Elective –I	3	-	-	3	40	60	3	3
4	**	Program Elective-II	3	-	-	3	40	60	3	3
5	MTEC-117A	RF and Microwave Circuit Design(Lab.)	-	-	4	4	40	60	2	3
6	MTEC-119A	Wireless & Mobile Communications (Lab.)	-	-	4	4	40	60	2	3
7	MTRM-111A	Research Methodology and IPR	2	-	-	2	40	60	2	3
8	***	Audit Course-I	2	-	-	2	100	-	0	3
	TOTAL		**16**	**0**	**8**	**24**	**280**	**420**	**18**	
							700			

*Program Elective - I		**Program Elective- II	
MTEC-105A	Advanced Communication Networks	MTEC-111A	Cognitive Radio
MTEC-107A	Pattern Recognition and Machine Learning	MTEC-113A	Wireless Sensor Networks
MTEC-109A	Statistical Information Processing	MTEC-115A	High Performance Networks

***Audit Course-I	
MTAD-101A	English for Research Paper Writing
MTAD-103A	Disaster Management
MTAD-105A	Sanskrit for Technical Knowledge
MTAD-107A	Value Education

Note1: The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

*** **Note2:** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

SEMESTER-II

S. No.	Course code	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	MTEC-102A	Antennas and Radiating Systems	3	-	-	3	40	60	3	3
2	MTEC-104A	Advanced Digital Signal Processing	3	-	-	3	40	60	3	3
3	*	Program Elective-III	3	-	-	3	40	60	3	3
4	**	Program Elective-IV	3	-	-	3	40	60	3	3
5	MTEC-118A	Antennas and Radiating Systems Lab		-	4	4	40	60	2	3
6	MTEC-120A	Advanced Digital Signal Processing Lab	-	-	4	4	40	60	2	3
7	# MTEC-122A	Mini Project	-	-	4	4	100		2	3
8	***	Audit Course-II	2			2	100		0	3
		TOTAL	**14**		**12**	**26**	**340**	**360**	**18**	
							700			

***Program Elective - III**		****Program Elective - IV**	
MTEC-106A	Satellite Communication	MTEC-112A	Optimization Techniques
MTEC-108A	Internet of Things	MTEC-114A	MIMO System
MTEC-110A	Voice and Data networks	MTEC-116A	Programmable Networks – SDN, NFV

*****Audit Course - II**	
MTAD-102A	Constitution of India
MTAD-104A	Pedagogy Studies
MTAD-106A	Stress Management by Yoga
MTAD-108A	Personality Development through Life Enlightenment Skills.

Note1: The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

*****Note2:**Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

#Note3: Mini project: During this course the student will be able to understand the contemporary/emerging technologies for various processes and systems. During the semester, the students are required to search/gather the material/information on a specific topic, comprehend it and present/discuss the same in the class. He/she will be acquainted to share knowledge effectively in oral (seminar) and written form (formulate documents) in the form of report. The student will be evaluated on the basis of viva/ seminar (40 marks) and report (60 marks).

SEMESTER-III

S. No.	Course Code	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	*	Program Elective-V	3	-	-	3	40	60	3	3
2	**	Open Elective	3	-	-	3	40	60	3	3
3	MTEC-207A	Dissertation Phase-I	-	-	20	20	100	-	10	3
		TOTAL	**6**		**20**	**26**	**180**	**120**	**16**	
							300			

***Program Elective - V**	
MTEC-201A	Adaptive Filter Theory
MTEC-203A	Optical Networks
MTEC-205A	Remote Sensing

****Open Elective**		
1.	MTOE-201A	Business Analytics
2.	MTOE-203A	Industrial Safety
3.	MTOE-205A	Operations Research
4.	MTOE-207A	Cost Management of Engineering Projects
5.	MTOE-209A	Composite Materials
6.	MTOE-211A	Waste to Energy

SEMESTER-IV

S. No.	Course Code		L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	MTEC-202A	Dissertation Phase-II	-	-	32	32	100	200	16	3
	TOTAL						**300**		**16**	

Total credits of all four semesters – 68

Note 1: At the end of the second semester each student is required to do his/her Dissertation work in the identified area in consent of the Guide/Supervisor. Synopsis for the Dissertation Part-I is to be submitted within three weeks of the beginning of the Third Semester.

Note 2: Each admitted student is required to submit the report of his/her Dissertation Part-I as per the schedule mentioned in Academic calendar for the corresponding academic session otherwise the Dissertation Part-II cannot be continued at any level.

Note 3: The course of program/open elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

MTEC-101A	RF and Microwave Circuit Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand the behavior of RF passive components and model active components. Perform transmission line analysis and demonstrate use of Smith Chart for high frequency circuit design.*						
CO2	*Able to analyze the microwave resonators, filters, couplers etc.*						
CO3	*Analyze the microwave solid state devices such as diodes and Transistors.*						
CO4	*Able to design and analyze the microwave amplifiers.*						

Unit 1

Transmission Line Theory: Lumped element circuit model for transmission line, fieldanalysis, Smith chart, quarter wave transformer, generator and load mismatch, impedancematching and tuning.Microwave Network Analysis: Impedance and equivalent voltage and current, Impedanceand admittance matrix, The scattering matrix, transmission matrix, Signal flow graph.

Unit 2

Microwave Components: Microwave resonators, Microwave filters, power dividers anddirectional couplers, Ferromagnetic devices and components.Nonlinearity and Time Variance, Inter-symbol interference, random process &noise,definition of sensitivity and dynamic range, conversion gain and distortion.

Unit 3

Microwave Semiconductor Devices and Modeling: PIN diode, Tunnel diodes, Varactordiode, Schottky diode, IMPATT and TRAPATT devices, transferred electron devices, Microwave BJTs, GaAs FETs, low noise and power GaAs FETs, MESFET, MOSFET, HEMT.

Unit 4

Amplifiers Design: Power gain equations, stability, impedance matching, constant gain andnoise figure circles, small signal, low noise, high power and broadband amplifier, oscillators, Mixers design.

References:

1) Matthew M. Radmanesh, "Advanced RF & Microwave Circuit Design: The Ultimate Guide to Superior Design", Author House, 2009.
2) D.M.Pozar, " Microwave Engineering" ,Wiley, 4th edition, 2011.
3) R.Ludwig and P.Bretchko, "R. F. Circuit Design", Pearson Education Inc, 2009.
4) G.D. Vendelin, A.M. Pavoi, U. L. Rohde, "Microwave Circuit Design Using Linear And Non Linear Techniques", John Wiley 1990.
5) S.Y. Liao, "Microwave circuit Analysis and Amplifier Design", Prentice Hall 1987. Radmanesh, "RF and Microwave Electronics Illustrated" , Pearson Education, 2004.

MTEC-103A	Wireless & Mobile Communication						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques*						
CO2	*Distinguish various multiple-access techniques for mobile communications e.g. FDMA, TDMA, CDMA, and their advantages and disadvantages.*						
CO3	*Analyze path loss and interference for wireless telephony and their influences on a mobile-communication system's performance.*						
CO4	*Analyze and design CDMA system functioning with knowledge of forward and reverse channel details, advantages and disadvantages of using the technology, understanding upcoming technologies like 3G, 4G etc.*						

Unit 1

Cellular Communication Fundamentals:Cellular system design, Frequency reuse, cellsplitting, handover concepts, Co channel and adjacent channel interference, interference reductiontechniques and methods to improve cell coverage, Frequency management and channel assignment.GSM architecture and interfaces, GSM architecture details, GSM subsystems, GSM Logical Channels, Data Encryption in GSM, Mobility Management, Call Flows in GSM.2.5 G Standards: High speed Circuit Switched Data (HSCSD), General Packet Radio Service (GPRS), 2.75 G Standards: EDGE,

Unit 2

Spectral efficiency analysis based on calculations for Multiple access technologies:TDMA,FDMA and CDMA,Comparison of these technologies based on their signal separation techniques, advantages, disadvantages and application areas.Wireless network planning (Link budget and power spectrum calculations)

Unit 3

Mobile Radio Propagation:Large Scale Path Loss, Free Space Propagation Model,Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings. Small Scale Fading and Multipath Propagation, Impulse Response Model, Multipath Measurements, Parameters of Multipath channels, Types of Small Scale Fading: Time Delay Spread; Flat, Frequency selective, Doppler Spread; Fast and Slow fading.Equalization, Diversity:Equalizers in a communications receiver, Algorithms for adaptiveequalization, diversity techniques, space, polarization, frequency diversity, Interleaving.

Unit 4

Code Division Multiple Access:Introduction to CDMA technology, IS 95 systemArchitecture, Air Interface, Physical and logical channels of IS 95, Forward Link and Reverse link operation, Physical and Logical channels of IS 95 CDMA, IS 95 CDMA Call Processing, soft Handoff, Evolution of IS 95 (CDMA One) to CDMA 2000, CDMA 2000 layering structure and channels.Higher Generation Cellular Standards:3G Standards: evolved EDGE, enhancements in 4Gstandard, Architecture and representative protocols, call flow for LTE, VoLTE, UMTS, introduction to 5G

References:

1. V.K.Garg, J.E.Wilkes, "Principle and Application of GSM", Pearson Education, 5th edition, 2008.
2. V.K.Garg, "IS-95 CDMA & CDMA 2000", Pearson Education, 4th edition, 2009.
3. T.S.Rappaport, "Wireless Communications Principles and Practice", 2nd edition, PHI,2002.
4. William C.Y.Lee, "Mobile Cellular Telecommunications Analog and Digital Systems", 2nd edition, TMH, 1995.
5. AshaMehrotra, "A GSM system Engineering" Artech House Publishers Bosten, London,1997.

MTEC-105A	Advanced Communication Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand advanced concepts in Communication Networking.*						
CO2	*Design and develop protocols for Communication Networks.*						
CO3	*Optimize the Network Design.*						
CO4	*Understand the different versions of Internet Protocol*						

Unit 1

Overview of Internet-Concepts, challenges and history.Overview of -ATM. TCP/IPCongestion and Flow Control in Internet-Throughput analysis of TCP congestion control. TCP for high bandwidth delay networks. Fairness issues in TCP.Real Time Communications over Internet. Adaptive applications.Latency and throughputissues.Integrated Services Model (intServ).Resource reservation in Internet.RSVP.Characterization of Traffic by Linearly Bounded Arrival Processes (LBAP).Leaky bucket algorithm and its properties.

Unit 2

Packet Scheduling Algorithms-requirements and choices. Scheduling guaranteed serviceconnections. GPS, WFQ and Rate proportional algorithms.High speed scheduler design.Theoryof Latency Rate servers and delay bounds in packet switched networks for LBAP traffic;Active Queue Management - RED, WRED and Virtual clock. Control theoretic analysis of activequeue management.

Unit 3

IP address lookup-challenges. Packet classification algorithms and Flow Identification-Grid of Tries, Cross producting and controlled prefix expansion algorithms.Admission control in Internet.Concept of Effective bandwidth.Measurement basedadmission control.Differentiated Services in Internet (Diff Serv).Diff Serv architecture and framework.

Unit 4

IPV4, IPV6, IP tunnelling, IP switching and MPLS, Overview of IP over ATM and itsevolution to IP switching.MPLS architecture and framework.MPLS Protocols. Traffic engineering issues in MPLS.

References:

1. Jean Wairand and PravinVaraiya, “High Performance Communications Networks”, 2nd edition, 2000.
2. Jean Le Boudec and Patrick Thiran, “Network Calculus A Theory of Deterministic Queueing Systems for the Internet”, Springer Veriag, 2001.
3. Zhang Wang, “Internet QoS”, Morgan Kaufman, 2001.
4. Anurag Kumar, D. Manjunath and Joy Kuri, “Communication Networking: An Analytical Approach” , Morgan Kaufman Publishers, 2004.
5. George Kesidis, “ATM Network Performance”, Kluwer Academic, Research Papers, 2005.

MTEC-107A	Pattern Recognition and Machine Learning						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Study the parametric and linear models for classification Design neural network and SVM for classification.						
CO2	Develop machine independent and unsupervised learning techniques.						
CO3	Understand programming algorithms						
CO4	Understand machine learning and clustering						

Unit 1

Introduction to Pattern Recognition: Problems, applications, design cycle, learning andadaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bayes rule, discriminant functions, loss functions and Bayesian error analysis**Linear models:** Linear Models for Regression, linear regression, logistic regression LinearModels for Classification

Unit 2

Neural Network: perceptron, multi-layer perceptron, backpropagation algorithm, error surfaces,practical techniques for improving backpropagation, additional networks and training methods, Adaboost, Deep Learning

Unit 3

Linear discriminant functions - decision surfaces, two-category, multi-category, minimum-squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit 4

Algorithm independent machine learning – lack of inherent superiority of any classifier, biasand variance, re-sampling for classifier design, combining classifiers
Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering,hierar
chical clustering

References:

1) Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John Wiley & Sons, 2001.
2) Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

MTEC-109A	Statistical Information Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Characterize and apply probabilistic techniques in modern decision systems, such as information systems, receivers, filtering and statistical operations.						
CO2	Demonstrate mathematical modelling and problem solving using such models.						
CO3	Comparatively evolve key results developed in this course for applications to signal processing, communications systems.						
CO4	Develop frameworks based in probabilistic and stochastic themes for modelling and analysis of various systems involving functionalities in decision making, statistical inference, estimation and detection.						

Unit 1

Review of random variables: Probability Concepts, distribution and density functions,moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Vector quantization, Tchebaychef inequality theorem, Central Limit theorem, Discrete &Continuous Random Variables.
Random process: Expectations, Moments,Ergodicity, Discrete-Time Random Processes Stationary process, autocorrelation and auto covariance functions, Spectral representation of random signals, Properties of power spectral density, Gaussian Process and White noise process.

Unit 2

Random signal modelling: MA(q), AR(p), ARMA(p,q) models, Hidden Markov Model &its applications ,Linear System with random input , Forward and Backward Predictions, Levinson Durbin Algorithm.Statistical Decision Theory: Bayes' Criterion, Binary Hypothesis Testing, M-aryHypothesis Testing, Minimax Criterion, Neyman-Pearson Criterion, Composite Hypothesis Testing.Parameter Estimation Theory: Maximum Likelihood Estimation, Generalized Likelihood Ratio Test ,Some Criteria for Good Estimators, Bayes' Estimation Minimum Mean-Square Error Estimate, Minimum, Mean Absolute Value of Error Estimate Maximum A Posteriori Estimate , Multiple Parameter Estimation Best Linear Unbiased Estimator ,Least-Square Estimation Recursive Least-Square Estimator.

Unit 3

Spectral analysis: Estimated autocorrelation function, Periodogram, Averaging theperiodogram (Bartlett Method), Welch modification, Parametric method, AR(p) spectral estimation and detection of Harmonic signals.
Information Theory and Source Coding: Introduction, Uncertainty, Information andEntropy, Source coding theorem, Huffman, ShanonFano , Arithmetic , Adaptive coding , RLE , LZW Data compaction, , LZ-77, LZ-78. Discrete Memory less channels, Mutual information, channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles.

Unit 4

Application of Information Theory: Group, Ring & Field, Vector, GF addition,multiplication rules. Introduction to BCH codes, Primitive elements ,Minimal polynomials, Generator polynomials in terms of Minimal polynomials, Some examples of BCH codes,& Decoder, Reed- Solomon codes & Decoder, Implementation of Reed Solomon encoders and decoders.

References:

1) Papoulis and S.U. Pillai, "Probability, Random Variables and Stochastic Processes",4th Edition, McGraw-Hill, 2002.
2) D.G. Manolakis, V.K. Ingle and S.M. Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000.
3) MouradBarkat , "Signal Detection and Estimation", Artech House, 2nd Edition, 2005.
4) R G. Gallager, "Information theory and reliable communication", Wiley, 1st edition, 1968. . J. MacWilliams and N. J. A. Sloane, "The Theory of Error-Correcting Codes", New
5) York, North-Holland, 1977.
6) Rosen K.H, "Elementary Number Theory", Addison-Wesley, 6th edition, 2010.

MTEC-111A	Cognitive Radio						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand the fundamental concepts of cognitive radio networks.*						
CO2	*Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.*						
CO3	*Understand technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models/policies.*						
CO4	*Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading, as well as a number of optimisation techniques for better spectrum exploitation.*						

Unit 1

Introduction to Cognitive Radios: Digital dividend, cognitive radio (CR) architecture,functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.

Unit 2

Spectrum Sensing: Spectrum sensing, detection of spectrum holes (TVWS), collaborativesensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).Optimization Techniques of Dynamic Spectrum Allocation: Linear programming, convexprogramming, non-linear programming, integer programming, dynamic programming, stochastic programming.

Unit 3

Dynamic Spectrum Access and Management: Spectrum broker, cognitive radioarchitectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.

Unit 4

Spectrum Trading: Introduction to spectrum trading, classification to spectrum trading,radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), classification of auctions (single auctions, double auctions, concurrent, sequential).Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross-layer design for cognitive radio networks.

References:

1) EkramHossain, DusitNiyato, Zhu Han, "Dynamic Spectrum Access and Management in Cognitive Radio Networks", Cambridge University Press, 2009.
2) Kwang-Cheng Chen, Ramjee Prasad, "Cognitive radio networks", John Wiley & Sons Ltd., 2009.
3) Bruce Fette, "Cognitive radio technology", Elsevier, 2nd edition, 2009.
4) HuseyinArslan, "Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems", Springer, 2007.
5) Francisco Rodrigo Porto Cavalcanti, SorenAndersson, "Optimizing Wireless Communication Systems" Springer, 2009.
6) Linda Doyle, "Essentials of Cognitive Radio", Cambridge University Press, 2009.

MTEC-113A	Wireless Sensor Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Design wireless sensor network system for different applications under consideration.*						
CO2	*Understand the hardware details of different types of sensors and select right type of sensor for various applications.*						
CO3	*Understand radio standards and communication protocols to be used for wireless sensor network based systems and application.*						
CO4	*Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms and able to handle special issues related to sensors like energy conservation and security challenges.*						

Unit 1

Introduction and overview of sensor network architecture and its applications, sensornetwork comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun

SPOT, Software (Operating Systems): tinyOS, MANTIS, Contiki, and RetOS.

Unit 2

Programming tools: C, nesC. Performance comparison of wireless sensor networkssimulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)

Unit 3

Overview of sensor network protocols (details of atleast 2 important protocol per layer):Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

Unit 4

Data dissemination and processing; differences compared with other database managementsystems, data storage; query processing.Specialized features: Energy preservation and efficiency; security challenges; fault-tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

References:

1) H. Karl and A. Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, India, 2012.
2) C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, "Wireless Sensor Networks", Springer Verlag, 1st Indian reprint, 2010.
3) F. Zhao and L. Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufmann, 1st Indian reprint, 2013.
4) YingshuLi, MyT. Thai, Weili Wu, "Wireless sensor Network and Applications", Springer series on signals and communication technology, 2008.

MTEC-115A	High Performance Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.*						
CO2	*Design, implement, and analyze computer networks.*						
CO3	*Identify, formulate, and solve network engineering problems.*						
CO4	*Show knowledge of contemporary issues in high performance computer networks. Use techniques, skills, and modern networking tools necessary for engineering practice*						

Unit 1

Types of Networks, Network design issues, Data in support of network design. Networkdesign tools, protocols and architecture. Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, Beyond best effort, scheduling and policing mechanism, integrated services, and RSVP-differentiated services.

Unit 2

VoIP system architecture, protocol hierarchy, Structure of a voice endpoint, Protocols forthe transport of voice media over IP networks.Providing IP quality of service for voice, signaling protocols for VoIP, PSTN gateways, VoIP applications.VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS-operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

Unit 3

Traffic Modeling: Little's theorem, Need for modeling, Poisson modeling, Non-poissonmodels, Network performance evaluation.Network Security and Management: Principles of cryptography, Authentication, integrity,key distribution and certification, Access control and fire walls, attacks and counter measures, security in many layers.

Unit 4

Infrastructure for network management, The internet standard management framework –SMI, MIB, SNMP, Security and administration, ASN.1.

References:

1) Kershenbaum A., "Telecommunications Network Design Algorithms", Tata McGraw Hill, 1993.
2) Larry Peterson & Bruce David, "Computer Networks: A System Approach", Morgan Kaufmann, 2003.
3) Douskalis B., "IP Telephony: The Integration of Robust VoIP Services", Pearson Ed. Asia, 2000.
4) Warland J., Varaiya P., "High-Performance Communication Networks", Morgan Kaufmann, 1996.
5) Stallings W., "High-Speed Networks: TCP/IP and ATM Design Principles", Prentice Hall, 1998.
6) Leon Garcia, Widjaja, "Communication networks", TMH 7threprint 2002.
7) William Stalling, "Network security, essentials", Pearson education Asia publication, 4th Edition, 2011.

MTEC-117A	RF and Microwave Circuit Design (Lab.)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Learn to use HFSS (High Frequency Structural Simulator) to simulate, verify, and optimize their design.						
CO2	Learn to fabricate RF and Microwave circuits and then measure, and evaluate their prototype of Network Analyzer.						

List of Experiments:

1. To learn through demonstration the Radio-Frequency Characteristics of Components.
2. To Design, Characterize, fabricate and test the Microstrip Line.
3. To Design, Characterize,fabricate and test Wilkinson Power Divider.
4. To Design, Characterize, fabricate and test Hybrid Network.
5. To Design, Characterize, fabricate and test Phase Shifter.
6. To Design, Characterize, fabricate and test Microwave Filters.
7. To Design and Characterize Coaxial Cavity Resonator.
8. To study Impedance Matching and Tuning Techniques for microwave circuits.
9. To design and characterize Directional Coupler.
10. To study Characteristics of Gunn Diode.

MTEC-119A	Wireless & Mobile Communications(Lab.)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Understanding Cellular concepts, GSM and CDMA networks						
CO2	To study GSM handset by experimentation and fault insertion techniques						
CO3	Understating of 3G communication system by means of various AT commands usage inGSM						
CO4	Understanding CDMA concept using DSSS kit						

List of Experiments:

1. Introduction to LabVIEW/MATLAB/SciLab with its basic functions and study of modulation toolkit.
2. Learn how to Perform Basic Arithmetic and Boolean operations, Maximum and Minimum of an Array, Flat and Stacked sequence, Bundle and Unbundle cluster.
3. Design and verify the MSK modulator.
4. Design and verify the MSK demodulator
5. Design and verify the FSK modulator.
6. Design and verify the FSK demodulator.
7. Design and verify the BPSK modulator.
8. Design and verify the BPSK demodulator.
9. Design and verify the QPSK modulator.
10. Design and verify the QPSK demodulator
11. Design and verify the QAM modulator.
12. Design and verify the QAM demodulator.

MTRM-111A	Research Methodology and IPR						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*						
Course Outcomes (CO)							
CO1	Understand research problem formulation.						
CO2	Analyze research related information						
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.						
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.						

Unit 1

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology.Patent information and databases.Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc.Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'.
2. C.R. Kothari, "Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 ndEdition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

MTEC-102A	Antennas and Radiating Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Compute the far field distance, radiation pattern and gain of an antenna for given current distribution and study antenna parameters.*						
CO2	*Design and analyze linear wire and linear array antennas.*						
CO3	*Design antennas and antenna arrays for various desired radiation pattern characteristics.*						
CO4	*Able to design and analyze different types of Microstrip antenna.*						

Unit 1

Types of Antennas: Wire antennas, Aperture antennas, Micro strip antennas, Arrayantennas Reflector antennas, Lens antennas, Radiation Mechanism, Current distribution on thin wire antenna.

Fundamental Parameters of Antennas: Radiation Pattern, Radiation Power Density, Radiation Intensity, Directivity, Gain, Antenna efficiency, Beam efficiency, Bandwidth, Polarization, Input Impedance, radiation efficiency, Antenna Vector effective length, Friis Transmission equation, Antenna Temperature.

Unit 2

Linear Wire Antennas: Infinitesimal dipole, Small dipole, Region separation, Finite lengthdipole, half wave dipole, Ground effects.Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with non-uniform current.LinearArrays: Two element array, N Element array: Uniform Amplitude and spacing,Broadside and End fire array, Super directivity, Planar array, Design consideration.

Unit 3

Aperture Antennas: Huygen's Field Equivalence principle, radiation equations,Rectangular Aperture, Circular Aperture.Horn Antennas: E-Plane, H-plane Sectoral horns, Pyramidal and Conical horns.Reflector Antennas: Plane reflector, parabolic reflector, Cassegrain reflectors, Introductionto MIMO.

Unit 4

Micro strip Antennas: Basic Characteristics, Feeding mechanisms, Method of analysis,Rectangular Patch, Circular Patch.

References:

1) Constantine A. Balanis, "Antenna Theory Analysis and Design", John Wiley & Sons, 4th edition, 2016.
2) John D Kraus, Ronald J Marhefka, Ahmad S Khan, "Antennas for All Applications", Tata McGraw-Hill, 2002.
3) R.C.Johnson and H.Jasik, "Antenna Engineering hand book", Mc-Graw Hill, 1984.
   I.J.Bhal and P.Bhartia, "Micro-strip antennas", Artech house, 1980.

MTEC-104A	Advanced Digital Signal Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	To understand theory of different filters and algorithms						
CO2	To understand theory of multirate DSP, solve numerical problems and write algorithms						
CO3	To understand theory of prediction and solution of normal equations						
CO4	To know applications of DSP at block level.						

Unit-1

Review of Filter concepts- Review of design techniques and structures for FIR and IIR filters, representation of numbers, quantization of filter coefficients, round-off effects in digital filters.

Unit-2

Multirate Digital Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, sampling rate conversion by rational factor I/D, implementation of sampling rate conversion, multistage implementation of sampling rate conversion, sampling rate conversion of band pass signals, sampling rate conversion by an arbitrary factor, application of Multirate signal processing, digital filter bank, two-channel quadrature-mirror filter bank, M-channel QMF bank.

Unit-3

Wavelet Transform: Introduction to wavelet transform- Short Time Fourier Transform (STFT), Wavelet transform, Haar wavelet and Multirate resolution analysis, Daubechies wavelet, some other standard wavelets, applications of wavelet transform.

Unit-4

Power Spectrum Estimation: Estimation of spectra from finite-duration observation of signals, non-parametric methods for power spectrum estimation, parametric methods for power spectrum estimation, filter bank methods, Eigen analysis algorithms for spectrum estimation.

Text Books:

1. Digital Signal Processing : Principles, Algorithms, and Applications, 4/e, Authors : John G. ProakisDimitris G Manolakis Imprint : Pearson Education
2. Digital Signal Processing, Authors, Oppenheim, Alan V, Schafer, Ronald W., PHI

Reference Books:

1. Advanced Digital Signal Processing, Authors: Dr. Shaila D. Apte, Imprint: Wiley
2. Digital Signal Processing, 3/e, Authors: S.K.Mitra, Imprint : McGraw Hill
3. Digital Signal Processing and Applications with the TMS 320C6713 and TMS 320C6416 DSK, 2/e,Authors: RulphChassaing,DonaldReay, Imprint : Wiley
4. Digital Signal Processing, Authors: Tarun Kumar Rawat, Imprint: Oxford
5. Digital Signal Processing, Spectral Computation and Filter Design, Authors:CHI-Tsong Chen, Indian Edition, Imprint: Oxford
6. Theory and Applications of Digital Signal Processing,Authors: Lawrence R. Rabiner, Bernard Gold,Imprint:Prentice- Hall
7. Digital Signal Processing, Authors:Thomas J. Cavicchi, Imprint: Wiley
8. Modern Digital Signal Processing,Authors:V.Udayshankar,Imprint:PHI
9. Digital Signal Processing using MAT and Wavelets,2/e,Authors:MichaelWeeks,Imprint: Jones & Bartlett Publishers.

MTEC-106A	Satellite Communication						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Visualize the architecture of satellite systems as a means of high speed, high range communication system.						
CO2	State various aspects related to satellite systems such as orbital equations,						
CO3	Understand sub-systems in a satellite, link budget, modulation and multiple access schemes.						
CO4	Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.						

Unit 1

Architecture of Satellite Communication System: Principles and architecture of satelliteCommunication, Brief history of Satellite systems, advantages, disadvantages, applications, and frequency bands used for satellite communication and their advantages/drawbacks.

Unit 2

Orbital Analysis: Orbital equations, Kepler's laws of planetary motion, Apogee andPerigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc of a satellite, concepts of Solar day and Sidereal day.

Unit 3

Satellite sub-systems: Architecture and Roles of various sub-systems of a satellite systemsuch as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems, antenna sub-system.Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects,remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift.

Unit 4

Satellite link budget: Flux density and received signal power equations, Calculation ofSystem noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions, Case study of Personal Communication system (satellite telephony) using LEO.Modulation and Multiple Access Schemes used in satellite communication.Typicalcasestudies of VSAT, DBS-TV satellites and few recent communication satellites launched by NASA/ ISRO. GPS.

References:

1. S. K. Raman, "Fundamentals of Satellite Communication", PearsonEducation India, 2011. Tri T. Ha, "Digital Satellite Communications", Tata McGraw Hill, 2009.
2. Dennis Roddy, "Satellite Communication", McGraw Hill, 4th Edition, 2008.

MTEC-108A	Internet of Things						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand what IoT technologies are used for today, and what is required in certain scenarios.*						
CO2	*Understand the types of technologies that are available and in use today and can be utilized to implement IoT solutions.*						
CO3	*Apply these technologies to tackle scenarios in teams of using an experimental platform for implementing prototypes and testing them as running applications.*						
CO4	*Understand operating system requirements of IOT.*						

Unit 1

Smart cities and IoT revolution, Fractal cities, From IT to IoT, M2M and peer networkingconcepts, Ipv4 and IPV6.Software Defined Networks SDN, From Cloud to Fog and MIST networking for IoTcommunications, Principles of Edge/P2P networking, Protocols to support IoT communications, modular design and abstraction, security and privacy in fog.

Unit 2

Wireless sensor networks: introduction, IOT networks (PAN, LAN and WAN), Edgeresource pooling and caching, client side control and configuration.

Unit 3

Smart objects as building blocks for IoT, Open source hardware and Embedded systemsplatforms for IoT, Edge/gateway, IO drivers, C Programming, multithreading concepts.

Unit 4

Operating systems requirement of IoT environment, study of mbed, RIoT, andContikioperating systems, Introductory concepts of big data for IoTapplications.Applications of IoT, Connected cars IoT Transportation, Smart Grid and Healthcare sectorsusingIoT, Security and legal considerations, IT Act 2000 and scope for IoT legislation.

References:

1) A Bahaga, V. Madisetti, “Internet of Things- Hands on approach”, VPT publisher, 2014. A. McEwen, H. Cassimally, “Designing the Internet of Things”, Wiley, 2013.
2) CunoPfister, “Getting started with Internet of Things”, Maker Media, 1st edition, 2011. Samuel Greenguard, “Internet of things”, MIT Press, 2015.

Web resources:

1) http://www.datamation.com/open-source/35-open-source-tools-for-the-internet-of-things-1.html
2) https://developer.mbed.org/handbook/AnalogIn
3) http://www.libelium.com/50_sensor_applications
4) M2MLabs Mainspring http://www.m2mlabs.com/framework Node-RED http://nodered.org/

MTEC-110A	Voice and Data Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Protocol, algorithms, trade-offs rationale.*						
CO2	*Routing, transport, DNS resolutions*						
CO3	*Understand different Queuing models of Networks*						
CO4	*Network extensions and next generation architectures.*						

Unit 1

Network Design Issues, Network Performance Issues, Network Terminology, centralizedand distributed approaches for networks design, Issues in design of voice and data networks.Layered and Layer less Communication, Cross layer design of Networks, Voice Networks(wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

Unit 2

Data Networks and their Design, Link layer design- Link adaptation, Link LayerProtocols, Retransmission.Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

Unit 3

Queuing Models of Networks, Traffic Models , Little's Theorem, Markov chains, M/M/1and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks.

Unit 4

Inter-networking, Bridging, Global Internet, IP protocol and addressing, Sub netting ,Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control , Additive Increase/Multiplicative Decrease , Slow Start, Fast Retransmit/ Fast Recovery,Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in PacketNetworks. Network Calculus, Packet Scheduling Algorithms.

References:

1) D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
2) L. Peterson and B. S. Davie, "Computer Networks: A Systems Approach",5th Edition, Morgan Kaufman, 2011.
3) Kumar, D. Manjunath and J. Kuri, "Communication Networking: An analytical approach", 1st Edition, Morgan Kaufman, 2004.
4) Walrand, "Communications Network: A First Course", 2nd Edition, McGraw Hill, 2002.
5) Leonard Kleinrock, "Queueing Systems, Volume I: Theory", 1st Edition, John Wiley and Sons, 1975.
6) Aaron Kershenbaum, "Telecommunication Network Design Algorithms", McGraw Hill, 1993.
7) Vijay Ahuja, "Design and Analysis of Computer Communication Networks", McGraw Hill, 1987

MTEC-112A	Optimization Techniques						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand importance of optimization*						
CO2	*Apply basic concepts of mathematics to formulate an optimization problem*						
CO3	*Analyze and appreciate variety of performance measures for various optimization problems*						
CO4	*Understand Genetic algorithm and particle swarm Optimization.*						

Unit 1

Introduction to Classical Methods & Linear Programming Problems Terminology, Design Variables, Constraints, Objective Function, Problem Formulation. Calculus method, Kuhn Tucker conditions, Method of Multipliers. Linear Programming Problem, Simplex method, Two-phase method, Big-M method, Duality, Integer linear Programming, Dynamic Programming, Sensitivity analysis.

Unit 2

Single Variable Optimization Problems: Optimality Criterion, Bracketing Methods, Region Elimination Methods, Interval Halving Method, Fibonacci Search Method, Golden Section Method. Gradient Based Methods: Newton-Raphson Method, Bisection Method, Secant Method, Cubic search method.

Unit 3

Multi Variable and Constrained Optimization Technique, Optimality criteria, Direct search Method, Simplex search methods, Hooke-Jeeve'spatternsearch method, Powell's conjugate direction method, Gradient based method, Cauchy's Steepest descent method, Newton's method, Conjugate gradient method. Kuhn - Tucker conditions, Penalty Function, Concept of Lagrangian multiplier, Complex search method, Random search method.

Unit 4

Genetic Algorithm: Types of reproduction operators, crossover & mutation, Simulated Annealing Algorithm, Particle Swarm Optimization (PSO) – Example Problems

References:

1) S. S. Rao, "Engineering Optimization: Theory and Practice", Wiley, 2008.
2) K. Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall, 2005.
3) Mohan, C. and Deep, K.: "Optimization Techniques", New Age India Pvt. Ltd., 2009
4) Belegundu, A. D. and Chandrupatla, T. R. "Optimization Concepts and Applicationsin Engineering", Pearson Education Pvt. Ltd., 2002
5) D. E. Goldberg, "Genetic algorithms in Search, Optimization, and Machine learning", Addison-Wesley Longman Publishing, 1989.

MTEC-114A	MIMO Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Understand channel modelling and propagation, MIMO Capacity, space-time coding, MIMO receivers, MIMO for multi-carrier systems, multi-user communications, multi-user MIMO and diversity techniques.						
CO2	Understand equalising MIMO systems and pre-distortion in MIMO system						
CO3	Understand cooperative and coordinated multi-cell MIMO, introduction to MIMO in 4G (LTE, LTE-Advanced, WiMAX).						
CO4	Perform Mathematical modelling and analysis of MIMO systems.						

Unit 1

Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems,MIMO vs. multi-antenna systems.Diversity, Exploiting multipath diversity, Transmit diversity, Space-time codes, TheAlamouti scheme, Delay diversity, Cyclic delay diversity, Space-frequency codes, Receive diversity, The rake receiver, Combining techniques, Spatial Multiplexing, Spectral efficiency and capacity, Transmitting independent streams in parallel, Mathematical notation.

Unit 2

The generic MIMO problem, Singular Value Decomposition, Eigenvalues andeigenvectors, Equalising MIMO systems, Disadvantages of equalising MIMO systems, Pre-distortion in MIMO systems, Disadvantages of pre-distortion in MIMO systems, Pre-coding and combining in MIMO systems, Advantages of pre-coding and combining, Disadvantages of pre-coding and combining, Channel state information.

Codebooks for MIMO, Beamforming, Beamforming principles, Increasedspectrumefficiency, Interference cancellation, Switched beamformer, Adaptive beamformer, Narrowband beamformer, Wideband beamformer

Unit 3

Case study: MIMO in LTE, Codewords to layers mapping, Pre-coding for spatialmultiplexing, Pre-coding for transmit diversity, Beamforming in LTE, Cyclic delay diversity based pre-coding, Pre-coding codebooks, Propagation Channels, Time & frequency channel dispersion, AWGN and multipath propagation channels, Delay spread values and time variations, Fast and slow fading environments, Complex baseband multipath channels, Narrowband and wideband channels, MIMO channel models

Unit 4

Channel Estimation, Channel estimation techniques, Estimation and tracking, Trainingbased channel estimation, Blind channel estimation, Channel estimation architectures, Iterative channel estimation, MMSE channel estimation, Correlative channel sounding, Channel estimation in single carrier systems, Channel estimation for CDMA, Channel estimation for OFDM.

References:

1) Claude Oestges, Bruno Clerckx, "MIMO Wireless Communications : From Real-world Propagation to Space-time Code Design",Academic Press, 1st edition, 2010.
2) MohinderJanakiraman, “Space - Time Codes and MIMO Systems”, Artech House Publishers, 2004.

MTEC-116A	Programmable Networks - SDN, NFV						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand advanced concepts in Programmable Networks.*						
CO2	*Understand Software Defined Networking, an emerging Internet architectural framework. Implement the main concepts, architectures, algorithms, protocols and applications in SDN and NFV.*						
CO3	*Understand Programming for SDNs.*						
CO4	*Understand Network topologies.*						

Unit 1

Introduction to Programmable Networks, History and Evolution of Software DefinedNetworking (SDN), Fundamental Characteristics of SDN, Separation of Control Plane and Data Plane, Active Networking.Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the basicsofOpenFlow protocol.

Unit 2

Network Virtualization: Concepts, Applications, Existing Network VirtualizationFramework, Mininet A simulation environment for SDN.Control Plane: Overview, ExistingSDN Controllers including Floodlight andOpenDaylight projects. Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hadrware-based; Programmable Network Hardware.

Unit 3

Programming SDNs: Northbound Application Programming Interface, Current Languagesand Tools, Composition of SDNs. Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

Unit 4

Data Center Networks: Packet, Optical and Wireless Architectures, NetworkTopologies.Use Cases of SDNs: Data Centers, Internet Exchange Points, Backbone Networks, Home Networks, Traffic Engineering.

References:

1) Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies”, O'Reilly Media, August 2013.
2) Paul Goransson, Chuck Black, Timothy Culver. “Software Defined Networks: A Comprehensive Approach”, Morgan Kaufmann Publishers, 2016.
3) Fei Hu, “Network Innovation through OpenFlow and SDN: Principles and Design”, CRC Press, 2014.
4) VivekTiwari, “SDN and OpenFlow for Beginners”, Amazon Digital Services, Inc., ASIN: , 2013.
5) Nick Feamster, Jennifer Rexford and Ellen Zegura, “The Road to SDN: An Intellectual History of Programmable Networks” ACM CCR April 2014.
6) Open Networking Foundation (ONF) Documents, https://www.opennetworking.org, 2015. OpenFlow standards, http://www.openflow.org, 2015.

MTEC-118A	Antennas and Radiating Systems Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	Determine specifications, design, construct and test antenna.						
CO2	Explore and use tools for designing, analyzing and testing antennas. These tools include Antenna design and analysis software, network analyzers, spectrum analyzers, and antenna pattern measurement techniques.						

List of Experiments:

1. Simulation of half wave dipole antenna.
2. Simulation of change of the radius and length of dipole wire on frequency of resonance of antenna.
3. Simulation of quarter wave, full wave antenna and comparison of their parameters.
4. Simulation of monopole antenna with and without ground plane.
5. Study the effect of the height of the monopole antenna on the radiation characteristics of the antenna.
6. Simulation of a half wave dipole antenna array.
7. Study the effect of change in distance between elements of array on radiation pattern of dipole array.
8. Study the effect of the variation of phase difference 'beta' between the elements of the array on the radiation pattern of the dipole array.
9. Simulation of Microstrip Antenna.
10. Case study.

MTEC-120A	Advanced Digital Signal Processing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Design different digital filters in software*						
CO2	*Apply various transforms in time and frequency Perform decimation and interpolation*						

List ofExperiments:

1. Write a program for cascade and parallel realization of an FIR transfer function.
2. Write a program for cascade and parallel realization of an IIR transfer function.
3. Write a program to design a Butterworth IIR Band Pass Filter.
4. Write a program to design an FIR filter using various window functions.
5. Write a program to implement the interpolation and decimation.
6. Write a program to design two channels QMF Bank.
7. Write a program to compute the CWT.
8. Write a program to compute the DWT.
9. Write a program to design a wavelet filter.
10. Write a program to find the magnitude response of a wavelet.

MTEC-201A	Adaptive Filter Theory						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	To understand the concepts of estimation, normal equations and linear models.						
CO2	To understand Stochastic-Gradient Algorithms and Steady-State Performance of Adaptive Filters.						
CO3	To analyze the tracking and transient performance od adaptive filters.						
CO4	Understanding of RLS and various QR Algorithms.						

Unit-1

Introduction:-Variance of a random variable, Estimation: Given No Observations, Given Dependent Observations, Complex and Vector Cases, Normal Equations, Design Examples, Linear Models and applications. Minimum-Variance Unbiased Estimation and applications.

Steepest-Descent Algorithms:- Steepest-Descent Method, Transient Behavior, Iteration-Dependent Step-Sizes, Newton's Method.

Unit-2

Stochastic-Gradient Algorithms:- LMS Algorithm and applications, Normalized LMS Algorithm, Non-Blind Algorithms, Blind Algorithms and properties, Affine Projection Algorithms, Ensemble-Average Learning Curves.

Steady-State Performance of Adaptive Filters:- Performance Measures, Stationary Data Model, Fundamental Energy-Conservation Relation, Fundamental Variance Relation, Mean-Square Performance of LMS and ε-NLMS.

Unit-3

Tracking Performance of Adaptive Filters:-Non-stationary Data Model, Fundamental Energy-Conservation Relation, Fundamental Variance Relation, Tracking Performance of LMS and ε-NLMS.

Transient Performance of Adaptive Filters:-Data Model, Data-Normalized Adaptive Filters, Weighted Energy-Conservation Relation, Weighted Variance Relation, Transient Performance of LMS and ε-NLMS.

Unit-4

Recursive Least-Squares:-RLS Algorithm, Exponentially-Weighted RLS Algorithm, RLS Array Algorithms: Square-Root Factors, Norm and Angle Preservation, Motivation for Array Methods, RLS Algorithm, Inverse QR Algorithm, QR Algorithm, Extended QR Algorithm.

Text Books

1) "Fundamentals of Adaptive Filtering" by Ali H. Sayed, John Wiley and Sons.
2) "Adaptive Filter Theory" by S. Haykin, Pearson India.

Reference Books

1) "Adaptive Filters Theory and Applications", by B. Farhang-Boroujeny, John Wiley and Sons.
2) "Linear Estimation" by Kailath&Sayed, PHI
3) "Adaptive Filters" by Ali H. Sayed, John Wiley and Sons.

MTEC-203A	Optical Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Contribute in the areas of optical network and WDM network design.*						
CO2	*Implement simple optical network and understand further technology developments for future enhanced network.*						
CO3	*Able to understand the importance of Network Survivability in modern age*						
CO4	*Understand the Network access techniques*						

Unit- 1

SONET/SDH: optical transport network, IP, routing and forwarding, multiprotocol labelswitching.

WDM network elements: optical line terminals and amplifiers, optical add/dropmultiplexers, OADM architectures, reconfigurable OADM, optical cross connects.

Unit- 2

Control and management: network management functions, optical layer services andinterfacing, performance and fault management, configuration management, optical safety.

Unit -3

Network Survivability: protection in SONET/SDH & client layer, optical layer protectionschemes, WDM network design: LTD and RWA problems, dimensioning wavelength routingnetworks, statistical dimensioning models.

Unit- 4

Access networks: Optical time division multiplexing, synchronization, header processing,buffering, burst switching, test beds, Introduction to PON, GPON, AON.

References:

1) Rajiv Ramaswami, Sivarajan, Sasaki, "Optical Networks: A Practical Perspective", MK, Elsevier, 3 rd edition, 2010.

2) C. Siva Ram Murthy and Mohan Gurusamy, "WDM Optical Networks: Concepts Design, and Algorithms", PHI, EEE, 2001.

MTEC-205A	Remote Sensing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	*Understand basic concepts, principles and applications of remote sensing, particularly the geometric and radiometric principles;*						
CO2	*Provide examples of applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.*						
CO3	*Understand Microwave Scattering and Imaging System*						
CO4	*Understand Concepts of Thermal and Hyper Spectral Remote Sensing*						

Unit 1

Physics Of Remote Sensing: Electro Magnetic Spectrum, Physics of Remote Sensing-Effects of Atmosphere-Scattering–Different types–Absorption-Atmospheric window-Energy interaction with surface features –Spectral reflectance of vegetation, soil and water atmospheric influence on spectral response patterns-multi concept in Remote sensing.Data Acquisition: Types of Platforms–different types of aircrafts-Manned and Unmannedspacecrafts–sun synchronous and geo synchronous satellites –Types and characteristics of different platforms –LANDSAT,SPOT,IRS,INSAT,IKONOS,QUICKBIRD etc.

Unit 2

Photographic products, B/W, color, color IR film and their characteristics –resolvingpower of lens and film -Opto mechanical electro optical sensors –across track and along track scanners-multispectral scanners and thermal scanners–geometric characteristics of scanner imagery -calibration of thermal scanners.

Unit 3

Scattering System: Microwave scatterometry, types of RADAR –SLAR –resolution –range and azimuth –real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect-different types of Remote Sensing platforms –airborne and space borne sensors -ERS, JERS, RADARSAT, RISAT - Scatterometer, Altimeter-LiDAR remote sensing, principles, applications.

Unit 4

Thermal and Hyper Spectral Remote Sensing: Sensors characteristics-principle ofspectroscopy-imaging spectroscopy–field conditions, compound spectral curve, Spectral library, radiative models, processing procedures, derivative spectrometry, thermal remote sensing – thermal sensors, principles, thermal data processing, applications.Data Analysis: Resolution–Spatial, Spectral, Radiometric and temporal resolution-signalto noise ratio-data products and their characteristics-visual and digital interpretation–Basic principles of data processing –Radiometric correction–Image enhancement–Image classification– Principles of LiDAR, Aerial Laser Terrain Mapping.

References:

1) Lillesand T.M., and Kiefer,R.W. Remote Sensing and Image interpretation, John Wiley & Sons-2000, 6thEdition
2) John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 2nd Edition, 1995.
3) John A.Richards, Springer –Verlag, Remote Sensing Digital Image Analysis,1999.
   Paul Curran P.J. Principles of Remote Sensing, ELBS; 1995.
4) Charles Elachi and Jakob J. van Zyl , Introduction To The Physics and Techniques of Remote Sensing , Wiley Series in Remote Sensing and Image Processing, 2006.
5) Sabins, F.F.Jr, Remote Sensing Principles and Image interpretation, W.H.Freeman& Co, 1978.

MTOE-201A	Business Analytics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of this course is to give the student a comprehensive understanding of business analytics methods.						
Course Outcomes (CO)							
CO1	*Able to have knowledge of various business analysis techniques.*						
CO2	*Learn the requirement specification and transforming the requirement into different models.*						
CO3	*Learn the requirement representation and managing requirement assests.*						
CO4	*Learn the Recent Trends in Embedded and collaborative business*						

Unit 1

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Unit 2

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit 3

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.
Managing Requirements Assets: Change Control, Requirements Tools

Unit 4

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

References:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

MTOE-203A	Industrial Safety						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the industrial safety.*						
Course Outcomes (CO)							
CO1	*Understand the industrial safety.*						
CO2	*Analyze fundamental of maintenance engineering.*						
CO3	*Understand the wear and corrosion and fault tracing.*						
CO4	*Understanding that when to do periodic inceptions and apply the preventing maintenance.*						

Unit-1

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-2

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-3

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-4

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205A	Operations Research						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.						
Course Outcomes (CO)							
CO1	*Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.*						
CO2	*Students should able to apply the concept of non-linear programming*						
CO3	*Students should able to carry out sensitivity analysis*						
CO4	*Student should able to model the real world problem and simulate it.*						

Unit -1

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit -2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit- 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit -4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207A	Cost Management of Engineering Projects						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the strategic cost management process.*						
CO2	*Students should able to types of project and project team types*						
CO3	*Students should able to carry out Cost Behavior and Profit Planning analysis.*						
CO4	*Student should able to learn the quantitative techniques for cost management.*						

Unit-1

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost.Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-2

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities.Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts.Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-3

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems.Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector.Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets.Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit-4

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209A	Composite Materials						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the composite materials and their properties.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification and characteristics of Composite materials.*						
CO2	*Students should able reinforcements Composite materials.*						
CO3	*Students should able to carry out the preparation of compounds.*						
CO4	*Student should able to do the analysis of the composite materials.*						

UNIT–1:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites.Functional requirements of reinforcement and matrix.Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

UNIT – 2

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostaticpressing.Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–3

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – 4

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

MTOE-211A	Waste to Energy						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the generation of energy from the waste.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification of waste as a fuel.*						
CO2	*Students should able to learn the Manufacture of charcoal.*						
CO3	*Students should able to carry out the designing of gasifiers and biomass stoves.*						
CO4	*Student should able to learn the Biogas plant technology.*						

Unit-1

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-2

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-3

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-4

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

MTAD-101A	English For Research Paper Writing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Student will able to understand the basic rules of research paper writing.*						
Course Outcomes (CO)							
CO1	*Understand that how to improve your writing skills and level of readability*						
CO2	*Learn about what to write in each section*						
CO3	*Understand the skills needed when writing a Title*						
CO4	*Ensure the good quality of paper at very first-time submission*						

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

References:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

MTAD-103A	Disaster Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Develop an understanding of disaster risk reduction and management*						
Course Outcomes (CO)							
CO1	*Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*						
CO2	*Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*						
CO3	*Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*						
CO4	*critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in*						

Unit 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment.Strategies for Survival.Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation.Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

References:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies '"New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi.

MTAD-105A	Sanskrit for Technical Knowledge

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	*Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*						
Course Outcomes (CO)							
CO1	*To get a working knowledge in illustrious Sanskrit, the scientific language in the world*						
CO2	*Learning of Sanskrit to improve brain functioning*						
CO3	*Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*						
CO4	*The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*						

Unit –1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Unit – 2

Order, Introduction of roots,Technical information about Sanskrit Literature

Unit –3

Technical concepts of Engineering: Electrical, Mechanical

Unit –4

Technical concepts of Engineering: Architecture, Mathematics

References

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

MTAD-107A	Value Education

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	*Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*						
Course Outcomes (CO)							
CO1	*Knowledge of self-development*						
CO2	*Learn the importance of Human values*						
CO3	*Developing the overall personality*						
CO4	*Know about the importance of character*						

Unit 1

Values and self-development –Social values and individual attitudes.Work ethics, Indian vision of humanism.Moral and non- moral valuation.Standards and principles.Value judgements.

Unit 2

Importance of cultivation of values.Sense of duty.Devotion, Self-reliance.Confidence, Concentration.Truthfulness, Cleanliness.Honesty, Humanity.Power of faith, National Unity.Patriotism.Love for nature,Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude.Positive Thinking.Integrity and discipline.Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits.Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith.Self-management and Good health.Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

References

1.Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

MTAD-102A	Constitution of India

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	*Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*						
Course Outcomes (CO)							
CO1	*Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*						
CO2	*Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*						
CO3	*Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*						
CO4	*Discuss the passage of the Hindu Code Bill of 1956.*						

Unit I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

References

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MTAD-104A	Pedagogy Studies

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	*Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*.						
Course Outcomes (CO)							
CO1	*What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*						
CO2	*What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*						
CO3	*How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*						
CO4	*What is the importance of identifying research gaps?*						

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Unit 2

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change.Strength and nature of the body of evidence for effective pedagogical practices.Pedagogic theory and pedagogical approaches.Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 3

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

Unit 4

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

References

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

MTAD-106A	Stress Management by Yoga

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress						
Course Outcomes (CO)							
CO1	*Develop healthy mind in a healthy body thus improving social health.*						
CO2	*Improve efficiency*						
CO3	*Learn the Yogasan*						
CO4	*Learn the pranayama*						

Unit – 1

Definitions of Eight parts of yog (Ashtanga).

Unit- 2

Yam and Niyam, Do`s and Don't's in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit- 3

Asan and Pranayam, Various yog poses and their benefits for mind & body,

Unit- 4

Regularization of breathing techniques and its effects-Types of pranayam.

References

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-108A	Personality Development through Life Enlightenment Skills

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	0	-	100	100	3 Hrs.
Program Objective (PO)	To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students						
Course Outcomes (CO)							
CO1	*Students become aware about leadership.*						
CO2	*Students will learn how to perform his/her duties in day to day work.*						
CO3	*Understand the team building and conflict*						
CO4	*Student will learn how to become role model for the society.*						

Unit – 1

Neetisatakam-Holistic development of personality: Verses: 19, 20, 21, 22 (wisdom); Verses: 29, 31, 32 (pride & heroism); Verses: 26, 28, 63, 65 (virtue); Verses: 52, 53, 59 (don's); Verses: 71, 73, 75, 78 (do's).

Unit – 2

Approach to day to day work and duties; ShrimadBhagwadGeeta: Chapter-2: Verses: 41, 47, 48; Chapter-3: Verses: 13, 21, 27, 35; Chapter-6: Verses: 5, 13, 17, 23, 35; Chapter-18: Verses: 45, 46, 48.

Unit - 3

Statements of basic knowledge; ShrimadBhagwadGeeta: Chapter-2: Verses: 56, 62, 68; Chapter-12: Verses: 13, 14, 15, 16, 17, 18.

Unit – 4

Personality of Role model; ShrimadBhagwadGeeta: Chapter-2: Verses: 17; Chapter-3: Verses: 36, 37, 42: Chapter-4: Verses: 18, 38, 39; Chapter-18: Verses: 37, 38, 63.

References:

1. Srimad Bhagavad Gita, Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya), P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Dissertation Phase – I and Dissertation Phase - II

Teaching Scheme

Lab work : 20 and 32 hrs/week for DissertationPhase- I (MTEC-207A)and Phase- II (MTEC-202A) respectively

Course Outcomes:
At the end of this course, students will be able to

a. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
b. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
c. Ability to present the findings of their technical solution in a written report. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:
The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

1. Relevance to social needs of society

    - Relevance to value addition to existing facilities in the
    - Relevance to industry need

2. Problems of national importance

3. Research and development in various domain

4. The student should complete the following:

    - Literature survey Problem
    - Definition Motivation for study and Objectives

    - Preliminary design / feasibility / modular approaches
    - Implementation and Verification

5. Report and presentation

The dissertation phase- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

Design, fabrication, testing of Communication System.

The viva-voce examination will be based on the above report and work.

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<u>Guidelines for Dissertation Phase – I and Phase-II</u>

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referredliterature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

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KURUKSHETRA UNIVERSITY, KURUKSHETRA

('A+' Grade, NAAC Accredited)

SCHEME OF EXAMINATIONS FOR MASTER OF TECHNOLOGY IN CSE /COMPUTER ENGINEERING (W. E. F. SESSION: 2018-19)

SEMESTER-I

S. No.	Course Code	Subject	Teaching Schedule			Hours/ Week	Examination Schedule & Percentage Distribution			Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Total		
1	MTCE-101A	Advanced Computer Architecture and Parallel Processing	3	0	0	3	60	40	100	3	**3**
2	MTCE-103A	Software Quality Models & Testing	3	0	0	3	60	40	100	3	**3**
3	*	Program Elective -I	3	0	0	3	60	40	100	3	**3**
4	**	Program Elective -II	3	0	0	3	60	40	100	3	**3**
5	MTCE-117A	SQMT Lab	0	0	4	4	60	40	100	3	**2**
6	$	Program Elective Lab-I	0	0	4	4	60	40	100	3	**2**
7	MTRM-111A	Research Methodology and IPR	2	0	0	2	60	40	100	3	**2**
8	***	Audit Course-I	2	0	0	2	--	100	100	3	**0**
Total						**24**	**420**	**280**	**700**	**-**	**18**

***Program Elective -I**		****Program Elective -II**	
Course No.	**Subject**	**Course No.**	**Subject**
MTCE-105A	Advanced Computer Networks	MTCE-111A	Algorithm Analysis and Design
MTCE-107A	Distributed Operating Systems	MTCE-113A	Soft Computing
MTCE-109A	Number Theory and Cryptography	MTCE-115A	Speech and Language Processing

$:Program Elective Lab-I			
MTCE-119A	Distributed Operating Systems Lab	MTCE-125A	Algorithm Analysis and Design Lab
MTCE-121A	Number Theory and Cryptography Lab	MTCE-127A	Speech and Language Processing Lab
MTCE-123A	Soft Computing		

*****Audit Course-I**	
Course No.	**Subject**
MTAD-101A	English for Research Paper Writing
MTAD-103A	Disaster Management
MTAD-105A	Sanskrit for Technical Knowledge
MTAD-107A	Value Education

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2.*** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

MASTER OF TECHNOLOGY IN CSE /COMPUTER ENGINEERING
SEMESTER-II

S. No.	Course Code	Subject	Teaching Schedule			Hours/ Week	Examination Schedule & Percentage Distribution			Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Total		
1	MTCE-102A	Social Networks	3	0	0	3	60	40	100	3	**3**
2	MTCE-104A	Advanced Database System Design	3	0	0	3	60	40	100	3	**3**
3	*	Program Elective-III	3	0	0	3	60	40	100	3	**3**
4	**	Program Elective-IV	3	0	0	3	60	40	100	3	**3**
5	MTCE-118A	Social Networks Lab	0	0	4	4	60	40	100	3	**2**
6	$	Program Elective Lab-II	0	0	4	4	60	40	100	3	**2**
7	#MTCE-120A	Mini Project	0	0	4	4	-	100	100	3	**2**
8	***	Audit Course-II	2	0	0	2	--	100	100	3	**0**
Total						**26**	**360**	**340**	**700**	**-**	**18**

***Program Elective -III**		****Program Elective -IV**	
Course No.	**Subject**	**Course No.**	**Subject**
MTCE-106A	Mobile Ad-hoc and Wireless Sensor Networks	MTCE-112A	Security In Computing
MTCE-108A	Information Theory and Coding	MTCE-114A	Embedded System
MTCE-110A	Agile Software Engineering	MTCE-116A	Data Mining

$ Program Elective Lab-II			
MTCE-122A	Mobile Ad-hoc and Wireless Sensor Networks Lab	MTCE-128A	Security In Computing Lab
MTCE-124A	Information Theory and Coding Lab	MTCE-130A	Embedded System Lab
MTCE-126A	Agile Software Engineering Lab	MTCE-132A	Data Mining Lab

*****Audit Course-II**	
Course No.	**Subject**
MTAD-102A	Constitution of India
MTAD-104A	Pedagogy Studies
MTAD-106A	Stress Management by Yoga
MTAD-110A	Personality Development and Soft Skills

Note 1: After the second semester exams, the students are encouraged to go to Industrial Training/Internship for at least 6-8 weeks during the summer break with a specific objective for Dissertation Part–I (MTCE-207A). The industrial Training/Internship would be evaluated as the part of the Dissertation–I (with the marks distribution as 40 marks for Industrial Training/Internship and 60 marks for Dissertation Part–I).

Note 2: The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

*****Note 3:**Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

#Note4: Mini project: During this course the student will be able to understand the contemporary/emerging technologies for various processes and systems. During the semester, the students are required to search/gather the material/information on a specific topic, comprehend it and present/discuss the same in the class. He/she will be acquainted to share knowledge effectively in oral (seminar) and written form (formulate documents) in the form of report. The student will be evaluated on the basis of viva/ seminar (40 marks) and report (60 marks).

MASTER OF TECHNOLOGY IN CSE /COMPUTER ENGINEERING
SEMESTER-III

S. No.	Course Code	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution			Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Total		
1	*	Program Elective -V	3	0	0	03	60	40	100	3	**3**
2	**	Open Elective	3	0	0	03	60	40	100	3	**3**
3	MTCE-207A	Dissertation Part-I	0	0	20	10	--	100	100	--	**10**
Total							**120**	**180**	**300**		**16**

***Program Elective-V**	
Course No.	**Subject**
MTCE-201A	Object Oriented Software System Design
MTCE-203A	Big Data Analytics
MTCE-205A	Digital Image Processing

****Open Elective**		
1.	MTOE-201A	Business Analytics
2.	MTOE-203A	Industrial Safety
3.	MTOE-205A	Operations Research
4.	MTOE-207A	Cost Management of Engineering Projects
5.	MTOE-209A	Composite Materials
6.	MTOE-211A	Waste to Energy

MASTER OF TECHNOLOGY IN CSE /COMPUTER ENGINEERING
SEMESTER: IV

S. No.	Course Code	Subject	Teaching Schedule			Hours /Week	Examination Schedule & Percentage Distribution			Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Total		
1	MTCE-202A	Dissertation Part-II	0	0	32	16	200	100	300	--	16
Total						**16**	**200**	**100**	**300**		16

Total Credits – 68

Note 1: At the end of the second semester each student is required to do his/her Dissertation work in the identified area in consent of the Guide/Supervisor. Synopsis for the Dissertation Part-I is to be submitted within three weeks of the beginning of the Third Semester.

Note 2: Each admitted student is required to submit the report of his/her Dissertation Part-I as per the schedule

mentioned in Academic calendar for the corresponding academic session otherwise the Dissertation Part-II cannot be continued at any level.

Note 3: Each admitted student is required to submit his/her final Dissertation Part-IIas per the schedule mentioned in Academic calendar for the corresponding academic session only after the publication of two papers in a journal/International/National conference of repute like IEEE, Springer, Elsevier, ACM etc.

Note 4: The course of program/open elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

MTCE-101A	Advanced Computer Architecture and Parallel Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and compare different parallel computers, processor architectures and various techniques to improve processor performance.						
Course Outcomes (CO)							
CO1	Classify parallel computers based on different criteria and compare various program flow mechanisms.						
CO2	Contrast various processor architectures and solve problems of routing in various interconnection networks.						
CO3	Explain various instruction pipeline design techniques, memory hierarchy concepts and identify ways to reduce miss penalty and miss rate.						
CO4	Describe and distinguish various cache coherence protocols used in various shared memory architectures.						

Unit 1

Parallel computer models: The state of computing, Classification of parallel computers, Multiprocessors and multicomputer, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit 2

System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit 3

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Memory Hierarchy Design: Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

Unit 4

Multiprocessor Architectures: Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design trade-offs, synchronization,

Enterprise Memory subsystem Architecture: Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

Text Books:

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

Reference Books:

1. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998.
2. V.Rajaranam&C.S.R.Murthy, "Parallel computer"; PHI. 2002.
3. R.K.Ghose, RajanMoona&Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
4. Stalling W, "Computer Organisation & Architecture", PHI. 2000

5. D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley,1997.
6. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
7. D.A.Patterson, J.L.Hennessy, "Computer Architecture: A quantitative approach"; Morgan Kauffmann, February, 2002.
8. Hwan and Briggs, "Computer Architecture and Parallel Processing"; MGH. 1999.

MTCE-103A	Software Quality Models & Testing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The objective of this course is to provide the in-depth coverage of software quality models and software testing strategies. It focuses on test case generation techniques and testing levels. It also focuses on testing different kinds of software.						
Course Outcomes (CO)							
CO1	To develop test cases for any problem						
CO2	To pursue testing on any level of software design by using different testing strategies						
CO3	To learn the configuration management activities and testing object oriented software by using different testing methods.						
CO4	To apply testing principles for Testability, observability, controllability and software refactoring to achieve Agility.						

UNIT – I

Overview of SQM: Concepts of Software Quality, Quality Attributes, Software Quality Models:McCall, Boehm, ISO-9000, CMM.
Software testing principles: Need for testing, Psychology of testing, Testing economics, White box,Black box, Grey box testing, Software Development Life Cycle (SDLC) and Testing, SoftwareVerification& Validation, Weyuker's adequacy axioms.

UNIT – II

Testing strategies: White box testing techniques: Control Flow based testing - Statement coverage,Branch Coverage, Path Coverage; Data flow based testing, Mutation testing, Automated codecoverage analysis, Black box testing techniques: Boundary value analysis, Equivalence partitioning,Cause-effect graphing, Robustness testing, Levels of testing - Unit, Integration and System Testing;Acceptance testing: α, β, and γ testing.

UNIT – III

Configuration Management: Maintaining Product Integrity, Components, configuration items, changeManagement, Version Control, Configuration accounting, Reviews, Walkthrough, Inspection, andConfiguration Audits.
Testing object oriented software: Challenges, Differences from testing non-Object Oriented Software,Class testing strategies, Class Modality, State-based Testing.

UNIT – IV

Testability and related issues: Design for Testability, Observability & Controllability, Design byContract, Precondition, Post condition and Invariant, Regression Testing, Challenges, testoptimization.
Miscellaneous topics: Stress Testing, Testing web-enabled applications, Ad hoc testing: Buddy testing, pair testing,Exploratory testing, Agile and extreme testing.

Text Books:

1. Jorgensen P. C., "Software Testing - A Craftman's Approach", 2nd Ed., CRC Press.
2. Glenford J. Myers, "The Art of Software Testing", 3rd Ed., Wiley India Pvt. Ltd.

Reference Books:

1. Mathur P. Aditya, "Foundations of Software Testing", 2nd Ed., Pearson Education.
2. Robert V. Binder, "Testing Object-Oriented Systems: Models Patterns and Tools", PearsonEducation.
3. Limaye G. M., "Software Testing – Principles, Techniques, and Tools", Tata McGraw Hill.
4. Boris Beizer, "Black-Box Testing: Techniques for Functional Testing of Software and Systems",1st Ed.,Wiley India Pvt Ltd.
5. William E. Perry, "Effective Methods for Software Testing", 3rd Ed., Wiley India Pvt Ltd.

MTCE-105A	Advanced Computer Networks							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.							
Course Outcomes (CO)								
CO1	To classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.							
CO2	To describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.							
CO3	To deploy high performance computing standards, VPN and routing protocols.							
CO4	To get familiar with various security and privacy standards/tools.							

Unit 1

MAC Protocols for high speed and wireless networks -IEEE 802.3 standards for fast Ethernet, gigabit Ethernet, 10G, and 100VG-AnyLAN, IEEE 802.11, 802.15, and 802.16 standards for Wireless PAN, LAN, and MAN

Unit 2

IPv6: IPv4 versus IPv6, basic protocol, Header-extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, DHCPv6, IPv6 Routers and Routing.

Mobility in networks – Mobility Management: Cellular architecture, Mobility: handoff, types of handoffs; location management, HLR-VLR scheme, Mobile IP and IPv6.

Unit 3

IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. IPsec protected channel service, virtual private network service, multiprotocol label switching, MPLS VPN

Traffic Types, TCP extensions for high-speed networks,transaction-oriented applications. Other improvements in TCP, Performance issues, TCP Congestion Control – fairness, scheduling and Delay modeling, QoS issues, differentiated services.

Unit 4

Network security at various layers. Security related issues in mobility. Secure-HTTP, SSL, Message digests, Key distribution protocols. Digital signatures and digital certificates.

Books and References:

1 W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2 G. R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.
3 W. R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.
4 W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
5 C. E. Perkins, B. Woolf, and S. R. AlpertMobile IP: Design Principles and Practices, Addison Wesley, 1997.
6 J.F. Kurose and K.W. Ross, Computer Networking – A Top-down Approach Featuring the Internet, Pearson Education, New Delhi, 2004.
7 N. Olifer& V. Olifer, Computer Networks: Principles, Technologies, and Protocols for network Design, Wiley-Dreamtech Low Price, New Delhi

MTCE-107A	Distributed Operating Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	This course is planned to understand the basics of distributed systems, and various issues in distributed operating systems. The focus is on distributed system models , distributed architecture, synchronization, process allocation methods and memory sharing techniques.						
Course Outcomes (CO)							
CO1	Understand basics of distributed system and architecture with related factors.						
CO2	Recognize the synchronization concepts, transactions processing and deadlock issues.						
CO3	Explanation of fault tolerance, real time system and distributed file system.						
CO4	To know the concepts of consistency, shared memory and description of distributed operating systems.						

Unit 1

Introduction: Distributed system, goals, Hardware and Software concepts, Fundamental Issues in Distributed Systems, Distributed System Models and Architectures.

Communication in distributed systems: Layered protocols, client-server model.RPC, Group communication.

Unit 2

Synchronization in distributed Systems: Clock synchronization, Clock synchronization Algorithms, Mutual Exclusion and its algorithms, Election algorithms: Bully algorithm, Ring algorithm, Atomic transactions, Transaction models, Deadlocks: Distributed deadlock detection and prevention.

Unit 3

Process management: Threads, System models, processor allocation, scheduling algorithms, fault tolerance, real-time distributed systems

Distributed File System: Design and implementation of distributed file system, scalability and mobility issues, fault tolerance.

Unit 4

Distributed Shared Memory: Shared memory, consistency models, Page-based distributed shared memory

Case Studies: AMOEBA, MACH

1. Distributed Operating Systems; Andrew S Tanenbaum, Pearson Ed.
2. Distributed Systems: Concepts and Design; G Colouris, J Dollimore, T Kindberg 3/e Pearson Ed. 2002.
3. Principles of Distributed Systems, VK Garg, Kluwer Academic Publishers, 1996.
4. Distributed Systems and Algorithmic Approach by Su Kumar Boss, Chamal& Hall.
5. Principles of Distributed Computing by V K Garg, IEEE Press.
6. Distributed Computing by A D KshemKalyani&MukeshSingha.
7. Distributed Algorithms by Nancy Lynch, Morgan Kaufmann Press.
8. Introduction to Distributed Algorithms by G Tel, Cambridge University.

MTCE-109A	Number Theory and Cryptography						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	To introduce the concepts and methodology used in the Number Theory and Cryptography.						
Course Outcomes (CO)							
CO1	To introduce the mathematical fundamentals involve in cryptography.						
CO2	To describe the process of primality testing and factorization						
CO2	To understand the strength and weakness of cryptosystems						
CO3	To introduce the elliptic curve cryptography.						

Unit I

Elementary Number Theory: Divisibility, Division Algorithm, Euclidean Algorithm; Congruences, Complete Residue systems, Reduced Residue systems; Fermat's little theorem, Euler's Generalization, Wilson's Theorem; Chinese Remainder Theorem, Generalized Chinese Remainder Theorem-Euler Phi-function, multiplicative property; Finite Fields, Primitive Roots; Quadratic Residues, Legendre Symbol, Jacobi Symbol; Gauss's lemma, Quadratic Reciprocity Law.

Unit II

Primality Testing and Factorization: Primality Tests; Pseudo primes, Carmichael Numbers; Fermat's pseudoprimes, Euler pseudo primes; Factorization by Pollard's Rho method; Simple Continued Fraction, simple infinite continued fractions; Approximation to irrational numbers using continued fractions; Continued Fraction method for factorization.

Unit III

Public Key Cryptosystems: Traditional Cryptosystem, limitations; Public Key Cryptography; Diffie Hellmann key exchange; Discrete Logarithm problem; One-way functions, Trapdoor functions; RSA cryptosystem; Digital signature schemes; Digital signature standards; RSA signature schemes; Knapsack problem; El Gamal Public Key Cryptosystem; Attacks on RSA cryptosystem: Common modulus attack; Homomorphism attack, timing attack; Forging of digital signatures; Strong primes, Safe primes, Gordon's algorithm for generating strong primes.

Unit IV

Elliptic Curve Cryptography: Cubic Curves, Singular points, Discriminant; Introduction to Elliptic Curves, Geometry of elliptic curves over reals; Weierstrass normal form, point at infinity; Addition of two points; Bezout's theorem, associativity; Group structure, Points of finite order; Elliptic Curves over finite fields, Discrete Log problem for Elliptic curves; Elliptic Curve Cryptography; Factorization using Elliptic Curve; Lenstra's algorithm; ElGamal Public Key Cryptosystem for elliptic curves.

Reference Books:

1. A Course in Number Theory and Cryptography, Neal Koblitz, (Springer 2006).
2. An Introduction to Mathematical Cryptography, Jill Pipher, Jeffrey Hoffstein, Joseph H.Silverman (Springer, 2008).
3. An Introduction to theory of numbers, Niven, Zuckerman and Montgomery, (Wiley 2006).

4. Elliptic curves: Number theory and cryptography, Lawrence C. Washington, (Chapman & Hall/CRC 2003).
5. An Introduction to Cryptography, R.A. Mollin (Chapman & Hall, 2001).
6. Rational Points on Elliptic Curves, Silverman and Tate (Springer 2005).
7. Guide to elliptic curve cryptography Hankerson, Menezes, Vanstone (Springer, 2004).
8. Elementary Number Theory, Jones and Jones (Springer, 1998).

MTCE-111A	Algorithm Analysis and Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To Apply important Algorithmic design paradigms & methods of analysis & to Synthesize efficient Algorithms in common engineering design situations.						
Course Outcomes (CO)							
CO1	To prove the correctness & analyse the asymptotic performance of Algorithms.						
CO2	To know various Number Theoretic Algorithms & Graph Algorithms.						
CO3	To Analyse various Geometric Algorithms.						
CO4	Understand NP-completeness & identify different NP-complete problems.						

Unit 1

Introduction:
Algorithm concepts, Analyzing and design, Pseudocodeconventions, asymptotic efficiency of algorithms, asymptotic notations and their properties.

Analysis Techniques:
Growth Functions, Recurrences and Solution of Recurrence equation-, Amortized Analysis, Aggregate, Accounting and Potential Methods, Probabilistic analysis concepts, hiring problem and its probabilistic analysis, String Matching: naive string Matching, Rabin Karp, and String matching with finite Automata, KW and Boyer – Moore algorithm.

Unit 2

Number Theoretic Algorithms:
Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The chines remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization, Polynomials. Huffman Codes: Concepts, construction, correctness of Huffman's algorithms; Representation of polynomials, DFT, FFT, Efficient implementation of FFT, Graph Algorithm, Bellman Ford Algorithm, Single source shortest paths in a DAG Johnson's Algorithm for sparse graph, Flow networks & Ford fulkerson Algorithm, Maximum bipartite matching.

Unit 3

Computational Geometry:
Geometric structures using C++: Vectors, points, Polygons, Edges: Geometric Objects in space: Finding the intersection of a line & triangle, Finding star shaped polygons and convex hull using incremental insertion.

Unit 4

NP-completeness Concepts:
Polynomial time verification, NP-completeness and reducibility, showing problems to be NP-complete like Clique problem, vertex

cover problem etc.Approximation algorithms of these problems.

Reference Books

1 T. H Cormen, C E Leiserson.R L Rivest& C Stein, "Introduction to algorithms", 2nd Edition, PHI.
2 Michael J Laszio, "Computational Geometry and Computer Graphics in C++", PHI. India 1996.
3 Brassard, Bratley, "Fundamentals of algorithms", Prentice Hall of India.
4 Knuth, "The Art of Computer Programming", Vol I-III, Pearson Education.

MTCE-113A	Soft Computing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study on Soft Computing with Neural Networks, Fuzzy Logic, Optimization & Regression and Genetic algorithms approaches.						
Course Outcomes (CO)							
CO1	Understand various types of Neural Networks.						
CO2	Understand the detailed explanation of Fuzzy Logic with fuzzy sets.						
CO3	Description of optimization, regression methods and Genetic Algorithms for solving engineering problems						
CO4	Understanding all concepts of Soft Computing for problem solving.						

Unit 1

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit 2

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Applications.

Unit 3

Regression and Optimization: Least-Squares Methods for System Identification -System Identification: An Introduction, Basics of Matrix Manipulation and Calculus, Least-Squares Estimator, Geometric Interpretation of LSE, Recursive Least-Squares Estimator, Recursive LSE for Time-Varying Systems, An introduction to LSE for Nonlinear Models, Derivative-based Optimization-Descent Methods, The Method of Steepest Descent, Newton's Methods, Step Size Determination, Conjugate Gradient Methods, Analysis of Quadratic Case, Nonlinear Least-squares Problems, Incorporation of Stochastic Mechanisms, Derivative-Free Optimization.

Unit 4

Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Text Books:

1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir& B. Yuan, PHI, 1995.
3. "Neuro-fuzzy and Soft Computing", by J.-S.R. Jang, C.-T. Sun, and E. Mizutani, PHI.
4. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.
5. "Soft computing and Intelligent System Design", F. O. Karray and C. de Silva, Pearson, 2009.

Reference Books:

1. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MTCE-115A	Speech and Language Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	This subject covers the overview and description of automatic speech recognition system.						
Course Outcomes (CO)							
CO1	To learn the concepts in mechanics of speech						
CO2	To understand the spectral analysis of the speech signal and noise reduction methodology.						
CO3	To implement and use of the statistical approaches for the design and development of Automatic Speech Recognition (ASR).						
CO4	Understand the formal language theory of language processing and complexity measures.						

Unit I

Mechanics of Speech: Speech Production Mechanism, Nature of Speech Signal, Discrete Time Modeling of Speech Production, Representation of Speech Signals, Classification of Speech Sounds, Phones, Phonemes, Phonetics, IPA and Phonetic Alphabets, Articulatory Features, Auditory Perceptions, Anatomical Pathways from Ear to the Perception of Sound Peripheral Auditory System.

Unit II

Spectral Analysis of Speech Signal: Time Domain Parameter of Speech Signal, Methods of Extracting The Parameters: Energy Filter bank Analysis, Short Time Fourier analysis, Formant Extraction, Pitch Extraction; Noise Reduction Techniques, Spectral Estimation, Feature Analysis: MFCC, PLP, RASTA, PLP-RASTA; TRAP.

Unit III

Statistical Framework of ASR: Probability, Bayes Theorem, Covariance and Correlation, Gaussian Mixture Model, ASR Framework: Feature Extraction, Acoustic Model, Pronunciation Model, Language Model, Decoder; Unit Selection, Limitation of Basic HMM and Applications, Advanced HMM, Refinement of HMM, Hybrid HMM/ANN.

Unit IV

Language Processing: Formal Language Theory: Chomsky Hierarchy, Chart Parsing for Context Free Grammars, Stochastic Language Models: Probabilistic Context-Free Grammar, N-gram Language Models, Complexity measure of Language Models: N-

Gram Smoothing, Deleted Interpolation Smoothing, Backoff Smoothing, Class n-grams, Performance of N-gram Smoothing, Adaptive Language Models: Cache Language Models, Topic-Adaptive Models, Maximum Entropy Models.

References:

1. Speech and language processing, Daniel Jurafsky and James H. Martin, University of Colorado, Boulder.
2. Fundamentals of Speech Recognition, Lawrence Rabiner, Biing Hwang Juang and B.Yegnarayana, Pearson Edition
3. Speech Recognition – Theory and C++ Implementation, Claudio Becchetti, KlucioPrinaRicotti, FondazioneUgoBordoni, Rome, Italy.
4. Spoken Language Processing – A Guide to Theory, algorithm and system development, X.Huang, A. Acero, H. W. Hon.

MTCE-102A	Social Networks						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	This emerging and innovative field will provide the insight into latest communication techniques used in the online social networks for identifying and representing the hidden relationships, tracking the flow of information and to recognize data patterns in social networks by using graph, matrix, relationships, clustering, and equivalence between users.						
Course Outcomes (CO)							
CO1	To understand the essentials of social networks by learning different types of entities and relationships as nodes, edges within the graph and represent these information as relational data to determine the relative importance of a vertex to find the design levels						
CO2	To explore the detailed explanation of data generalization and mining from Twitter, Facebook and LinkedIn in well informed and efficient manner.						
CO3	To describe the semantic web using mining associations, correlations, classification, betweenness, centrality, equivalence relation, centralization, clustering coefficient and structural cohesion to generate visualizations and perform empirical investigations of network data.						
CO4	To interpret and synthesize the results with respect to collated datasets by using structural equivalence, automorphic equivalence and regular equivalence for interpreting quality factors and mining of complex type of data to execute better recommendation.						

Unit: I: Social Networks and Related Concepts

Introduction to Social Networks: Introduction, uses, examples and types of social networks, Social and economic networks, Opportunities and challenges in social networks, Social structure in social networks, Properties of social networks, algorithmic and economic aspects of social networks

Social Network Data: Nodes, Edges, Relationship, Graphs, Samples and Boundaries, Formal methods, Adjacency Matrix for undirected and directed networked graphs and using matrices to represent social relations, Random graphs, Properties of random graphs, Percolations, Branching processes, Growing spanning tree in random graphs.

Level in Social Networks: Ego networks, partial networks, complete or global networks, social networks methods including binary or valued, directed or undirected.

Unit: II Mining the Social Web

Mining Twitter: Fundamental Twitter Terminology, creating a Twitter API Connection, Exploring Trending Topics, searching for Tweets, extracting Tweets entities, analyzing Tweets and Tweet entities with frequency analysis, computing the lexical diversity of Tweets, Examining patterns in Retweets, Visualizing frequency data with histograms.

Mining Facebook: Understanding the social graph API, Understanding the open graph protocol, Analyzing social graph connections

Mining LinkedIn: Making LinkedIn API requests, Downloading LinkedIn connections as a CSV file, Clustering, normalizing data for analysis, measuring similarity, and clustering algorithms.

Unit: III Mining Web pages and Semantic Web

Mining Web pages: Scraping, Parsing and Crawling the Web, Discovering semantics by decoding syntax, Entity-Centric analysis: A paradigm shift, Quality of analytics for processing human language data.

Mining the Semantically Marked-Up Web: Microformats: Easy-to-implement Metadata, Semantics markup to semantic Web: A brief interlude, The semantic Web: An evolutionary revolution.

Social Network Analysis: Introduction, History, Metrics in social network analysis (Betweenness, Centrality, Equivalence relation, Centralization, Clustering coefficient and Structural cohesion).

Unit IV: Equivalence in Social Networks

Structural equivalence, Automorphic equivalence and Regular equivalence

Text Books:

1. Matthew A. Russell, "Mining the Social Web", O'Reilly and SPD, Second edition New Delhi, 2013.
2. Hanneman, R. A., & Riddle, M., "Introduction to social network methods, Riverside, California: University of California, Riverside. Available at: http://faculty.ucr.edu/~hanneman/nettext/.
3. "Social network analysis: Theory and applications". A free, Wiki Book available at: http://train.ed.psu.edu/WFED-543/SocNet_TheoryApp.pdf.

Reference Books:

1. Lon Safko, "The Social Media Bible: Tactics, Tools, and Strategies for Business Success", Wiley 3rd Edition, 2012.
2. Peter K Ryan, "Social Networking", Rosen Publishing Group, 2011.
3. John Scott, Peter J. Carrington, "Social Network Analysis", SAGE Publishing Ltd., 2011.

MTCE-104A	Advanced Database System Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	This course is designed to recognize data storage in DBMS, data representation using ER and EER modelling, query processing techniques , recovery management, data base security using firewall and digital signature						
Course Outcomes (CO)							
CO1	Understand the basics of DBMS architecture and data storage mechanism						
CO2	Depiction of various levels in database designing and database representation mechanism.						
CO3	To know the concepts of query processing, transition management and recovery management						
CO4	Explanation of database security techniques such as Firewalls, proxy servers, SSL and digital signatures						

Unit 1

Introduction: Overview of DBMS and its internal Architectural, Data Storage and representation in DBMS: Memory Hierarchy, Secondary storage mechanism and reliability improvement through mirroring and RAID, Recovery from disk crashes, Representing Relational data elements with records (fixed and variable) use of page and block formats, Heap, sorted and clustered file organization.

Unit 2

Indexing in DBMS: Clustered, primary, secondary, dense and Sparse indexing, Hash and Tree based index structures, ISA and B+ tree data structures, bit map indexing, R-indexing.

Database Design: Three steps of Conceptual, logical and Physical design, and methodology for design, Overview of E-R and

Extended E-R Modeling and conversion to logical tables and normalization, Physical database design and tuning – overview of tasks involved and methodology, Guidelines for index selection, Clustering, Demoralization and view definitions, Tuning of Queries with Explain PLAN.

Unit 3

Query Processing and Transaction management in DBMS: Query processing architecture in DBMS, relational operations and implementation techniques, Algorithms for Selection, Projection and Join, Query optimization, Query tree and optimization using Relational equivalences, Transaction Management DBMS: Transaction and ACID Properties, schedules and serializability, Concurrency control techniques – locking timestamps and Optimistic Concurrency control, Concept of Recovery management, Buffer and Recovery management structures in DBMS, Deferred update and ARIES algorithm for recovery with an example.

Unit 4

Database Security: Access Control mechanisms in DBMS, GRANT and REVOKE of VIEWS, Security for Internet applications through Encryption Firewalls, proxy servers, SSL and digital signatures.

Reference Books

1. Gracia-Mlina, Ullman and Widom, "Database System Implementation",(2001)-Pearson Education.
2. Connolly &Begg, "Database Systems", Third Edition (2002)-Pearson Publication.
3. Raghu Ramkrishnan&Gehrke**,** "Database Management Systems", Third Edition McGraw Hill Publications (2003).

MTCE-106A	**Mobile Ad-hoc and Wireless Sensor Networks**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.							
Course Outcomes (CO)								
After completion of course students will be able to								
CO1	Classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.							
CO2	Describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.							
CO3	Recently deployed high performance computing standards, VPN, routing protocols as to be gone through.							
CO4	Various security and privacy standards/tools to be described.							

Unit 1

Mobile Ad hoc Networks (MANET) – Mobility Management, modeling distributed applications for MANET, MAC mechanisms and protocols.

Unit 2

MANET Routing Protocols: Ad hoc network routing protocols, destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish-eye state routing, dynamic source routing, ad hoc on-demand routing, OLSR & TORA routing, location aided routing, zonal routing algorithm.

Unit 3

Ad hoc network security – Link layer, Network layer, Trust and key management.
Self policing MANET – Node Misbehaviour, secure routing, reputation systems.
Wireless Sensor Networks (WSN) – Design Issues, Clustering, Applications of WSN.

Unit 4

MAC layer and routing protocols in WSN
Data Retrieval Techniques in WSN – Sensor databases, distributed query processing, Data dissemination and aggregation schemes, Operating Systems for WSN, Security issues in WSN.

Books and References:

1 C. Siva Ram Murthy & B.S. Manoj, Mobile Ad hoc Networks – Architectures & Protocols, Pearson Education, New Delhi, 2004
2 C M Cordeiro& D.P. Agrawal, Adhoc& Sensor Networks – Theory and Applications, ISBN 981256-682-1, World Scientific Singapore, 2006
3 C. S. Raghvendra, Wireless Sensor Networks, Springer-Verlag, 2006.

MTCE-108A	**Information Theory and Coding**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	The objective of this course is to introduce the basic concepts of information theory and coding, including information, source coding, channel model, channel capacity, channel coding in an exemplary way.						
Course Outcomes (CO)							
CO1	To understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them.						
CO2	To describe the real life applications based on the fundamental theory and to apply convolution codes for performance analysis & cyclic codes for error detection and correction.						
CO3	To calculate entropy, channel capacity, bit error rate, code rate and steady-state probability.						
CO4	To implement the encoder and decoder of one block code or convolutional code using any program language.						

Unit 1

Overview; Basic Concepts - Entropy and Mutual information; Lossless Source Coding – Source entropy rate; Kraft inequality; Huffman code; Asymptotic equipartition property; Universal coding; Noisy Channel Coding - Channel capacity; Random channel codes; Noisy channel coding theorem for discrete memory-less channels; Typical sequences; Error exponents; Feedback; Continuous and Gaussian channels; Lossy Source Coding - Rate- Distortion functions; Random source codes; Joint source-channel coding and the separation theorem.

Unit 2

Source coding- Text, Audio and Speech: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio
layers I,II,III, Dolby AC3 - Speech: Channel V coder, Linear Predictive Coding Source coding- Image and Video: Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF –Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG

Unit 3

Standard Error control coding- Block codes: Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes -Linear block codes,

Unit 4

Cyclic codes - Syndrome calculation, Encoder and decoder – CRC Error control coding- convolution codes: code tree, trellis, state diagram - Encoding – Decoding:
Sequential search and Viterbi algorithm – Principle of Turbo coding

Text Books:

1. Mark Kelbert(Author), Yuri Suhov, Information Theory and Coding by Example, CambridgeUniversity Press, 2013.

Reference Books:

1. Simon Haykin and Michael Moher, Communication Systems, 5th Edition, Wiley, 2010
2. T.M. & Thomas, J.A. (2006). Elements of Information Theory. New York: Wiley.
3. Jiri Adamek, Foundations of coding, Wiley Interscience, 1991.
4. T. M. Cover and J. A. Thomas, Elements of information theory, Wiley, 1991.

MTCE-110A	Agile Software Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	Introduces the business value of adopting Agile approaches and provide complete understanding of the Agile development practices.						
Course Outcomes (CO)							
CO1	To understand the background and driving forces for taking an Agile approach to software development.						
CO2	To explore the business value of adopting Agile approaches.						
CO3	To drive development with unit tests using Test Driven Development.						
CO4	To apply design principles and refactoring to achieve Agility.						

Unit I: Fundamentals of Agile

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

Unit II: Agile Scrum Framework

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

Unit III: Agile Testing

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

Unit IV: Agile Software Design and Development

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Text Books:

1. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson publications.
2. Robert C. Martin, Agile Software Development, Principles, Patterns and Practices, Prentice Hall.
3. Lisa Crispin, Janet Gregory, Agile Testing: A Practical Guide for Testers and Agile Teams, Addison Wesley.

Reference books:

1. Alistair Cockburn, Agile Software Development: The Cooperative Game, Addison Wesley.
2. Mike Cohn, User Stories Applied: For Agile Software, Addison Wesley.

MTCE-112A	Security In Computing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**100**	**50**	**150**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study of Probability, Random Variables and Stochastic Processes.						
Course Outcomes (CO)							
CO1	To evaluate the risks and vulnerabilities in protocols/Standards.						
CO2	To apply number theory and algebra required for designing cryptographic algorithms.						

CO3	To Design symmetric key, asymmetric key encryption techniques, design authentication, message integrity and authenticated encryption protocols.
CO4	To design and security analysis of systems including distributed storage and Electronic voting**.**

UNIT – I

Computer Security Concept, Threats, Attacks and Assets, Security Functional Requirements,Security Architecture for Open System, Scope of Computer Security, Computer Security Trendsand Strategy.
Cryptography: Terminology and Background, Substitution Ciphers, Transpositions, Cryptanalysis,Data Encryption Standard, DES & AES Algorithms and comparison, Public Key Encryption,Possible Attacks on RSAMalicious Software: Types of Malicious Software, Viruses, Virus countermeasures, Worms, Bots,Rootkits.

UNIT – II

Protection in General-Purpose Operating Systems: Security Methods of Operating Systems,Memory and Address Protection.
Designing Trusted Operating Systems: Security Policies, Models of Security, Designing of TrustedOperating System.Linux Security: Linux Security Model, Linux Vulnerabilities, Linux System Hardening, ApplicationSecurity, Mandatory Access Control

UNIT – III

Database Security: Relational Database, Database Access Control, Inference, Statistical Databases,Database Encryption.Data Mining Security: Security Requirements, Reliability and Integrity, Sensitive data, MultilevelDatabases, Proposal for Multilevel Security, Data Mining - Privacy and Sensitivity, DataCorrectness and Integrity, Data Availability.
Trusted Computing: Concept of Trusted System, Trusted Computing and Trusted Platform Module,Common Criteria for Information Technology Security Evaluation.

UNIT – IV

Security in Networks: Threats in networks, Network security controls, Firewall and IntrusionPrevention Systems: Need, Characteristics, Types of Firewalls, Firewall Basing, IntrusionPrevention Systems. Intrusion Detection Systems.
Internet Security Protocols and Standards: Secure Socket Layer (SSL) and Transport Layer Security(TLS), IP4 and IP6 Security, Secure Email.Legal and Ethical Aspects: Cybercrime and Computer Crime, Intellectual Property, Copyrights,Patents, Trade Secrets, Privacy and Ethical Issues.

Text Books:

1. Pfleeger C. &Pfleeger S.L., "Security in Computing", 4th Ed., Pearson Education.
2. Stalling W., Brown L., "Computer Security Principles and Practice", 3rd Ed., Pearson Education.

Reference Books:

1. Schneier B., "Applied Cryptography: Protocols, Algorithms and Source Code in C", 2nd Ed., Wiley India Pvt. Ltd.

MTCE-114A	Embedded Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3 Hrs.**

Program Objective (PO)	To introduce the complete design of a modern embedded system with functional requirements for hardware and software components including processor, networking components, and sensors, along with applications, subsystem interfaces, networking, and middleware and to show how to understand and program such systems using a concrete platform built around.
Course Outcomes (CO)	
CO1	Understand key concepts of embedded systems like History, definition and Classification, and characteristics of Embedded Systems
CO2	Complete system design concepts of embedded systems for Processor and Memory Organization and peripheral devices.
CO3	Understand the basics of Microcontrollers and assembly Language programming process.
CO4	Become aware of interrupts and deployment of embedded processors and supporting devices in real-world applications

Unit 1

Introduction to embedded systems: Background and History of Embedded Systems, definition and Classification, Programming languages for embedded systems: desirable characteristics of programming languages for embedded systems, low-level versus high-level languages, main language implementation issues: control, typing. Major programming languages for embedded systems. Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

Unit 2

Processor and Memory Organization: Structural units in processor, Processor selection for an embedded system, Memory devices, Memory selection, Allocation for memory to program segments and blocks and memory map of a system, DMA, Interfacing processor. I/O Devices -Device I/O Types and Examples? Synchronous -iso-synchronous and Asynchronous Communications from Serial Devices -Examples of Internal Serial-Communication Devices -UART and HDLC -Parallel Port Devices -Sophisticated interfacing features in Devices/Ports-Timer and Counting Device.

Unit 3

Microcontroller: Introduction to Microcontrollers, Evolution, Microprocessors vs. Microcontrollers, MCS-51 Family Overview, Important Features, Architecture.8051 Pin Functions, Architecture, Addressing Modes, Instruction Set, Instruction Types.**Programming:** Assembly Programming. Timer Registers, Timer Modes, Overflow Flags, Clocking Sources, Timer Counter Interrupts, Baud Rate Generation. Serial Port Register, Modes of Operation, Initialization, Accessing, Multiprocessor Communications, Serial Port Baud Rate.

Unit 4

Interrupts: Interrupt Organization, Processing Interrupts, Serial Port Interrupts, External Interrupts, Interrupt Service Routines. Microcontroller Specification, Microcontroller Design, Testing, Timing Subroutines, Look-up Tables, Serial Data Transmission.**Applications:** Interfacing Keyboards, Interfacing Displays, Interfacing A/D and D/A Converters, Pulse Measurement, Loudspeaker Interface, Memory Interface.

Books and References:

1. John Catsoulis, “Designing Embedded Hardware”, O’reilly
2. An Embedded Software Primer”, David E. Simon, Pearson Education
3. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley & Sons, Inc
4. KarimYaghmour, “Building Embedded Linux Systems”, O’reilly
5. Michael Barr, “Programming Embedded Systems”, O’reilly
6. Alan C. Shaw, “Real-time systems & software”, John Wiley & sons, Inc.
7. Wayne Wolf, “Computers as Components”, Harcourt India Pvt. Ltd.

MTCE-116A	Data Mining						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**		**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study on data mining methodology.						
Course Outcomes (CO)							
CO1	Understand the basics of data mining and data warehousing						
CO2	Understand the detailed explanation of data generalization and statistical measures						
CO3	Description of mining associations, correlations, classification and prediction						
CO4	Description on cluster analysis and mining of complex type of data like world wide web and text data base						

Unit 1

Introduction

Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction.

Data Warehouse

Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

Unit 2

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance,Mining descriptive statistical measures in large databases.

Unit 3

Mining association rules in large databases: Association rule mining, Mining single dimensional Boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction.

Unit 4

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining the World Wide Web, Applications and trends in data mining.

Books and References:

1 Data Mining: Concepts and Techniques; Jiawei Han and MichelineKamber; Elsevier.

2 "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.

3 "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001.

4 "Data Mining: Concepts and Techniques", J.Han, M.Kamber, Academic Press, Morgan Kanfman Publishers, 2001.

5 "Data Mining", by Pieter Adrians, DolfZantinge, Addison Wesley 2000.

6 "Data Mining with Microsoft SQL Server", by Seidman, Prentice Hall of India,2001.

MTCE-201A	Object Oriented Software System Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To provide the thorough knowledge to use the concepts and their design attributes for object based system design and their related paradigms to foster better communication and product quality in order to solve the real time problems by applying the object oriented pattern and visual modeling throughout the software development life cycles.						
Course Outcomes (CO)							
CO1	To learn the basic concepts of object oriented design and methods and also to get exposure of UML for analyzing and designing quality software systems.						
CO2	To explore the details of object-oriented software development methods using use cases, relations, responsibilities, interface objects, services and system design and object-oriented methodologies for choosing and designing effective and time critical software systems.						
CO3	To realize the nature of design patterns by understanding and identifying design model, components, software behavior, Methodology for Object-Oriented Design (MOOD), and reusability and Life Cycle issues to create naturalized object oriented design.						
CO4	To evaluate object oriented design processes using software maintenance process, configuration management and maintenance models to articulate better software system for performing required tasks.						

Unit 1: Introduction, Methods and Concepts

Introduction: Object oriented concepts, Object-oriented domain analysis, software reuse, software life cycle models, unified modeling language (UML).

Object-oriented methods (OOM): Overview, Goals, Concepts: Object analysis model, Information model. Behavior model, Process model, Requirements definition model, benefits and weaknesses.

Unit 2: Object-Oriented Software Development Methods and Methodologies

Object-oriented software development methods: ObjectOry: System development and analysis, use cases, entities, interface objects, services and system design, advantages, Introduction to Object-oriented structured design and application examples.

Object-oriented Methodologies: Classification, Rumbaugh methodology, Jacobson methodology, Booch methodology, Responsibility-Driven design, Pun and Winder methodology, Shlaer/Mellor methodology.

Unit 3: Object-Oriented Design, Reusability and Life Cycle Issues

Object-Oriented Design: Representation of design model, Identification of components, classes, inheritance and objects, Identification of software behavior, Suitability of Methodology for Object-Oriented Design (MOOD), Context of MOOD, A CASE environment for MOOD, MOOD tools.

Reusability and Life Cycle Issues: Reusability during Object-Oriented design, Object-Oriented software life cycle model, Software life cycle issues.

Unit 4: Software Maintenance Concepts and Object-Oriented Programming Languages

Software Maintenance Concepts: Software maintenance process, Reverse engineering environment, Documentation for Software maintenance, Software configuration management and Software maintenance models.

Object-Oriented Programming Languages: Simula, SmallTalk, Ada95, Object COBOL.

Text Books:

1. Jag Sodhi, Prince Sodhi, Object-Oriented Methods for Software Development, McGraw-Hill.
2. Luiz Fernando Capretz, Miriam A M Captrez, Object-Oriented Software: Design and Maintenance, World Scientific.
3. Luiz Fernando Capretz, Object-Oriented Design Methodologies for Software Systems, Ph.D. Thesis, University of Newcastle upon Tyne, United Kingdom, November 1991. Available Online at: https://theses.ncl.ac.uk/dspace/bitstream/10443/1967/1/Capretz,%20L.F.%201991.pdf
4. Ali Bahrami, Object Oriented Systems Development: McGraw Hill, 1999.
5. Rumbaugh*et al*.,Object Oriented Modeling and Design, PHI, 1997 .
6. Wendy Boggs, Michael Boggs, Mastering UML with Rational Rose, Sybex BPB Publications, 2007.

Reference Books:

1 Object-Oriented Analysis and Design with Applications (3rd Edition) 3rd Edition, Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, Addison-Wesley, 2007
2. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, 1st Edition, , Addison-Wesley, 2007
3. Refactoring: Improving the Design of Existing Code (Addison-Wesley Object Technology Series), Martin Fowler, Kent Beck, John Brant, William Opdyke, Don Roberts, Erich Gamma, Addison-Wesley, 2007
4. Object Oriented Analysis and Design: Understanding System Development with UML 2.0, Mike O' Docherty, Wiley India, 2010.

MTCE-203A	Big Data Analytics							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
4	0	0	4	60	40	--	100	3 Hrs.
Program Objective (PO)	Understand big data for business intelligence. Learn business case studies for big data analytics. Understand NoSQL big data management. Perform map-reduce analytics using Hadoop and related tools							
Course Outcomes (CO)								
CO1	Understand the basics of big data							
CO2	Understand the detailed explanation of NoSQL							
CO3	Analysing the data with Hadoop and learn the MapReduce							
CO4	Description on Hbase, Pig and Hive							

Unit 1

What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

Unit 2

Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.

Unit 3

Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures

MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats

Unit 4

Hbase, data model and implementations, Hbase clients, Hbase examples, praxis.Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.

Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts.

Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.

References:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of
4. Polyglot Persistence", Addison-Wesley Professional, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
7. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
8. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
9. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
10. Alan Gates, "Programming Pig", O'Reilley, 2011.

MTCE-205A	Digital Image Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	**Introduces the working knowledge of how digital image processing is implemented by using various algorithms and also the various techniques of transformation, enhancement, restoration, compression, segmentation and image morphology.**						
Course Outcomes (CO)							
CO1	Knowledge in the science of images and image processing.						
CO2	To apply knowledge of mathematics, science and engineering in the area of computer vision.						
CO3	knowledge in the techniques of Digital Image Processing, including Image Enhancement in the Spatial and Frequency Domain, Compression, Morphology and Segmentation.						
CO4	Learn and apply knowledge in analyzing image segmentation, representation, description, and recognition techniques.						
CO5	Design and implement computer vision systems to detect, localize and recognize objects within images.						

Unit 1

Introduction And Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Unit 2

Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.

Unit 3

Image Restoration:A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-InvarientDedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

Unit 4

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

Object Recoginition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

Text Books:

1 Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education, 2004.

2 A.K. Jain, "Fundamental of Digital Image Processing", PHI, 2003.

Reference Books:

1 RosefieldKak, "Digital Picture Processing", 1999.

3. W.K. Pratt, "Digital Image Processing", 2000.

MTOE-201A	Business Analytics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of this course is to give the student a comprehensive understanding of business analytics methods.						
Course Outcomes (CO)							
CO1	*Able to have knowledge of various business analysis techniques.*						
CO2	*Learn the requirement specification and transforming the requirement into different models.*						
CO3	*Learn the requirement representation and managing requirement assests.*						
CO4	*Learn the Recent Trends in Embedded and collaborative business*						

Unit 1

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.

Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Unit 2

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.

Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit 3

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.

Managing Requirements Assets: Change Control, Requirements Tools

Unit 4

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

References:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

MTOE-203A	Industrial Safety						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the industrial safety.*						
Course Outcomes (CO)							
CO1	*Understand the industrial safety.*						
CO2	*Analyze fundamental of maintenance engineering.*						
CO3	*Understand the wear and corrosion and fault tracing.*						
CO4	*Understanding that when to do periodic inceptions and apply the preventing maintenance.*						

Unit-1

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-2

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-3

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-4

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205A	**Operations Research**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.						
Course Outcomes (CO)							
CO1	*Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.*						
CO2	*Students should able to apply the concept of non-linear programming*						
CO3	*Students should able to carry out sensitivity analysis*						
CO4	*Student should able to model the real world problem and simulate it.*						

Unit -1

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit -2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit- 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit -4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207A	Cost Management of Engineering Projects						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the strategic cost management process.*						
CO2	*Students should able to types of project and project team types*						
CO3	*Students should able to carry out Cost Behavior and Profit Planning analysis.*						
CO4	*Student should able to learn the quantitative techniques for cost management.*						

Unit-1

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost.Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-2

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities.Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts.Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-3

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems.Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector.Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets.Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit-4

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209A	**Composite Materials**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the composite materials and their properties.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification and characteristics of Composite materials.*						
CO2	*Students should able reinforcements Composite materials.*						
CO3	*Students should able to carry out the preparation of compounds.*						
CO4	*Student should able to do the analysis of the composite materials.*						

UNIT–1:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites.Functional requirements of reinforcement and matrix.Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

UNIT – 2

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostaticpressing.Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–3

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – 4

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

MTOE-211A	**Waste to Energy**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the generation of energy from the waste.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification of waste as a fuel.*						
CO2	*Students should able to learn the Manufacture of charcoal.*						
CO3	*Students should able to carry out the designing of gasifiers and biomass stoves.*						
CO4	*Student should able to learn the Biogas plant technology.*						

Unit-1

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-2

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-3

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-4

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

MTCE-117A	SQMT Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**ThisSoftware Laboratory focuses on test case generation on testing different kinds of software and to provide the in-depth coverage of software quality models and software testing strategies.**						
Course Outcomes (CO)							
CO1	To develop test cases for any problem						
CO2	To pursue testing on any level of software design by using different testing strategies						
CO3	Create a test plan document of real time applications.						
CO4	To apply testing tools for designing the test case to test the real time application.						

 # Case Study 1: Write the test cases for the largest of three numbers based on:

- Boundary value analysis test
- Robustness based testing
- Equivalence class partitioning test
- Decision table based test

 # Case Study 2: Cause Effect Graph Testing for a Triangle Program

Perform cause effect graph testing to find a set of test cases for the following program specification: Write a program that takes three positive integers as input and determine if they represent three sides of a triangle, and if they do, indicate what type of triangle it is. To be more specific, it should read three integers and set a flag as follows:

- If they represent a scalene triangle, set it to 1.
- If they represent an isosceles triangle, set it to 2.
- If they represent an equilateral triangle, set it to 3.
- If they do not represent a triangle, set it to 4.

 # Case Study 3: Boundary Value Analysis for a Software Unit

The following is a specification for a software unit. The unit computes the average of 25 floating point numbers that lie on or between bounding values which are positive values from 1.0 (lowest allowed boundary value) to 5000.0 (highest allowed boundary value). The bounding values and the numbers to average are inputs to the unit. The upper bound must be greater than the lower bound. If an invalid set of values is input for the boundaries an error message appears and the user is

reported. If the boundary values are valid the unit computes the sum and the average of the numbers on and within the bounds. The average and sum are output by the unit, as well as the total number of inputs that lie within the boundaries. Derive a set of equivalence classes for the averaging unit using the specification, and complement the classes using boundary value analysis. Be sure to identify valid and invalid classes.

Design a set of test cases for the unit using your equivalence classes and boundary values. For each test case, specify the equivalence classes covered, input values, expected outputs, and test case identifier. Show in tabular form that you have covered all the classes and boundaries. Implement this module in the programming language of your choice. Run the module with your test cases and record the actual outputs. Save an uncorrected version of the program for future use.

 # Case Study 4: Write the test cases for any known application (e.g. banking application) using

I) Basis path testing

II) Component testing

III) Data flow analysis test

 # Case Study 5: Create a test plan document for any application (e.g. Library Management System)

 # Case Study 6: Model Based Testing

Design and develop a scientific calculator program using various GUI components and events. Build the test model for the same. Determine the inputs that can be given to the model.

Calculate expected output for the model. Run the test cases. Compare the actual output with the expected output. Any model-based technique can be used for building the test model.

 # Case Study 7: Study and implementation of

- Mutation test
- Slice based test

 # Case Study 8: Introduction to any two open source testing tool:

- Study of any testing tool (e.g. Win runner)
- Study of any web testing tool (e.g. Selenium)
- Study of any bug tracking tool (e.g. Bugzilla, bugbit)
- Study of any test management tool (e.g. Test Director)
- Study of any open source-testing tool (e.g. Test Link)

 # Case Study 9: Web Application Testing for Student Grade System

With educational organizations under increasing pressure to improve their performance tosecure funding for future provision of programmes, it is vital that they have accurate, up-to-dateinformation. For this reason, they have MIS systems to record and track student enrolment andresults on completion of a learning programme. In this way they can monitor achievementstatistics.All student assignment work is marked and recorded by individual module tutors usinga spreadsheet, or similar, of their own design. In the computing department these results areinput into a master spreadsheet to track a student's overall progress throughout theirprogramme of study. This is then made available to students through the web portal used incollege. Perform web application testing for this scenario.

MTCE-119A	**Distributed Operating System Lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To get awareness of Distributed Operating System and getting knowledge of various design aspects of operating system.						
Course Outcomes (CO)							
CO1	Understand the design aspects of operating system						
CO2	Exposure on usage of various operating systems.						
CO3	Design modern distributed system components.						

List of Practical

1. Simulate the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority

2. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked

3. Implement process strategies: creation of Child, Zombie, and Orphan process

4. Implement file organization strategies a) Single level b) Two level c) Hierarchical

5. Simulate Bankers Algorithm for Dead Lock Avoidance

6. Simulate Bankers Algorithm for Dead Lock Prevention

7. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU

8. Implement shared memory and semaphore concepts for Inter process communication

MTCE-121A	Number Theory and Cryptography Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To be able to implement and analyze algorithms for different encryption techniques. Applications to cryptography are explored including symmetric and public-key cryptosystems. To be able to implement different methods of attacks on data.**						
Course Outcomes (CO)							
CO1	To understand mathematics behind cryptography.						
CO2	Students will be able to implement algorithms of cryptography, including encryption/decryption and hash functions.						
CO3	Students will be able to implement various network security practice applications.						
CO4	Identify various attacks and formulate defense mechanism.						

LIST OF EXPERIMENTS

1. Write a program to implement encryption using binary/byte addition.
2. Write a program to implement encryption using binary Exclusive-OR (XOR).
3. Write a program to implement Triple DES with CBC mode and Weak DES keys.
4. Write a program to implement RSA Encryption and Factorization Attacks.
5. Write a program to implement Attack on RSA encryption with short RSA modulus.
6. Write a program to implement hash generation and sensitivity of hash functions to plaintext modifications.

7. Write a program to implement Digital Signature Visualization.
8. Write a program to implement RSA Signature.
9. Write a program to implement Attack on Digital Signature/Hash Collision.
10. Write a program to implement Firewalls and IDS.

MTCE-123A	Soft Computing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To get awareness of Neural Network based learning and training; and getting knowledge of various Neural Network training based learning techniques. To explore the knowledge through implementation the Evolutionary approaches like Genetic and Differential Evolution.						
Course Outcomes (CO)							
CO1	To be able to get basic concepts of Neural Networks.						
CO2	To get understanding of designing and training various Neural Networks like AND, OR, X-OR Logic.						
CO3	Students are able to analyse and provide solutions for real world problems using Soft Computing techniques.						
CO4	Implementation of stochastic population-based Genetic and Differential Evolutionary approaches.						

LIST OF EXPERIMENTS

1. Study of different types of Neural Networks.
2. To design and train AND gate using neural network training.
3. To design and train OR gate using neural network training.
4. To design and train X-OR gate using neural network training.
5. To design and train AND gate using Back propagation (BPN).

6. To design and train OR gate using Back propagation.
7. To design and train X-OR gate using Back propagation.
8. To implement Genetic Algorithm using soft computing approach.
9. To implement Differential Evolutionary approach for solving stochastic problems.
10. To solve real-world problems using population-based Genetic and Differential Evolutionary approaches.

MTCE-125A	**Algorithm Analysis and Design Lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**The student will learn how to design the algorithm techniques, become familiar with the different algorithm design techniques and improve the efficiency of existing algorithms.**						
Course Outcomes (CO)							
CO1	The student should be able to Design algorithms for real time problems						
CO2	The student should be able to Analyse the time and space complexity of algorithms.						
CO3	Students will be able to learn how to improve the efficiency of algorithms.						
CO4	To apply testing tools for designing the test case to test the real time application.						

List of Practical

1. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.

2. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

3. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.
4. Implement 0/1 Knapsack Problem using Dynamic Programming.
5. Print all the nodes reachable from a given starting node in a digraph using BFS method.
6. Implement Huffman code using Greedy approach.
7. Implement Naïve String matching technique to match the string.
8. Implement N Queen's problem using Back Tracking.
9. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
10. Implement longest common subsequence.

MTCE-127A	**Speech and Language Processing Lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**This Software Laboratory focuses on study of speech and the process of natural language in forms of token and tag some words to make meaningful. This also extracts information and measure the semantic similarity of sentences.**						
Course Outcomes (CO)							
CO1	To process the basic text in form of Tokenization and Stemming						
CO2	To study distributional properties in large samples of language data						
CO3	To implement and find semantics based on lexical semantics						
CO4	To extract information based on relation						

LIST OF PRACTICALS

Case Study 1
Take a sample of sentences and process the text in form of tokenization and normalize this data using stemming

Case Study 2
Take a file of size less than 50MB. now select some word and convert these words to N-grams.

Case Study 3
A part-of-speech tagger, or POS-tagger, processes a sequence of words, and attaches a part of speech tag to each word. take some adjective of English language and tag it.

Case Study 4
To Measure Semantic Similarity between sentences like sentence of "Harry is running fast" and "Harry is Sprinting"

Case Study 5
To associate each word with a word sense disambiguator to select the right meaning among all possible senses for each word.

Case Study 6
Build a system that will extract structured data, such as tables, from unstructured text and use them for training and evaluating models?

Case Study 7
Develop a Model Building in which a machine learning model is trained on a labeled dataset and Improve Performance of Text Classifier

MTCE-122A	Mobile Ad-hoc and Wireless Sensor Networks Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.						
Course Outcomes (CO)							
CO1	Classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.						

CO2	Describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.
CO3	Recently deployed high performance computing standards, MANET, routing protocols as to be gone through.

LIST OF PRACTICALS

1. Create scenarios, simulate, and study the evolution of contention-oriented protocols (Aloha, Slotted Aloha, and Ethernet).
2. Implement ARP to find the medium access control address of the destination using the destination's internet protocol address.
3. Create scenarios, simulate, and study the variation of throughput and Mean Delay as the number of nodes increase.
4. Create scenarios and study the difference in performance (with respect to throughput and delay) between token ring and token bus protocols.
5. Write a program to correct error using hamming code in a data received from a network simulator, error is introduced during transmission through as simulator.
6. Simulate a network implementing X.25 protocol. Change the Automatic Repeat Request (ARQ) protocol and then compare the network's performance.
7. Create a scenario, simulate, and study the performance of the different congestion control algorithms .
8. Write a program for the flow control protocols i.e Stop and wait, Go back-N, selective repeat over UDP and verify through a simulator
9. Implement, and verify through a simulator, a program to create sub-network and assign addresses based on the number of hosts connected to the network.
10. Implement AODV routing protocol in MANET.
11. Implement DSDV routing protocol in MANET.
12. Implement DSR routing protocol in MANET.
13. Study the effect of different Routing protocols (RIP and OSPF) on network's performance through simulation.
14. Create a scenario and study the performance of MANET mobility models.

MTCE-124A	**Information Theory and Coding Lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**This Information Theory and Coding Laboratory get exposure to emerging topics in information theory and coding.**						
Course Outcomes (CO)							

CO1	Determine various entropies and compare channel capacity of different channels.
CO2	Understand techniques of design &performance evaluation of error correcting codes.
CO3	**Design and develop solutions for technical issues related to information coding.**
CO4	Learn about syndrome calculation and design of encoder and decoder.

LIST OF PRACTICALS

1. Write a program for determination of various entropies and mutual information of a given channel. Test various types of channel such as
a) Noise free channel
b) Error free channel
c) Binary symmetric channel
d) Noisy channel
Compare channel capacity of above channels.

2. Implement a program for generation and evaluation of variable length source coding using Huffman Coding and decoding (C/MATLAB).

3. Implement coding and decoding of Cyclic codes.

4. Implement coding and decoding of Linear block codes.

5. Implement coding and decoding of BCH and RS codes.

6. Implement coding and decoding of Convolutional codes.

7. Write a simulation program to implement source coding and channel coding for transmitting a text file.

8. Implement a program to study performance of a coded and uncoded communication system (calculate the error probability).

MTCE-126A	**Agile Software Engineering Lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**

Program Objective (PO)	**This Software Laboratory focuses on to analyze, design and provide optimal solution for Computer Science & Engineering and multidisciplinary problems.**
Course Outcomes (CO)	
CO1	To Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
CO2	To Design solutions for complex engineering problems
CO3	To Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools
CO4	To demonstrate the knowledge of and need for sustainable development. .

1. Understand the background and driving forces for taking an Agile Approach to Software Development. Study the Important Characteristics that make agile approach best suited for Software Development.

2. Understand the business value of adopting agile approach.

3. Study the Agile Process Examples
   a) SCRUM
   b) FDD
   c) Lean software development
   d) XP

3. Understand agile development practices using SCRUM

4. Drive Development with Unit Test using Test Driven Development.

5. Apply Design principle and Refactoring to achieve agility

6. To study automated build tool.

7. To study version control tool.

8. To study Continuous Integration tool.

9. Perform Testing activities within an agile project.

MTCE-128A	Security in Computing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**This Security in computing laboratory provide an applied understanding of the principles of network and computer security.**						
Course Outcomes (CO)							
CO1	Learn about the encryption and decryption using different algorithms.						
CO2	A hands-on experience in attack execution and the use of tools in such attacks.						
CO3	**Create virtual private network to evaluate response time.**						
CO4	The practical knowledge to secure computers and network including the setup of policies and security assessment.						

LIST OF PRACTICALS

1. Write a program for encryption and decryption using DES algorithm in Java.

2. Write a program for encryption and decryption using AES algorithm in Java.

3. Design and implementation of a simple client/server model and running application using sockets and TCP/IP.Eavespdropping attacks and it's prevention using SSH.

4. Create a virtual private network (VPN) WAN to evaluate application response time in the presence and absence of a firewall.

5. Isolate WLAN traffic using separate Firewall for VPN connection.

6. Implement a program to manage security in a small business network.

7. Implement security and networking policies settings across the company.

8. Demonstrate intrusion detection system (IDS) using any tool (snort or any other s/w).

9. Installation of rootkits and study about the variety of options.

10. Implement the simple substitution technique named Caesar cipher using C language.

MTCE-130A	Embedded Systems Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**This laboratory will develop the programming skills in the embedded systems field. Emphasis is given to interface handling; device driver and application development. Programming of mobile devices is included.**						
Course Outcomes (CO)							
CO1	**To Familiarize with programming methods and tools for embedded systems**						
CO2	**To Write efficient programs in C to develop embedded systems**						
CO3	**To Program Device Drivers for embedded systems**						
CO4	**To Program mobile devices**						

LIST OF PRACTICALS/PROGRAMS

1. Design an embedded system for traffic light controller using 8051 microcontroller.
2. Program for an embedded system in C using GNU development tools.
3. Program to demonstrate a simple interrupt handler and setting up a timer.
4. Program to create two tasks which trigger blinking of two LEDs at different timings.
5. Program to send messages to mailbox by one task and read from mailbox by another task.
6. Write an assembly program to configure and control General Purpose Input/Output (GPIO) port pins.
7. Program to imlement Buzzer interface on IDE environment.
8. To interface and convert Digital to Analog data using DAC in ARM processor.
9. To develop, code, configure and test a device driver.
10. To implement concurrency and resource management in mobile devices.

MTCE-132A	Data Mining Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To get awareness of data mining tools and getting knowledge of various performance metrics for evaluation of data mining techniques. To explore the different validation techniques on training data set.						
Course Outcomes (CO)							
CO1	To be able to get basic concepts of data mining.						
CO2	To get understanding of data pre-processing, generalization and data characterization techniques to provide suitable input for a range of data mining algorithms.						
CO3	Students are able to analyze and provide solutions for real world problems using mining association techniques.						
CO4	Examine the different classification & clustering techniques in data mining.						

EXPERIMENTS / OBJECTIVES

1. Study of Data Mining tool.
2. Develop an application to extract association mining rule.
3. Develop an application for classification of data.
4. Develop an application for one clustering technique.
5. Develop an application for implementing Naive Bayes classifier.
6. Implementation of association mining rule –Apriori algorithm.
7. Develop an application for decision tree.
8. To create a Decision tree by training data set.
9. To create a Decision tree by cross validation training data set.
10. To create a Decision tree by using Prune mode and Reduced error Pruning and show accuracy for cross validation trained data set.

	Dissertation Part-I (MTCE-207A) and Dissertation Part-II (MTCE-202A)
Course Outcomes (CO)	
CO1	Ability to synthesize knowledge and skills previously gained and applied to an in depth study and execution of new technical problem.
CO2	Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
CO3	Ability to present the findings of their technical solution in a written report.
CO4	Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following:

Relevance to social needs of society

Relevance to value addition to existing facilities in the institute

Relevance to industry need

Problems of national importance

Research and development in various domain.

The student should complete the following:

Literature survey Problem Definition

Motivation for study and Objectives

Preliminary design / feasibility / modular approaches

Implementation and Verification

Report and presentation

The dissertation part- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Part – I and II

As per the AICTE directives, the dissertation is an yearlong activity, to be carried out and evaluated in two parts i.e. Part– I: July to December and Part– II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.

The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing Engineering and any other related domain. In case of Industry sponsored projects, the relevant application notes, white papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Part–I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper, proof of concept/functionality, part results, and record of continuous progress.

Part–I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Part-I work.

During Part– II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
Part–II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, and record of continuous progress.
Part-II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the Part-I work.

MTRM-111A	**Research Methodology and IPR**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*						

Course Outcomes (CO)	
CO1	Understand research problem formulation.
CO2	Analyze research related information
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

Unit 1

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology.Patent information and databases.Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc.Traditional knowledge Case Studies, IPR and IITs.

References:

1. Melville and Wayne Goddard, "Research methodology: an introduction for science & Stuart engineering students'.
2. C.R. Kothari, "Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 ndEdition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

MTAD-101A	**English For Research Paper Writing**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Student will able to understand the basic rules of research paper writing.*						
Course Outcomes (CO)							
CO1	*Understand that how to improve your writing skills and level of readability*						
CO2	*Learn about what to write in each section*						
CO3	*Understand the skills needed when writing a Title*						
CO4	*Ensure the good quality of paper at very first-time submission*						

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

References:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

MTAD-103A	Disaster Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Develop an understanding of disaster risk reduction and management*						
Course Outcomes (CO)							
CO1	*Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*						
CO2	*Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*						
CO3	*Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*						
CO4	*critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in*						

Unit 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment.Strategies for Survival.Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation.Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

References:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi.

MTAD-105A	Sanskrit for Technical Knowledge						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*						
Course Outcomes (CO)							
CO1	*To get a working knowledge in illustrious Sanskrit, the scientific language in the world*						
CO2	*Learning of Sanskrit to improve brain functioning*						
CO3	*Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*						
CO4	*The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*						

Unit –1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Unit – 2

Order, Introduction of roots,Technical information about Sanskrit Literature

Unit –3

Technical concepts of Engineering: Electrical, Mechanical

Unit –4

Technical concepts of Engineering: Architecture, Mathematics

References

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

MTAD-107A	Value Education						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*						
Course Outcomes (CO)							
CO1	*Knowledge of self-development*						
CO2	*Learn the importance of Human values*						
CO3	*Developing the overall personality*						
CO4	*Know about the importance of character*						

Unit 1

Values and self-development –Social values and individual attitudes.Work ethics, Indian vision of humanism.Moral and non- moral valuation.Standards and principles.Value judgements.

Unit 2

Importance of cultivation of values.Sense of duty.Devotion, Self-reliance.Confidence, Concentration.Truthfulness, Cleanliness.Honesty, Humanity.Power of faith, National Unity.Patriotism.Love for nature,Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude.Positive Thinking.Integrity and discipline.Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits.Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith.Self-management and Good health.Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

References

1.Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

MTAD-102A	**Constitution of India**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*						
Course Outcomes (CO)							
CO1	*Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*						
CO2	*Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*						
CO3	*Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*						
CO4	*Discuss the passage of the Hindu Code Bill of 1956.*						

Unit I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

References

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MTAD-104A	Pedagogy Studies						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*.						
Course Outcomes (CO)							
CO1	*What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*						
CO2	*What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*						
CO3	*How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*						
CO4	*What is the importance of identifying research gaps?*						

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Unit 2

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change.Strength and nature of the body of evidence for effective pedagogical practices.Pedagogic theory and pedagogical approaches.Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 3

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

Unit 4

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

References

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

MTAD-106A	Stress Management by Yoga						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress						
Course Outcomes (CO)							

CO1	*Develop healthy mind in a healthy body thus improving social health.*
CO2	*Improve efficiency*
CO3	*Learn the Yogasan*
CO4	*Learn the pranayama*

Unit – 1

Definitions of Eight parts of yog (Ashtanga).

Unit- 2

Yam and Niyam, Do`s and Don't's in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit- 3

Asan and Pranayam, Various yog poses and their benefits for mind & body,

Unit- 4

Regularization of breathing techniques and its effects-Types of pranayam.

References

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-110A	**Personality Development and Soft Skills**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**--**	**100**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To become a person with stable mind, pleasing personality and determination in order to achieve the highest goal.							
Course Outcomes (CO)								
CO1	Students become aware about leadership.							
CO2	Students will learn how to improve communication skills							
CO3	Understand the team building and conflict							
CO4	Student will learn how to manage the time.							

Unit 1

Leadership Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in Administration. Interpersonal: Introduction to Interpersonal Relations, Analysis Relations of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Unit II

Communication: Introduction to Communication, Flow of Communication, Listening, Barriers of Communication, How to overcome barriers of communication.

Stress Introduction to Stress, Causes of Stress, Impact Management Stress, Managing Stress

Unit III

Group Dynamics and team Building: Importance of groups in organization, Interactions in group, Group Decision Taking, Team Building, Interaction with the Team, How to build a good team?

Conflict: Introduction to Conflict, Causes of Conflict, Management Managing Conflict

Unit IV

Time Management: Time as a Resource, Identify Important Time Wasters, Individual Time Management Styles, Techniques for better Time Management.

Motivation: Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

Suggested reading

- E.Berne, Games People Play, Grove Press Inc., 1964; Penguin, 1968.
- Hargreaves, G. Stress Management, Marshall Publishing, London 1998
- Barker D, TA and Training, Gower Publishing Company Ltd., 1982.
- Jongewardm D &Seyer P C, Choosing Success, John Wiley & Sons Inc.1978
- Arnold, JHC Feldman, D.C. Organizational Behaviour IRWIN/McGRAW-HILL 1986
- Chandan, J.S., Organizational Behaviour. Vikas Publishing House PVT LTD 1994
- Statt, D.A. Using Psychology in Management Training, Taylor and Francis Inc.2000
- Luthans F., OrganisationalBehaviour, IRWIN/McGRAW-HILL 1998

KURUKSHETRA UNIVERSITY, KURUKSHETRA

('A+' Grade, NAAC Accredited)

SCHEME OF EXAMINATIONS FOR
MASTER OF TECHNOLOGY IN
Information Technology (IT)
(W. E. F. SESSION: 2018-19)

SEMESTER-I

S. No.	Course Code	Subject	Teaching Schedule			Hours/ Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Practical	Total		
1	MTIT-101A	Parallel Computer Architecture	3	0	0	3	60	40	--	100	3	**3**
2	MTIT-103 A	Mobile computing	3	0	0	3	60	40	--	100	3	**3**
3	*	Program Elective -I	3	0	0	3	60	40	--	100	3	**3**
4	**	Program Elective -II	3	0	0	3	60	40	--	100	3	**3**
5	MTIT-117 A	Software Lab I – Mobile computing lab	0	0	4	4	--	40	60	100	3	**2**
6	MTIT-119 A	Software Lab II - Signal and system	0	0	4	4	--	40	60	100	3	**2**
7	MTRM-111 A	Research Methodology and IPR	2	0	0	2	60	40	--	100	3	**2**
8	***	Audit Course-I	2	0	0	2	--	100	--	100	3	**0**
Total						**24**	**300**	**240**	**120**	**700**	**-**	**18**

***Program Elective –I**		****Program Elective -II**	
Course No.	**Subject**	**Course No.**	**Subject**
MTIT-105 A	Signals and System	MTIT-111 A	Information Storage management
MTIT-107 A	Advanced computer architecture	MTIT-113 A	SoftComputing
MTIT-109 A	Number Theory and Cryptography	MTIT-115 A	Advanced Computer Networks

*****Audit Course-I**	
Course No.	**Subject**
MTAD-101 A	English for Research Paper Writing
MTAD-103 A	Disaster Management
MTAD-105 A	Sanskrit for Technical Knowledge
MTAD-107 A	Value Education

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. *** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

SEMESTER-II

S. No.	Course Code	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Practical	Total		
1	MTIT-102 A	Digital Signal Processing	3	0	0	3	60	40	--	100	3	**3**
2	MTIT-104 A	Stochastic Processes & Queueing Theory	3	0	0	3	60	40	--	100	3	**3**
3	*	Program Elective-III	3	0	0	3	60	40	--	100	3	**3**
4	**	Program Elective-IV	3	0	0	3	60	40	--	100	3	**3**
5	MTIT-118 A	Software Lab I	0	0	4	4	--	40	60	100	3	**2**
6	MTIT-120 A	Software Lab II – Information theory and coding	0	0	4	4	--	40	60	100	3	**2**
7	MTIT-122 A	Mini Project with Seminar	2	0	0	2	-	100	--	100	3	**2**
8	***	Audit Course-II	2	0	0	2	--	100	--	100	3	**0**
Total						**24**	**240**	**340**	**120**	**700**	**-**	**18**

***Program Elective –III**		****Program Elective -IV**	
Course No.	**Subject**	**Course No.**	**Subject**
MTIT-106 A	Design Patterns	MTIT-112 A	Enterprise Resource Planning
MTIT-108 A	Information Theory and Coding	MTIT-114 A	Algorithm Analysis and Design
MTIT-110 A	Security In Computing	MTIT-116 A	Data Mining

*****Audit Course-II**	
Course No.	**Subject**
MTAD-102 A	Constitution of India
MTAD-104 A	Pedagogy Studies
MTAD-106 A	Stress Management by Yoga
MTAD-108 A	Personality Development through Life Enlightenment Skills

Note 1: After the second semester exams, the students are encouraged to go to Industrial Training/Internship for at least 6-8 weeks during the summer break with a specific objective for Dissertation Part–I (MTIT-207A). The industrial Training/Internship would be evaluated as the part of the Dissertation–I (with the marks distribution as 40 marks for Industrial Training/Internship and 60 marks for Dissertation Part–I).

Note 2: The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

*****Note 3:**Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

SEMESTER-III

S. No.	Course Code	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Practical	Total		
1	*	Program Elective -V	3	0	0	03	60	40	--	100	3	**3**
2	**	Open Elective	3	0	0	03	60	40	--	100	3	**3**
3	MTIT-207 A	Dissertation Part-I	0	0	20	10	--	100		100	--	**10**
Total							**120**	**180**	**0**	**300**		**16**

***Program Elective-V**	
Course No.	**Subject**
MTIT-201 A	Mobile Ad-hoc and Wireless Sensor Networks
MTIT-203 A	Advances in algorithms
MTIT-205 A	Genetic Algorithm

****Open Elective**		
1.	MTOE-201 A	Business Analytics
2.	MTOE-203 A	Industrial Safety
3.	MTOE-205 A	Operations Research
4.	MTOE-207 A	Cost Management of Engineering Projects
5.	MTOE-209 A	Composite Materials
6.	MTOE-211 A	Waste to Energy

SEMESTER: IV

S. No.	Course Code	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs.)	Credit
			L	T	P		Major Test	Minor Test	Practical	Total		
1	MTIT-202 A	Dissertation Part-II	0	0	32	16	--	100	200	300	--	16
Total						**16**		**100**	**200**	**300**		16

Total Credits – 68

Note 1: At the end of the second semester each student is required to do his/her Dissertation work in the identified area in consent of the Guide/Supervisor. Synopsis for the Dissertation Part-I (MTIT-207A) is to be submitted within three weeks of the beginning of the Third Semester.

Note 2: Each admitted student is required to submit the report of his/her Dissertation Part-I (MTIT-207A) as per the schedule mentioned in Academic calendar for the corresponding academic session otherwise the Dissertation Part-II (MTIT-202A) cannot be continued at any level.

Note 3: Each admitted student is required to submit his/her final Dissertation Part-II (MTIT-202A) as per the schedule

mentioned in Academic calendar for the corresponding academic session only after the publication of two papers in a journal/International/National conference of repute like IEEE, Springer, Elsevier, ACM etc.

Note 4: The course of program/open elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

MTIT – 101 A	**Parallel Computer Architecture**					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To learn the advanced concepts of Computer Architecture**					
CO 1	To learn the parallel models and processors					
CO 2	Pipelining and scalable architectures					
CO 3	Memory organization					
CO 4	To learn the multithreaded and data flow architecture					

Unit -I

Introduction to parallel processing

Basic concepts – types and level of parallelism - classification of parallel architecture – basic parallel techniques - shared memory multiprocessors – distributed memory multicomputer – parallel Random access machine – VLSI complexity model .

Unit -II

Processors and memory hierarchy

Advanced processor technology – Super scalar and vector processors – Memory hierarchy technology, virtual memory technology – cache memory organization – shared – memory organization.

Unit -III

Pipelining and superscalar techniques

Linear pipeline processors – Nonlinear pipeline processors – Instruction pipeline design –Arithmetic pipeline design – Superscalar pipeline design

Unit -IV

Parallel and scalable architecture

Cache coherence and synchronization mechanisms – coherence problem – snoopy bus and directory based protocol - Vector processing principle Vector instruction types – vector access memory schemes - SIMD computer organization - Implementation models - CM2 – architecture latency hiding techniques

Principles of Multithreading – issues and solutions – multiple context processors - Scalable and Multithreaded architectures- Stanford Dash multiprocessor - KSR1 - Dataflow computer-static data flow computer -Dynamic data flow computer

Text books

1. Kai Hwang, "*Advanced Computer Architecture", Parallelism, Scalability, Programmability*", McGraw Hill, 1993.
2. Hwang Briggs, "*Computer Architecture and parallel processing*", McGraw Hill, 1984.

Reference books

1. Dezsosima, Terence Fountain ,PeterKarsuk , " *Advanced Computer Architectures : A design space approach*" , Addison Wesley, 1997.
2. David Culler , Jaswinder Pal Singh , Anoop Gupta , "*Parallel Computer Architecture A Hardware/Software Approach*" ,Elsevier

MTIT- 103 A	Mobile Computing					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**The course aims to provide basic understanding about Mobile Communication , Mobile Hardware, Mobile Software**					
Course Outcomes						
CO 1	To understand about the architecture for Mobile Computing					
CO 2	To get an idea about the mobile computing through telephony and GPRS,					
CO 3	To understand the WAP and Symbian OS, Windows CE with wireless devices					
CO 4	To understand mobile computing through Java					

UNIT – 1

Introduction and mobile computing architecture

Mobility of bits and bytes-Mobile computing-Networks- Middleware and gateways-Applications and services-Developing mobile computing applications- Security in mobile computing- Architecture for mobile computing- Design considerations for mobile computing

UNIT – I1

Mobile computing through telephony and gprs

Multiple Access procedures-mobile computing through telephone- Voice XMLTelephony Application Programming Interface- GPRS and packet data network- GPRS Network Architecture-GPRS Network Operations-Data Services in GPRSApplications and limitations of GPRS

UNIT – 1

Wap and wireless devices with symbianos

Wireless Application protocol-MMS-GPRS Applications-Client Programming: Mobile phones-PDA-Design constraints in applications for handheld devices- Wireless devices with Symbian OS-Symbian OS Architecture-Applications for Symbian-Controls and Compound controls- Security on the Symbian OS

UNIT – 1

J2ME

J2ME Technology-CDC-CLDC-Programming for CLDC-MIDlet event handling-GUI in MIDP-UI Design issues-Record Management System-communication in MIDPSecurity considerations in MIDP

18 IT2013 SRM(E&T) ; Framework for voice over IP-Session Initiation Protocol-Real time protocols- Convergence technologies-Call routing-Voice over IP applications-IMS-Mobile VoIP-Security Protocols-Security framework for mobile environment

Text Books

1. Asoke K Talukder, Roopa R Yavagal "*Mobile Computing Technology, Applications and Service Creation*" Tata McGraw Hill, 2005.
2. Yu-Kwong Ricky Kwok, Vincent K.N. Lau, "*Wireless Internet and Mobile Computing: Interoperability and Performance* ", Wiley-IEEE Press,

Reference Book

1. Frank Adelstein, Sandeep KS Gupta , Golden Richard III,LorenSchwiebert, "F*undamentals of Mobile and Pervasive Computing",* McGraw-Hill Professional;

MTIT-105 A	Signal and system					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To familiarize the students with the basic concepts of signals and systems**					
Course Outcomes						
CO 1	Introduction and classification of signals and systems based on their properties.					
CO 2	To understand the basic concepts of random variables and LTI systems.					
CO 3	Familiarization with the sampling process and spectral analysis of signals using Fourier Series.					
CO 4	Apply transform techniques to analyze continuous-time and discrete-time signals and systems					

Unit-I

Introduction to Signals: Continuous and discrete time signals, deterministic and stochastic signals, periodic and a periodic signals, even and odd signals, energy and power signals, exponential , sinusoidal signals and singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation

Introduction to Systems: Linear and non-linear systems, time invariant and time varying systems, lumped and distributed systems,deterministic and stochastic systems, casual and non-causal systems, analog and discrete / digital memory and memory less systems.

Unit-II

Random Variables: Introduction to Random Variables, pdf, cdf, moments, distributions, correlation functions.

Linear Time Invariant Systems: Introduction to linear time invariant (LTI) systems, properties of LTI systems, convolution integral, convolution sum, causal LTI systems described by differential and difference equations. Concept of impulse response

Unit-III

Discretisation of Analog Signals: Introduction to sampling, sampling theorem and its proof. Effect of under sampling, reconstruction of a signal from sampled signal.

Fourier Series : Continuous time Fourier series (CTFS), Properties of CTFS, Convergence of Fourier series, Discrete time Fourier Series (DTFS), Properties of DTFS , Fourier series and LTI system, Filtering.

Unit-IV

Fourier Transform: Continuous Time Fourier Transform (CTFT), Properties of CTFT, Systems characterized by linear constant- coefficient differential equations.

Discrete time Fourier transform (DTFT), Properties of DTFT, Duality, Systems characterized by Linear constant coefficient difference equations.

Laplace Transform: Introduction to Laplace transform, Region of convergence for laplace transform, Inverse laplace transform, Properties oflaplace transform, Analysis and characterization of LTI systems using laplace transform, System function algebra and block diagram representations, Unilateral laplace transform.

Text Books:

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Signals and Systems, Prentice Hall

India, 2nd Edition, 2009

Reference Books:

1. Simon Haykins – "Signal & Systems", Wiley Eastern
2. Tarun Kumar Rawat , Signals and Systems , Oxford University Press.

MTIT-107 A	**Advanced Computer Architecture**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and compare different parallel computers, processor architectures and various techniques to improve processor performance.						
Course Outcomes (CO)							
CO1	Classify parallel computers based on different criteria and compare various program flow mechanisms.						
CO2	Contrast various processor architectures and solve problems of routing in various interconnection networks.						
CO3	Explain various instruction pipeline design techniques, memory hierarchy concepts and identify ways to reduce miss penalty and miss rate.						
CO4	Describe and distinguish various cache coherence protocols used in various shared memory architectures.						

Unit 1

Parallel computer models: The state of computing, Classification of parallel computers, Multiprocessors and multicomputer, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit 2

System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit 3

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Memory Hierarchy Design: Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

Unit 4

Multiprocessor Architectures: Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design trade-offs, synchronization,

Enterprise Memory subsystem Architecture: Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

Text Books:

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

Reference Books:

1. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998.
2. V.Rajaranam&C.S.R.Murthy, "Parallel computer"; PHI. 2002.
3. R.K.Ghose, RajanMoona&Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
4. Stalling W, "Computer Organisation & Architecture", PHI. 2000
5. D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley,1997.
6. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
7. D.A.Patterson, J.L.Hennessy, "Computer Architecture: A quantitative approach"; Morgan Kauffmann, February, 2002.
8. Hwan and Briggs, "Computer Architecture and Parallel Processing"; MGH. 1999.

MTIT-109 A	**Number Theory and Cryptography**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	To introduce the concepts and methodology used in the Number Theory and Cryptography.						
Course Outcomes (CO)							
CO1	To introduce the mathematical fundamentals involve in cryptography.						
CO2	To describe the process of primality testing and factorization						
CO2	To understand the strength and weakness of cryptosystems						
CO3	To introduce the elliptic curve cryptography.						

Unit I

Elementary Number Theory: Divisibility, Division Algorithm, Euclidean Algorithm; Congruences, Complete Residue systems, Reduced Residue systems; Fermat's little theorem, Euler's Generalization, Wilson's Theorem; Chinese Remainder Theorem, Generalized Chinese Remainder Theorem-Euler Phi-function, multiplicative property; Finite Fields, Primitive Roots; Quadratic Residues, Legendre Symbol, Jacobi Symbol; Gauss's lemma, Quadratic Reciprocity Law.

Unit II

Primality Testing and Factorization: Primality Tests; Pseudo primes, Carmichael Numbers; Fermat's pseudoprimes, Euler pseudo primes; Factorization by Pollard's Rho method; Simple Continued Fraction, simple infinite continued fractions; Approximation to irrational numbers using continued fractions; Continued Fraction method for factorization.

Unit III

Public Key Cryptosystems: Traditional Cryptosystem, limitations; Public Key Cryptography; Diffie Hellmann key exchange; Discrete Logarithm problem; One-way functions, Trapdoor functions; RSA cryptosystem; Digital signature schemes; Digital signature standards; RSA signature schemes; Knapsack problem; El Gamal Public Key Cryptosystem; Attacks on RSA cryptosystem: Common modulus attack; Homomorphism attack, timing attack; Forging of digital signatures; Strong primes, Safe primes, Gordon's algorithm for generating strong primes.

Unit IV

Elliptic Curve Cryptography: Cubic Curves, Singular points, Discriminant; Introduction to Elliptic Curves, Geometry of

elliptic curves over reals; Weierstrass normal form, point at infinity; Addition of two points; Bezout's theorem, associativity; Group structure, Points of finite order; Elliptic Curves over finite fields, Discrete Log problem for Elliptic curves; Elliptic Curve Cryptography; Factorization using Elliptic Curve; Lenstra's algorithm; ElGamal Public Key Cryptosystem for elliptic curves.

Reference Books:

1. A Course in Number Theory and Cryptography, Neal Koblitz, (Springer 2006).
2. An Introduction to Mathematical Cryptography, Jill Pipher, Jeffrey Hoffstein, Joseph H.Silverman (Springer, 2008).
3. An Introduction to theory of numbers, Niven, Zuckerman and Montgomery, (Wiley 2006).
4. Elliptic curves: Number theory and cryptography, Lawrence C. Washington, (Chapman & Hall/CRC 2003).
5. An Introduction to Cryptography, R.A. Mollin (Chapman & Hall, 2001).
6. Rational Points on Elliptic Curves, Silverman and Tate (Springer 2005).
7. Guide to elliptic curve cryptography Hankerson, Menezes, Vanstone (Springer, 2004).
8. Elementary Number Theory, Jones and Jones (Springer, 1998).

MTIT- 111 A	**Information Storage Management**					
Lecture	**Tutori**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**The course aims to provide basic understanding about Information Storage and Management**					
Course Outcomes						
CO 1	Identify the components of managing the data center and Understand logical and					
CO 2	Evaluate storage architectures, including storage subsystems SAN, NAS,					
CO 3	Understand the business continuity, backup and recovery methods.					
CO 4	Idea about managing storage infrastructure					

UNIT – 1

Introduction to storage and management

Introduction to Information Storage Management - Data Center Environment– Database Management System (DBMS) - Host - Connectivity –Storage-Disk Drive Components- Intelligent Storage System -Components of an Intelligent Storage System- Storage Provisioning- Types of Intelligent Storage Systems

UNIT – 1I

Storage networking

Fibre Channel: Overview - SAN and Its Evolution -Components of FC SAN –FC Connectivity-FC Architecture- IPSAN-FCOE-FCIP-Network-Attached Storage- General-Purpose Servers versus NAS Devices - Benefits of NAS- File Systems and Network File Sharing-Components of NAS - NAS I/O Operation -NAS
Implementations -NAS File-Sharing Protocols-Object-Based Storage Devices- Content-Addressed Storage -CAS Use Cases.

UNIT – 1II

Backup and recovery

Business Continuity -Information Availability -BC Terminology-BC Planning Life Cycle - Failure Analysis -Business Impact Analysis-Backup and Archive – Backup Purpose -Backup Considerations -Backup Granularity - Recovery Considerations - Backup Methods -Backup Architecture - Backup and Restore Operations.

UNIT – 1V

Securing and managing storage infrastructure

Information Security Framework -Storage Security Domains-Security Implementations in Storage Networking - Monitoring the Storage Infrastructure - Storage Infrastructure Management Activities -Storage Infrastructure Management Challenges.

Text Book

1. **EMC Corporation**, "*Information Storage and Management"*, Wiley India, 2nd Edition, 2011.
2. **Robert Spalding,** "*Storage Networks: The Complete Reference"*, Tata McGraw Hill, Osborne, 2003.

Reference Book

1. **Marc Farley,***"Building Storage Networks"*, Tata McGraw Hill, Osborne,2nd Edition, 2001.
2. **Meeta Gupta,** *"Storage Area Network Fundamentals"*, Pearson Education Limited, 2002.

MTIT-113 A	**Soft Computing**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study on Soft Computing with Neural Networks, Fuzzy Logic, Optimization & Regression and Genetic algorithms approaches.						
Course Outcomes (CO)							
CO1	Understand various types of Neural Networks.						
CO2	Understand the detailed explanation of Fuzzy Logic with fuzzy sets.						
CO3	Description of optimization, regression methods and Genetic Algorithms for solving engineering problems						
CO4	Understanding all concepts of Soft Computing for problem solving.						

Unit 1

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit 2

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro

Fuzzy Networks, Applications.

Unit 3

Regression and Optimization: Least-Squares Methods for System Identification -System Identification: An Introduction, Basics of Matrix Manipulation and Calculus, Least-Squares Estimator, Geometric Interpretation of LSE, Recursive Least-Squares Estimator, Recursive LSE for Time-Varying Systems, An introduction to LSE for Nonlinear Models, Derivative-based Optimization-Descent Methods, The Method of Steepest Descent, Newton's Methods, Step Size Determination, Conjugate Gradient Methods, Analysis of Quadratic Case, Nonlinear Least-squares Problems, Incorporation of Stochastic Mechanisms, Derivative-Free Optimization.

Unit 4

Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Text Books:

1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir& B. Yuan, PHI, 1995.
3. "Neuro-fuzzy and Soft Computing", by J.-S.R. Jang, C.-T. Sun, and E. Mizutani, PHI.
4. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.
5. "Soft computing and Intelligent System Design", F. O. Karray and C. de Silva, Pearson, 2009.

Reference Books:

1. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MTIT-115 A	**Advanced Computer Networks**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.							
Course Outcomes (CO)								
CO1	To classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.							
CO2	To describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.							
CO3	To deploy high performance computing standards, VPN and routing protocols.							
CO4	To get familiar with various security and privacy standards/tools.							

Unit 1

MAC Protocols for high speed and wireless networks -IEEE 802.3 standards for fast Ethernet, gigabit Ethernet, 10G, and 100VG-AnyLAN, IEEE 802.11, 802.15, and 802.16 standards for Wireless PAN, LAN, and MAN

Unit 2

IPv6: IPv4 versus IPv6, basic protocol, Header-extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, DHCPv6, IPv6 Routers and Routing.

Mobility in networks – Mobility Management: Cellular architecture, Mobility: handoff, types of handoffs; location management, HLR-VLR scheme, Mobile IP and IPv6.

Unit 3

IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. IPsec protected channel service, virtual private network service, multiprotocol label switching, MPLS VPN

Traffic Types, TCP extensions for high-speed networks, transaction-oriented applications. Other improvements in TCP, Performance issues, TCP Congestion Control – fairness, scheduling and Delay modeling, QoS issues, differentiated services.

Unit 4

Network security at various layers. Security related issues in mobility. Secure-HTTP, SSL, Message digests, Key distribution protocols. Digital signatures and digital certificates.

Books and References:

1 W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2 G. R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.
3 W. R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.
4 W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
5 C. E. Perkins, B. Woolf, and S. R. Alpert.Mobile IP: Design Principles and Practices, Addison Wesley, 1997.
6 J.F. Kurose and K.W. Ross, Computer Networking – A Top-down Approach Featuring the Internet, Pearson Education, New Delhi, 2004.
7 N. Olifer& V. Olifer, Computer Networks: Principles, Technologies, and Protocols for network Design, Wiley-Dreamtech Low Price, New Delhi

MTRM-111 A	**Research Methodology and IPR**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*						
Course Outcomes (CO)							
CO1	Understand research problem formulation.						
CO2	Analyze research related information						
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.						
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.						

Unit 1

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'.
2. C.R. Kothari, "Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 ndEdition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

MTIT-117 A	**Software Lab I – Mobile computing lab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
--	**--**	**4**	**2**	**60**	**40**	**100**	**3**
Purpose	**To familiarize the students with the basic concepts of mobile computing**						
	Course outcomes						
CO 1	To familiarize the students with J2ME						
CO 2	To study and implement implement mobile network using NS2						
CO 3	To familiarize the students with Wireless Markup Language						
CO 4	To study basic concepts of WAP , WAP architecture , applications etc						

List of experiments

1. To study basic concept of J2ME.
2. Set up and configuration of access point
3. To study various classes (such as TextBox, ChoiceGroup , Drop Down menus etc.) and their implementation in J2ME
4. To install NS2 or NS3.
5. To implement mobile network using NS2.
6. To study basic tags of WML
7. Develop a mobile calculator application that performs addition, subtraction, multiplication, division, etc operations on mobile by using either Android or IBM Worklight
8. Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc
9. To study basic concepts of WAP , WAP architecture , applications etc.

MTIT-119 A	Software Lab II - Signal and system						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
--	**--**	**4**	**2**	**60**	**40**	**100**	**3**
Purpose	**To familiarize the students with the basic concepts of signals and systems**						
	Course outcomes						
CO 1	Introduction and classification of signals and systems based on their properties						
CO 2	To understand the basic concepts of random variables and LTI systems.						
CO 3	Familiarization with the sampling process and spectral analysis of signals using Fourier Series.						
CO 4	Apply transform techniques to analyze continuous-time and discrete-time signals and systems						

List of Experiments:

1. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling and time-shifting).
2. To explore the various properties of the impulse signals.
3. WAP to explore the time variance and time invariance property of a given system.
4. To explore causality and non-causality property of a system.
5. To visualize the relationship between the continuous-time Fourier series and Fourier transform of a signal.
6. To visualize the relationship between continuous-time and discrete-time Fourier transform of a signals.
7. WAP to demonstrate the time domain sampling of bandlimited signals (Nyquist theorem).
8. To demonstrate the time domain sampling of non-bandlimited signals and antialiasing filter.
9. To demonstrate the sampling in frequency domain (Discrete Fourier Transform).
10. To demonstrate the spectral analysis using Discrete Fourier Transform.
11. To demonstrate the convolution and correlation of two continuous-time signals.

MTIT – 102 A	Digital Signal Processing					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To familiarize the students with the basic concepts of Digital Signal Processing**					
CO 1	Introduce to Z-Transform, Fourier Transform and their properties.					
CO 2	To understand the basic concepts of Frequency Domain sampling and implementation of Discrete Time Systems.					
CO 3	Familiarization with the Design of FIR Filters.					
CO 4	Familiarization with the Design of IIR Filters.					

Unit-I

Discrete Transforms: Z- transform and its properties, Inversion of Z-transform, One sided Z-transform and solution of differential equations. Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability test, relationship between Z-transform and Fourier transform.

Frequency Selective Filters: All pass filters, minimum-phase, maximum-phase and mixed-phase systems, Goertzel algorithm, Chirp Z-transform, applications of Z-Transform.

Unit-II

Frequency Domain Sampling and DFT: Properties of DFT, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2, radix-4, computation of DFT of real sequences.

Implementation of Discrete Time Systems: Direct form, cascade form, frequency sampling and lattice structures for FIR systems. Direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems.

Unit-III

Design of FIR Filters : Characteristics of practical frequency selective filters. Filters design specifications peak pass band ripple, minimum stop band attenuation. Four types of FIR filters, alternation theorem.

Design of FIR filters using windows, Kaiser window method comparison of design methods for FIR filters, Gibbs phenomenon, design of FIR filters by frequency sampling method, design of optimum equiripple FIR filters.

Unit-IV

Design of IIR Filters: Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse Invariance Method, Bilinear Transformation Method, Least Square Methods.

Characteristics of Butterworth, Chebyshev and Elliptical analog filters, Design of IIR filters, Frequency transformation, , design of IIR filters in frequency domain.

Text Books:

1. John G. Proakis, Digital Signal Processing, PHI.
2. Digital Signal Processing: Alon V. Oppenhelm;PHI

Reference Books:

1. S. K. Mitra, Digital Signal Processing , TMH
2. Rabiner and Gold, Digital Signal Processing, PHI
3. Salivahan, Digital Signal Processing , TMH

MTIT - 104 A	Stochastic Processes & Queueing Theory					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To impart knowledge on probability concepts to study their applications in stochastic processes & queuing theory.**					
Course Outcomes						
CO 1	Compute the characteristics of the random variable given the probabilities					
CO 2	Understand and apply various distribution					
CO 3	Solve cases of different Stochastic processes along with their properties.					
CO 4	Gain sufficient knowledge in principles of Markov chains and queueing theory					

Unit-I

Probability & Random variables

Introduction ; Basics of probability; Probability space , Conditional probability ; One dimensional and two dimensional Random Variables – Characteristics of Random Variables : Expectation, Moments.

Unit-II

Theoretical distributions

Discrete : Binomial, Poisson, Negative Binomial, Geometric, Uniform Distributions. Continuous: Uniform, Exponential, Erlang and Gamma, Weibull Distributions.

Unit-III

Stochastic processes

Classification of Stochastic Processes – Bernoulli process – Poisson process – Pure birth process – Birth and Death process.

Unit-IV

Markov chains & Queuing theory

Introduction – Discrete-Parameter Markov Chains – Transition Probability Matrix – Chapman Kolmogorov Theorem – State classification and limiting distributions.

Characteristics of Markovian Single server and Multi server queuing models; Queuing System – PollaczekKhinchin formula.

Text book

1. Kishore.S.Trivedi, "*Probability & Statistics with Reliability, Queuing and Computer Science Applications*", PHI, New Delhi, 1995.
2. Veerajan T, "*Probability, Statistics and Random Processes*", 3rd Edition Tata McGraw Hill,2002.

Reference Books

1. Gupta S.C and Kapoor V.K, "*Fundamentals of Mathematical Statistics*", 9th Ed, SChand& Co.
2. Gross.D and Harris.C.M. "*Fundementals of Queuing theory*", John Wiley and Sons, 1985.
3. Allen.A.O., "*Probability, Statistics and Queuing Theory*", Academic Press, 1981.

MTIT-106 A	Design Patterns					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	75	25	**100**	**3**
Purpose	**To familiarize students with advanced skills in object-oriented design and programming**					
Course Outcomes						
CO 1	Understand common design patterns					
CO 2	Be able to identify appropriate patterns for design problems					
CO 3	Be able to evaluate the quality of software source code					
CO 4	Be able to refactor badly designed program by properly using design patterns					

Unit-I

Introduction to design patterns

Design Patterns Arose from Architecture and Anthropology - Architectural to Software Design Patterns - Advantages of Design Patterns - Adapter Pattern - Strategy Pattern - Bridge Pattern - Abstract Factory Pattern.

Unit-II

New paradigm of design

Principles and Strategies of Design Patterns - Open-Closed Principle – Designing from Context - Encapsulating Variation. Commonality and Variability Analysis - Analysis Matrix - Decorator Pattern.

Unit-III

Values of patterns

Observer Pattern - Categories of Patterns - Template Method Pattern – Applying the Template Method to the Case Study - Using Template Method Pattern to Reduce Redundancy.

Unit-IV

Factories

Design Patterns: Factories - Singleton Pattern and the Double-Checked Locking Pattern - Applying Singleton Pattern to Case Study. Object Pool Pattern - Management of Objects. Factory Method Pattern - Factory Method Pattern andObject-Oriented Languages.

Text books

1. Jason McC. Smith ,*"Elemental design Patterns"*, Pearson, 2012.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *"Design Patterns: Elements of Reusable Object-Oriented Software"*, Addison-Wesley, 2003.

Reference book

1. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates, *"Head First Design Patterns"*, O'Reilly Media, Inc., 2004.

MTIT-108 A	Information Theory and Coding						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3Hrs.**
Program Objective (PO)	The objective of this course is to introduce the basic concepts of information theory and coding, including information, source coding, channel model, channel capacity, channel coding in an exemplary way.						
Course Outcomes (CO)							
CO1	To understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them.						
CO2	To describe the real life applications based on the fundamental theory and to apply convolution codes for performance analysis & cyclic codes for error detection and correction.						
CO3	To calculate entropy, channel capacity, bit error rate, code rate and steady-state probability.						
CO4	To implement the encoder and decoder of one block code or convolutional code using any program language.						

Unit 1

Overview; Basic Concepts - Entropy and Mutual information; Lossless Source Coding – Source entropy rate; Kraft inequality; Huffman code; Asymptotic equipartition property; Universal coding; Noisy Channel Coding - Channel capacity; Random channel codes; Noisy channel coding theorem for discrete memory-less channels; Typical sequences; Error exponents; Feedback; Continuous and Gaussian channels; Lossy Source Coding - Rate- Distortion functions; Random source codes; Joint source-channel coding and the separation theorem.

Unit 2

Source coding- Text, Audio and Speech: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio
layers I,II,III, Dolby AC3 - Speech: Channel V coder, Linear Predictive Coding Source coding- Image and Video: Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF –Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG

Unit 3

Standard Error control coding- Block codes: Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes -Linear block codes,

Unit 4

Cyclic codes - Syndrome calculation, Encoder and decoder – CRC Error control coding- convolution codes: code tree, trellis, state diagram - Encoding – Decoding:
Sequential search and Viterbi algorithm – Principle of Turbo coding

Text Books:

1. Mark Kelbert(Author), Yuri Suhov, Information Theory and Coding by Example, Cambridge University Press, 2013.

Reference Books:

1. Simon Haykin and Michael Moher, Communication Systems, 5th Edition, Wiley, 2010
2. T.M. & Thomas, J.A. (2006). Elements of Information Theory. New York: Wiley.
3. Jiri Adamek, Foundations of coding, Wiley Interscience, 1991.
4. T. M. Cover and J. A. Thomas, Elements of information theory, Wiley, 1991.

MTIT-110 A	Security In Computing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**100**	**50**	**150**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study of Probability, Random Variables and Stochastic Processes.						
Course Outcomes (CO)							
CO1	To evaluate the risks and vulnerabilities in protocols/Standards.						
CO2	To apply number theory and algebra required for designing cryptographic algorithms.						
CO3	To Design symmetric key, asymmetric key encryption techniques, design authentication, message integrity and authenticated encryption protocols.						
CO4	To design and security analysis of systems including distributed storage and Electronic voting**.**						

UNIT – I

Computer Security Concept, Threats, Attacks and Assets, Security Functional Requirements, Security Architecture for Open System, Scope of Computer Security, Computer Security Trends and Strategy.

Cryptography: Terminology and Background, Substitution Ciphers, Transpositions, Cryptanalysis, Data Encryption Standard, DES & AES Algorithms and comparison, Public Key Encryption, Possible Attacks on RSA Malicious Software: Types of Malicious Software, Viruses, Virus countermeasures, Worms, Bots, Rootkits.

UNIT – II

Protection in General-Purpose Operating Systems: Security Methods of Operating Systems, Memory and Address Protection.

Designing Trusted Operating Systems: Security Policies, Models of Security, Designing of Trusted Operating System. Linux Security: Linux Security Model, Linux Vulnerabilities, Linux System Hardening, Application Security, Mandatory Access Control

UNIT – III

Database Security: Relational Database, Database Access Control, Inference, Statistical Databases, Database Encryption. Data Mining Security: Security Requirements, Reliability and Integrity, Sensitive data, Multilevel Databases, Proposal for Multilevel Security, Data Mining - Privacy and Sensitivity, Data Correctness and Integrity, Data Availability.

Trusted Computing: Concept of Trusted System, Trusted Computing and Trusted Platform Module, Common Criteria for Information Technology Security Evaluation.

UNIT – IV

Security in Networks: Threats in networks, Network security controls, Firewall and Intrusion Prevention Systems: Need, Characteristics, Types of Firewalls, Firewall Basing, Intrusion Prevention Systems. Intrusion Detection Systems.

Internet Security Protocols and Standards: Secure Socket Layer (SSL) and Transport Layer Security (TLS), IP4 and IP6 Security, Secure Email. Legal and Ethical Aspects: Cybercrime and Computer Crime, Intellectual Property, Copyrights, Patents, Trade Secrets, Privacy and Ethical Issues.

Text Books:

1. Pfleeger C. &Pfleeger S.L., "Security in Computing", 4th Ed., Pearson Education.
2. Stalling W., Brown L., "Computer Security Principles and Practice", 3rd Ed., Pearson Education.

Reference Books:

1. Schneier B., "Applied Cryptography: Protocols, Algorithms and Source Code in C", 2nd Ed., Wiley India Pvt. Ltd.

MTIT-112 A	Enterprise resource planning					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	75	25	**100**	**3**
Purpose	To analyze, design and propose IT solutions for the integration of business process throughout the enterprise.					
Course Outcomes						
CO 1	Introduce to the concept of ERP					
CO 2	Propose reengineered enterprise processes that optimize the enterprise's performance.					
CO 3	Design integrated organizational structures and business processes that					
CO 4	ERP case studies in various fields.					

Unit-I

Introduction

ERP as integrated management information system - Evolution of ERP – Benefits of ERP. ERP vs Traditional Information systems.

Unit-II

Business process reengineering

Business Process Reengineering- need and challenges, - Management concerns about BPR. - BPR to build business Model for ERP. ERP & Competitive advantage, - Basic Constituents of ERP, Selection criteria for ERP Packages. Procurement process for ERP Package.

Unit-III

ERP implementation

ERP Implementation- issues, Role of Consultants, Vendors, Users, - Need for training, customization. ERP implementation methodology and post implementation issues and options.

Unit-IV

ERP case studies

ERP Case Studies In HRM, Finance, Production, Product Database, Materials, Sales & Distribution.

Text Books

1. Bret Wagner, Ellen Monk, "*Concepts in Enterprise Resource Planning",* Cengage Learning , 2012.
2. Bret Wagner, Ellen Monk, *"Enterprise Resource Planning",* Third Edition Cengage Learning, 2008.

Reference Books

1. Thomas F. Wallace , Michael H. Kremzar, "*ERP: Making It Happen" ,* John willey

MTIT-114 A	Algorithm Analysis and Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To Apply important Algorithmic design paradigms & methods of analysis & to Synthesize efficient Algorithms in common engineering design situations.						
Course Outcomes (CO)							
CO1	To prove the correctness & analyse the asymptotic performance of Algorithms.						
CO2	To know various Number Theoretic Algorithms & Graph Algorithms.						
CO3	To Analyse various Geometric Algorithms.						
CO4	Understand NP-completeness & identify different NP-complete problems.						

Unit 1

Introduction:

Algorithm concepts, Analyzing and design, Pseudocode conventions, asymptotic efficiency of algorithms, asymptotic notations and their properties.

Analysis Techniques:

Growth Functions, Recurrences and Solution of Recurrence equation-, Amortized Analysis, Aggregate, Accounting and Potential Methods, Probabilistic analysis concepts, hiring problem and its probabilistic analysis, String Matching: naive string Matching, Rabin Karp, and String matching with finite Automata, KW and Boyer – Moore algorithm.

Unit 2

Number Theoretic Algorithms:

Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The chines remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization, Polynomials. Huffman Codes: Concepts, construction, correctness of Huffman's algorithms; Representation of polynomials, DFT, FFT, Efficient implementation of FFT, Graph Algorithm, Bellman Ford Algorithm, Single source shortest paths in a DAG Johnson's Algorithm for sparse graph, Flow networks & Ford fulkerson Algorithm, Maximum bipartite matching.

Unit 3

Computational Geometry:

Geometric structures using C++: Vectors, points, Polygons, Edges: Geometric Objects in space: Finding the intersection of a line & triangle, Finding star shaped polygons and convex hull using incremental insertion.

Unit 4

NP-completeness Concepts:

Polynomial time verification, NP-completeness and reducibility, showing problems to be NP-complete like Clique problem, vertex cover problem etc.Approximation algorithms of these problems.

Reference Books

1 T. H Cormen, C E Leiserson.R L Rivest& C Stein, "Introduction to algorithms", 2nd Edition, PHI.
2 Michael J Laszio, "Computational Geometry and Computer Graphics in C++", PHI. India 1996.
3 Brassard, Bratley, "Fundamentals of algorithms", Prentice Hall of India.
4 Knuth, "The Art of Computer Programming", Vol I-III, Pearson Education.

MTIT-116 A	Data Mining						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**		**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To introduce the detailed study on data mining methodology.						
Course Outcomes (CO)							
CO1	Understand the basics of data mining and data warehousing						
CO2	Understand the detailed explanation of data generalization and statistical measures						
CO3	Description of mining associations, correlations, classification and prediction						
CO4	Description on cluster analysis and mining of complex type of data like world wide web and text data base						

Unit 1

Introduction

Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction.

Data Warehouse

Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

Unit 2

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases.

Unit 3

Mining association rules in large databases: Association rule mining, Mining single dimensional Boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction.

Unit 4

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining the World Wide Web, Applications and trends in data mining.

Books and References:

1. Data Mining: Concepts and Techniques; Jiawei Han and MichelineKamber; Elsevier.
2. "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.
3. "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001.
4. "Data Mining: Concepts and Techniques", J.Han, M.Kamber, Academic Press, Morgan Kanfman Publishers, 2001.
5. "Data Mining", by Pieter Adrians, DolfZantinge, Addison Wesley 2000.
6. "Data Mining with Microsoft SQL Server", by Seidman, Prentice Hall of India,2001.

MTIT-118 A	Software Lab I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
--	--	4	2	60	40	100	3
Purpose	**To familiarize the students with the basic concepts of DSP**						
	Course outcomes						
CO 1	Study of different function and signals of DSP.						
CO 2	To familiarize students with DFT and DTFT						
CO 3	To demonstrate the concept of convolution						
CO 4	To demonstrate Z transform						

List of Experiments:

1. Write a program to plot the Sine wave, cosine wave and Tangent wave.
2. Write a program to plot the following functions: a)impulse function b)unit step c)unit ramp d)

exponential e) sinusoidal

3. Write a program to plot the convolution and multiplication of two signals.
4. Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase plots using subplots.
5. Verify the Symmetry, time shifting and modulating properties of DTFT with a rectangular pulse.
6. Study different window functions available in signal processing.
7. Verify the properties of Discrete Fourier Transform (DFT).
8. Write a program to find the convolution of two sequences using in built convolution function.
9. Write a program to study the frequency shift property of DTFT.
10. Write a program to study the sampling theorem of a continuous time signal.
11. Write a program to study the Z-Transform.

MTIT-120 A	Software Lab II – Information theory and coding						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
--	**--**	**4**	**2**	**60**	**40**	**100**	**3**
Purpose	**To familiarize the students with the basic concepts of DSP**						
	Course outcomes						
CO 1	Study of different function and signals of DSP.						
CO 2	To familiarize students with DFT and DTFT						
CO 3	To demonstrate the concept of convolution						
CO 4	To demonstrate Z transform						

List of Experiments:

1. Write a program for determination of various entropies and mutual information of a given channel. Test various types of channel such as a) Noise free channel. b) Binary symmetric channel etc Compare channel capacity of above channels
2. Write a program for generation and evaluation of variable length source coding using C / MATLAB for Shannon – Fano coding and decoding
3. Write a program for generation and evaluation of variable length source coding using C / MATLAB for Huffman coding and decoding
4. Write a Program for coding & decoding of Linear block codes.
5. Write a Program for coding & decoding of Cyclic codes.
6. Write a program for coding and decoding of convolutional codes.
7. Write a program for coding and decoding of BCH and RS codes.
8. Write a program to study performance of a coded and uncoded communication system (Calculate the error probability).
9. Write a simulation program to implement source coding and channel coding for transmitting a text file.

MTIT-201 A	Mobile Ad-hoc and Wireless Sensor Networks							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.							
Course Outcomes (CO)								
After completion of course students will be able to								
CO1	Classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.							
CO2	Describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.							
CO3	Recently deployed high performance computing standards, VPN, routing protocols as to be gone through.							
CO4	Various security and privacy standards/tools to be described.							

Unit 1

Mobile Ad hoc Networks (MANET) – Mobility Management, modeling distributed applications for MANET, MAC mechanisms and protocols.

Unit 2

MANET Routing Protocols: Ad hoc network routing protocols, destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish-eye state routing, dynamic source routing, ad hoc on-demand routing, OLSR & TORA routing, location aided routing, zonal routing algorithm.

Unit 3

Ad hoc network security – Link layer, Network layer, Trust and key management.
Self policing MANET – Node Misbehaviour, secure routing, reputation systems.
Wireless Sensor Networks (WSN) – Design Issues, Clustering, Applications of WSN.

Unit 4

MAC layer and routing protocols in WSN
Data Retrieval Techniques in WSN – Sensor databases, distributed query processing, Data dissemination and aggregation schemes, Operating Systems for WSN, Security issues in WSN.

Books and References:

1 C. Siva Ram Murthy & B.S. Manoj, Mobile Ad hoc Networks – Architectures & Protocols, Pearson Education, New Delhi, 2004

2 C M Cordeiro& D.P. Agrawal, Adhoc& Sensor Networks – Theory and Applications, ISBN 981256-682-1, World Scientific Singapore, 2006

3 C. S. Raghvendra, Wireless Sensor Networks, Springer-Verlag, 2006.

MIT- 203 A	Advances in Algorithms					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	75	25	**100**	**3**
Purpose	**The objective of this course is to provide in-depth coverage of advanced data structures and algorithm design techniques.**					
Course Outcomes						
CO 1	Introduction about algorithms					
CO 2	To introduce students to advance data structures					
CO 3	To introduce students to design and analysis					
CO 4	To introduce students to some miscellaneous topics related to algorithms					

UNIT – I

Algorithms: Role of algorithms in computing, Asymptotic Notations, Standard notations and common functions.
Recurrence: The maximum-subarray problem, Strassen's algorithm for matrix multiplication substitution and recursion-tree method for solving recurrences, master method for solving recurrences, Proof of the master theorem, Probabilistic Analysis and Randomized Algorithms.

UNIT – II

Sorting: Bubble sort, Heap, Building and maintaining heap, Heapsort, Quicksort, Lower bounds for sorting, Counting sort, radix sort, bucket sort.
Advanced Data Structures: Splay Trees, Top-down splay trees, Red-black Trees, Deterministic skip lists, AA-Trees, Trie, Treaps, K-d Trees.

UNIT – III

Advanced Design and Analysis: Dynamic Programming: matrix-chain multiplication, Longest common subsequence, optimal binary search tree, Greedy algorithms: Huffman codes.
Graph Algorithms: Storage of graphs, traversing a graph, Topological sort, Minimum Spanning Trees, Shortest path problems: Single source and All-pairs shortest path, Maximum Flow networks, matching in bipartite graphs.

UNIT – IV

Miscellaneous Topics: Knapsack Problem and Memory functions, Approximate String Matching, Chinese remainder theorem, Integer factorization, naïve-string matching, Rabin-karp string matching, String matching with finite automata, Knuth-moris-pratt algorithm, finding convex hull, Polynomial time, verification and reducibility, NP-completeness and proofs.

Text Books:

1. Cormen, Thomos, Leiserson, *"Introduction to Algorithms"*, 3rd Ed., PHI Learning
2. Neapolitan R., Naimipour K., *"Foundations of Algorithms"*, 4th Ed., Jones and Bartlett Publishers.

Reference Books:

1. AnanyLevitin, "*Introduction to Design and Analysis of Algorithms*", 2nd Ed., Pearson Education.
2. Cooper A., *"Computability Theory"*, Chapman and Hall/ CRC Press.
3. Robert Sedgewick, *"Algorithms in C: Fundamentals, Data Structures, Sorting, Searching, Parts 1-4*", 3rd Ed., Pearson Education India.
4. Steven Skiena, "*The Algorithm Design Manual*", 2nd Ed., Springer India.

MTIT-205 A	Genetic Algorithms					
Lecture	**Tutorial**	**Practical**	**Major Test**	**MinorTest**	**Total**	**Time**
4	**1**	**-**	75	25	**100**	**3**
Purpose	**To familiarize students with genetic algorithms**					
Course Outcomes						
CO 1	To introduce student to the concept of optimization					
CO 2	Difference between GA and traditional methods					
CO 3	To introduce student to implement GA on computer					
CO 4	To introduce student to Advanced operators and techniques in Genetic Search					

UNIT – I

Introduction: Goal of optimization, local and global optima, Multi-objective optimization, Problems in global optimization like premature convergence to a local optimum, overfittingetc, A brief history of evolutionary computation, The appeal of evolution, Biological terminology, Search spaces and fitness landscapes, Conventional Optimization and Search Techniques - Gradient-Based Local Optimization Method, Random Search, Stochastic Hill Climbing, Simulated Annealing etc.

UNIT – II

Genetic algorithms(GA), Evolution strategies, Difference between Genetic Algorithm and traditional methods, Selection – elitism, rank selection, tournament selection, Boltzmann selection, steady state selection etc.; Crossover, mutation; Schema theorem – schemata and masks, Wildcards, Holland's schema theorem and criticism; convergence.

.UNIT – III

Computer Implementation of Genetic Algorithm: Data Structures, Reproduction, Crossover, and mutation, Mapping objective functions to fitness form, Fitness scaling, Different types of encodings - Binary Encoding, Octal Encoding, Hexadecimal Encoding, Permutation Encoding, Value Encoding, Tree Encoding etc.

UNIT – IV

Advanced operators and techniques in Genetic Search: Dominance, Diploidy, and Abeyance, Inversion and other reordering operators like partially matched crossover, order crossover and cycle crossover, Niche and speciations, Micro-operators, Knowledge based techniques, Genetic algorithm and parallel processors.

Classification of Genetic Algorithm: Simple Genetic Algorithm(SGA), Parallel and Distributed Genetic Algorithm (PGA and DGA), Hybrid Genetic Algorithm (HGA), Adaptive Genetic Algorithm(AGA), Fast Messy Genetic Algorithm (FmGA), Independent Sampling Genetic Algorithm(ISGA).

Text Books:

1. Goldberg D. E., *Genetic Algorithms in Search, Optimization, and Machine Learning*, Pearson Education.
2. Sivanandam S. N. & Deepa S. N., *Introduction to Genetic Algorithms*, Springer.

Reference Books:

1. Mitchell M., *An Introduction to Genetic Algorithms*, Prentice-Hall.
2. Weise Thomas, *Global Optimization Algorithms– Theory and Application,* http://www.it-weise.de/ projects/book.pdf.

MTOE-201 A	Business Analytics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of this course is to give the student a comprehensive understanding of business analytics methods.						
Course Outcomes (CO)							
CO1	*Able to have knowledge of various business analysis techniques.*						
CO2	*Learn the requirement specification and transforming the requirement into different models.*						
CO3	*Learn the requirement representation and managing requirement assests.*						
CO4	*Learn the Recent Trends in Embedded and collaborative business*						

Unit 1

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.

Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Unit 2

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit 3

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.
Managing Requirements Assets: Change Control, Requirements Tools

Unit 4

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

References:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

MTOE-203 A	**Industrial Safety**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the industrial safety.*						
Course Outcomes (CO)							
CO1	*Understand the industrial safety.*						
CO2	*Analyze fundamental of maintenance engineering.*						
CO3	*Understand the wear and corrosion and fault tracing.*						
CO4	*Understanding that when to do periodic inceptions and apply the preventing maintenance.*						

Unit-1

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-2

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-3

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-4

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel

generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205 A	**Operations Research**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.						
Course Outcomes (CO)							
CO1	*Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.*						
CO2	*Students should able to apply the concept of non-linear programming*						
CO3	*Students should able to carry out sensitivity analysis*						
CO4	*Student should able to model the real world problem and simulate it.*						

Unit -1

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit -2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit- 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit -4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207 A	**Cost Management of Engineering Projects**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the strategic cost management process.*						
CO2	*Students should able to types of project and project team types*						
CO3	*Students should able to carry out Cost Behavior and Profit Planning analysis.*						
CO4	*Student should able to learn the quantitative techniques for cost management.*						

Unit-1

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-2

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-3

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit-4

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209 A	**Composite Materials**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the composite materials and their properties.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification and characteristics of Composite materials.*						
CO2	*Students should able reinforcements Composite materials.*						
CO3	*Students should able to carry out the preparation of compounds.*						
CO4	*Student should able to do the analysis of the composite materials.*						

UNIT–1:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

UNIT – 2

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–3

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – 4

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

MTOE-211 A	**Waste to Energy**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the generation of energy from the waste.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification of waste as a fuel.*						
CO2	*Students should able to learn the Manufacture of charcoal.*						
CO3	*Students should able to carry out the designing of gasifiers and biomass stoves.*						
CO4	*Student should able to learn the Biogas plant technology.*						

Unit-1

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-2

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-3

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-4

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

MTAD-101 A	English For Research Paper Writing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Student will able to understand the basic rules of research paper writing.*						
Course Outcomes (CO)							
CO1	*Understand that how to improve your writing skills and level of readability*						
CO2	*Learn about what to write in each section*						
CO3	*Understand the skills needed when writing a Title*						
CO4	*Ensure the good quality of paper at very first-time submission*						

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit 4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

References:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

MTAD-103 A	Disaster Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Develop an understanding of disaster risk reduction and management*						
Course Outcomes (CO)							
CO1	*Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*						
CO2	*Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*						
CO3	*Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*						
CO4	*critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in*						

Unit 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

References:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies '"New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi.

4.

MTAD-105 A	**Sanskrit for Technical Knowledge**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*						
Course Outcomes (CO)							
CO1	*To get a working knowledge in illustrious Sanskrit, the scientific language in the world*						
CO2	*Learning of Sanskrit to improve brain functioning*						
CO3	*Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*						
CO4	*The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*						

Unit –1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Unit – 2

Order, Introduction of roots,Technical information about Sanskrit Literature

Unit –3

Technical concepts of Engineering: Electrical, Mechanical

Unit –4

Technical concepts of Engineering: Architecture, Mathematics

References

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

4.

MTAD-107 A	**Value Education**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*						
Course Outcomes (CO)							
CO1	*Knowledge of self-development*						
CO2	*Learn the importance of Human values*						
CO3	*Developing the overall personality*						
CO4	*Know about the importance of character*						

Unit 1

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

Unit 2

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature,Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

References

1.Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

MTAD-102 A	**Constitution of India**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*						
Course Outcomes (CO)							
CO1	*Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*						
CO2	*Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*						
CO3	*Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*						
CO4	*Discuss the passage of the Hindu Code Bill of 1956.*						

Unit I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

References

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

5.

MTAD-104 A	**Pedagogy Studies**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*.						
Course Outcomes (CO)							
CO1	*What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*						
CO2	*What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*						
CO3	*How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*						
CO4	*What is the importance of identifying research gaps?*						

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Unit 2

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 3

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

Unit 4

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

References

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

7.

MTAD-106 A	Stress Management by Yoga						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress						
Course Outcomes (CO)							
CO1	*Develop healthy mind in a healthy body thus improving social health.*						
CO2	*Improve efficiency*						
CO3	*Learn the Yogasan*						
CO4	*Learn the pranayama*						

Unit – 1

Definitions of Eight parts of yog (Ashtanga).

Unit- 2

Yam and Niyam, Do`s and Don't's in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit- 3

Asan and Pranayam, Various yog poses and their benefits for mind & body,

Unit- 4

Regularization of breathing techniques and its effects-Types of pranayam.

References

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-108 A	Personality Development through Life Enlightenment Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students						
Course Outcomes (CO)							
CO1	*Students become aware about leadership.*						
CO2	*Students will learn how to perform his/her duties in day to day work.*						
CO3	*Understand the team building and conflict*						
CO4	*Student will learn how to become role model for the society.*						

Unit – 1

Neetisatakam-Holistic development of personality: Verses: 19, 20, 21, 22 (wisdom); Verses: 29, 31, 32 (pride & heroism); Verses: 26, 28, 63, 65 (virtue); Verses: 52, 53, 59 (don's); Verses: 71, 73, 75, 78 (do's).

Unit – 2

Approach to day to day work and duties; ShrimadBhagwadGeeta: Chapter-2: Verses: 41, 47, 48; Chapter-3: Verses: 13, 21, 27, 35; Chapter-6: Verses: 5, 13, 17, 23, 35; Chapter-18: Verses: 45, 46, 48.

Unit - 3

Statements of basic knowledge; ShrimadBhagwadGeeta: Chapter-2: Verses: 56, 62, 68; Chapter-12: Verses: 13, 14, 15, 16, 17, 18.

Unit – 4

Personality of Role model; ShrimadBhagwadGeeta: Chapter-2: Verses: 17; Chapter-3: Verses: 36, 37, 42: Chapter-4: Verses: 18, 38, 39; Chapter-18: Verses: 37, 38, 63.

References:

1. Srimad Bhagavad Gita, Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya), P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

3.

	Dissertation Part-I (MTIT-207A) and Dissertation Part-II (MTIT-202A)
Course Outcomes (CO)	
CO1	Ability to synthesize knowledge and skills previously gained and applied to an in depth study and execution of new technical problem.
CO2	Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
CO3	Ability to present the findings of their technical solution in a written report.
CO4	Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following:

Relevance to social needs of society

Relevance to value addition to existing facilities in the institute

Relevance to industry need

Problems of national importance

Research and development in various domain.

The student should complete the following:

Literature survey Problem Definition

Motivation for study and Objectives

Preliminary design / feasibility / modular approaches

Implementation and Verification

Report and presentation

The dissertation part- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Part – I and II

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two parts i.e. Part– I: July to December and Part– II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.

The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing Engineering and any other related domain. In case of Industry sponsored projects, the relevant application notes, white papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Part–I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper, proof of concept/functionality, part results, and record of continuous progress.

Part–I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Part-I work.

During Part– II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Part–II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, and record of continuous progress.

Part-II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the Part-I work.

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY
KURUKSHETRA UNIVERSITY KURUKSHETRA

('A+' Grade, NAAC Accredited)

SCHEME OF EXAMINATIONS FOR
MASTER OF TECHNOLOGY IN
BIOTECHNOLOGY
(W. E. F. SESSION: 2018-19)

SEMESTER-I

S. No.	Course Code	SUBJECT	L	T	P	Total	Minor Test	Major Test	Practical	Cr.	Duration of Exam (Hrs.)
1	MTBT-101A	Genomics and Proteomics	3	-	-	3	40	60		3	3
2	MTBT-103A	Advances in Bioprocess Engineering	3	-	-	3	40	60		3	3
3	*	Program Elective –I	3	-	-	3	40	60		3	3
4	**	Program Elective-II	3	-	-	3	40	60		3	3
5	MTBT-117A	Bioanalytical Techniques Lab	-	-	4	4	40		60	2	3
6	MTBT-119A	Fermentation Technology Lab	-	-	4	4	40		60	2	3
7	MTRM-111A	Research Methodology and IPR	2	-	-	2	40	60		2	3
8	***	Audit Course	2			2	100			0	3
	Total		16		8	24	380	300	120	18	
								700			

*Program Elective-I		**Program Elective -II	
Course No.	**Subject**	**Course No.**	**Subject**
MTBT-105A	Phytomedicine	MTBT-111A	Biomaterial Technology
MTBT-107A	Microbial Diversity	MTBT-113A	Biosensor Technology
MTBT-109A	Fungal Biotechnology	MTBT-115A	Protein Engineering

***Audit Course-I	
Course No.	**Subject**
MTAD-101A	English for Research Paper Writing
MTAD-103A	Disaster Management
MTAD-105A	Sanskrit for Technical Knowledge
MTAD-107A	Value Education

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. *** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

SEMESTER- Ⅱ

S. No.	Course Code	Subject	L	T	P	Total	Minor* Test	Major Test	Practical	Cr.	Duration of Exam (Hrs.)
1	MTBT-102A	Drug Discovery and Development	3	-	-	3	40	60		3	3
2	MTBT-104A	Biomedical Engineering	3	-	-	3	40	60		3	3
3	*	Program Elective-III	3	-	-	3	40	60		3	3
4	**	Program Elective-IV	3	-	-	3	40	60		3	3
5	MTBT-118A	Molecular Techniques Lab		-	4	4	40		60	2	3
6	MTBT-120A	Advanced Molecular Techniques. Lab	-	-	4	4	40		60	2	3
7	# MTBT-122A	Mini Project	-	-	4	2	40	60		2	3
8	***	Audit Course-II	2			2	100			0	3
	Total		**14**		**12**	**24**	**280**	**300**	**120**	**18**	**3**
							700				

*Program Elective -III		**Program Elective -IV	
Course No.	**Subject**	**Course No.**	**Subject**
MTBT-106A	Metabolic Engineering	MTBT-112A	Biomedical Equipments
MTBT-108A	Biofuel Technology	MTBT-114A	Gene Therapy and Gene Editing
MTBT-110A	Advanced Industrial Biotechnology	MTBT-116A	Metagenomics

*** Audit Course - II	
MTAD-102A	Constitution of India
MTAD-104A	Pedagogy Studies
MTAD-106A	Stress Management by Yoga
MTAD-108A	Personality Development through Life Enlightenment Skills.

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. *** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

3. Students be encouraged to go to Industrial Training/Internship for at least 6-8 weeks during the summer break with a specific objective for Dissertation Part–I (MTBT-203 A). The industrial Training/Internship would be evaluated as the part of the Dissertation–I (with the marks distribution as 40 marks for Industrial Training/Internship and 60 marks for Dissertation Part–I).

#4**. Mini project:** During this course the student will be able to understand the contemporary/emerging technologies for various processes and systems. During the semester, the students are required to search/gather the material/information on a specific topic, comprehend it and present/discuss the same in the class. He/she will be acquainted to share knowledge effectively in oral (seminar) and written form (formulate documents) in the form of report. The student will be evaluated on the basis of viva/ seminar (40 marks) and report (60 marks).

SEMESTER -III

S. No.	Course Code	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	MTBT-201A	Advanced Food Biotechnology	3	-	-	3	40	60	3	3
2	*	Open Elective	3	-	-	3	40	60	3	3
3	MTBT-203A	Dissertation Part-I	-	-	20	-	100	-	10	-
		Total	**6**		**20**	**6**	**180**	**120**	**16**	-
	Total					**300**				

*Open Elective		
1.	MTOE-201A	Business Analytics
2.	MTOE-203A	Industrial Safety
3.	MTOE-205A	Operations Research
4.	MTOE-207A	Cost Management of Engineering Projects
5.	MTOE-209A	Composite Materials
6.	MTOE-211A	Waste to Energy

Note: 1.The course of open elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

SEMESTER-IV

Sr. No.	Course Code		L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (Hrs.)
1	MTBT-202A	Dissertation - Part II	-	-	32	-	100	200	16	-
	Total				**32**		**100**	**200**	**16**	-
							300		**16**	

Total credits of all four semesters – 68

MTBT-101A	GENOMICS AND PROTEOMICS						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on different areas of genomics and proteomics						

Course Outcomes (CO)	
CO1	Students will be able to know structural organization and different tools used for analysis.
CO2	Students will be able to gain knowledge about Genome sequencing
CO3	Students will be able to know about techniques used in protein analysis.
CO4	Students will be able to study analysis of Genomic and Proteomics

Unit I

Introduction: Structural organization of genome in Prokaryotes and Eukaryotes; Organelle DNA-mitochondrial, chloroplast; DNA sequencing principles and translation to large scale projects; Next-Gen sequence technology and applications. Recognition of coding and non-coding sequences and gene annotation; Tools for genome analysis- RFLP, DNA fingerprinting, RAPD, PCR,. DNA chips and their use in transcriptome analysis; Mutants and RNAi in functional genomics.

Unit II

Genome sequencing projects: Human, microbes, plants and animals; Accessing and retrieving genome project information from web; Identification and classification using molecular markers-16SrRNAtyping/sequencing, EST and SNP's contigs; allele/gene mining; synteny and comparative genomics. Dart

Unit III

Proteomics: Protein analysis (includes measurement of concentration, amino acid composition, N-terminal sequencing);2 Delectrophoresis of proteins; Microscale solution isoelectric focusing; Peptide fingerprinting; Protein-protein interactions, Yeast two hybrid system. SAGE.

Unit IV

Genomic and Proteomic analysis: Metabolomics for elucidating metabolic pathways, Analysis of microarray data; Protein and peptide microarray-based technology; PCR-directed protein *insitu* arrays; Structural proteomics. Real Time PCR, Platform technologies for screening.

References:

1. Voet D, Voet JG & PrattCW, Fundamentals of Biochemistry, 2ndEdition.Wiley2006
2. Brown TA, Genomes, 3rd Edition. Garland Science2006
3. Campbell AM &Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition..
4. PrimroseS & TwymanR, Principles of Gene Manipulation and Genomics, 7thEdition, Blackwell,2006.
5. Glick BR & Pasternak JJ, Molecular Biotechnology, 3rdEdition, ASM Press, 1998.
6. Specific journals and published references.

MTBT-103A	Advances in Bioprocess Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major**	**Minor**	**Total**	**Time**
3	**0**	**-**	**3**	**60**	**40**	**100**	3
PURPOSE	To sensitize the students about Advances in Bioprocess Engineering						
COUSE OUTCOMES							
CO 1	To sensitize students about basic concept of Bioprocess and its historical development.						
CO2	The students will be able to understand about ideal reactors for kinetic data measurement and industrial bioreactor.						
CO3	The students will be able to learn about techniques used for recovery of fermentation product.						
CO4	The students will be able to understand the basic concepts in process optimization.						

Unit I

Introduction to Bioprocess Engineering: **Historical development of bioprocessing technology**, processing and production of recombinant products. Batch and chemostat cultures; Computer simulations; Fed-batch and mixed cultures; Scale-up principles. Transport phenomenon in bioprocess systems.

Unit II

Kinetics of substrate utilization and product formation. Ideal reactors for kinetics measurements. **High performing reactors and industrial reactors**. Kinetics of balanced growth.. Structured kinetic models. Product formation kinetics. Segregated kinetic models of growth and product formation.

Unit III

Recovery and purification of fermentation products: Liquid-liquid extraction, cell disruption and isolation of non- secreted products, Lyophilization and Spray drying. Membrane based affinity separations; two-phase affinity partitioning; use of reverse micelles in protein separation; chiral separations; molecular imprinting.

Unit IV

Fermentation Technology: Case studies on production of lactic acid, glutamic acid, penicillin, microbial lipase and protease, recombinant insulin. Case studies should deal with strain improvement, medium designs, and process optimization.

References-

1. Biochemical Engineering fundamentals" by J E Bailey and D F Ollis, 2nd ed, McGraw-Hill .
2. "Principles of fermentation technology" by P F Stanbury and A Whitaker, Pergamon press.
3. "Principles of Cell Energetics" : BIOTOL series, Butterworth - Heinemann.
4. "Bioprocess Technology - Kinetics & Reactors" by A Moser, Springer-Verlag.
5. "Biotechnology" Vol.4 Meanning Modeling and Control Ed. K.Schugerl, VCH (1991).

6 "Biotechnology" Vol.3 Bioprocessing Ed.G. Stephanopoulos, VCH (1991).

7. "Biochemical Engineering and Biotechnology Handbook" by B.Atkinson&F.Mavituna, 2nd Ed. Stockton Press (1991).
7. Specific journals and published references.

MTBT-105A	Phytomedicine						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	Students will have knowledge about various strategies for the development of phytomedicine and mode of action of bioactive compound for the treatment of diseases						

Course Outcomes (CO)	
CO1	Students will learn about basics of Phytomedicine and quality issue associated with current medicine
CO2	Students will learn about selection of plant for medicine development and current status of phytomedicine in India
CO3	Students will have knowledge about various steps and strategies involved in phytomedicine development
CO4	Students will have knowledge about application of phytomedicine in treatment of severe diseases, mode of action of various biomolecules

Unit I

What is phytomedicine? History of phytomedicine. Taxonomy, Morphology and Ecology of Medicinal plants: a botanical perspective. Economic value of phytomedicne. Bioactive compounds in phytomedicine. Role of plant-derived compounds in drug development. Different classes of plant Secondary metabolites as a source of phytomedicine. Medicinal plant: molecular biology and Biotechnology approaches. Breeding and cultivation of medicinal plants, quality issues of current herbal medicines

Unit II

Selecting medicinal plants for development of phytomedicine and use in primary health care**;** bioactive phytocompounds and products traditionally used in India and Asia. Recent developments in drug discovery from plants. Examples of plant-derived compounds currently involved in clinical trials Phytomedicine: India's contribution.

Unit III

Development of phytomedicine; extraction, sample preparation, application of all available modern, high-tech methods to standardize phytomedicines before going for systematic pharmacological investigations and clinical studies. Quality control, screening, toxicity, and regulation of herbal drugs.

Unit IV

Application of phytomedicine in modern drug development. Molecular modes of action of some successful molecules used in phytomedicine, phyto-complexes versus single-entity drug, bioavailability issue. Drug delivery system for herbal-based therapeutics Methods for testing the anti-microbial, anti-cancer, anti-HIV, anti-diabetic, and neuroprotective activities of plant extracts. Reverse pharmacology approach for Phytomedicine development.

References:

1. Iqbal Ahmad, Farrukh Aqil, Mohammad Owais: Modern Phytomedicine: Turning Medicinal Plants into Drugs. (Wiley) 2006.
2. Leland J. Cseke; Ara Kirakosyan, Peter B. Kaufman, Sara Warber;James A. Duke; Harry L. Brielmann: Natural Products from Plants, 2ndedition; (CRC Press)2006.
3. Naturally Occurring Bioactive Compounds, 1st Edition (Advances in Phytomedicine vol 3). Edited by Rai & Carpinella. Publisher: ElsevierScience; 1 edition (December 2, 2006).
4. Stephen Neidle, Antony D Buss, Mark S Butler: Natural Product Chemistry for Drug Discovery; 1st Edition; (Royal Society ofChemistry).2009
5 Chemistry and Pharmacology of Naturally Occurring BioactiveCompounds. Editor, Goutam Brahmachari . Publisher: CRC Press; 1edition (February 20, 2013) 2013.

MTBT-107A	MICROBIAL DIVERSITY						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with the diversity of microorganisms on the Earth and concept of metagenomics**						
Course Outcomes							
CO1	**Learner will know about microbial evolution and systematics and overview of bacterial diversity**						
CO2	**Students will be able to learn about diversity of Gram-positive bacteria**						
CO3	**This unit will enable the students to understand the archaeal diversity**						
CO4	**Students will be able to learn eukaryotic and viral diversity and will also learn the concept of metagenomics**						

UNIT I

Microbial Evolution and Systematics. Early Earth and the origin and diversification of life. Microbial evolution andsystematic. Bergey's Manual of Systematic Bacteriology. Archaea and Bacterial Domains.

Overview. Bacterial Diversity: The phylogeny of bacteria. Phototrophic, Chemolithotrophic and MethanotrophicProteobacteria. Aerobic and Facultatively Aerobic Chemoorganotrophic Proteobacteria. Morphologically unusual Proteobacteria. Delta and Epsilonproteobacteria.

UNIT II

Overview of Gram positive and other bacteria. Actinobacteria.Cyanobacteria and Prochlorophytes. Chlamydia. Planctomyces/ Pirellula. Verrucomicrobia. Flavobacteria. Cytophaga Group. Green Sulphur and Non-Sulphur Bacteria. Spirochetes. Dienococci. Hyperthermophilic Bacteria- Nitrospira and Deferribacter.

UNIT III

Archaeal Diversity. Phylogeny and general metabolism. Euryarchaeota. Crenarchaeota. Evolution and life at hightemperature.

UNIT-IV

Eukaryotic and Viral Diversity. Phylogeny of Eukarya. Protists, Fungi, Unicellular Red and Green Algae. ViralDiversity. Viruses of Bacteria and Archaea. RNA and DNA viruses of Eukaryotes. Retroviruses and Hepadnaviruses.

Culture independent studies of microorganisms – metagenomics: principles and applications – steps in construction of a metagenomes – examples of metagenomic studies – metagenomics as a tool to reveal the vast microbial diversity.

References:

1. Madigan. M. T. 2008. Brock: Biology of Microorganisms. 12th Edition. Benjamin Cummings. California, USA.
2. Prescott, L. M., Harley, J. P. and Klein, D. A. 2007. Microbiology. 7th Edition. McGraw Hill, USA.
3. Atlas, R. M. and Bartha, R. 1997. Microbial Ecology: Fundamentals and Applications. Benjamin Cummings, California, USA.
4. Specific Journals and Published References

MTBT-109A	FUNGAL BIOTECHNOLOGY						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3.0**	**60**	**40**	**100**	**3 Hrs.**
Purpose	**To familiarize the students with the concepts of Fungal Biotechnology**						
Course Outcomes							
CO1	**Learner will know about basics of fungal biotechnology and fungal diversity**						
CO2	**Students will be able to understand the diversity of protozoal fungi**						
CO3	**This unit will enable the students to understand applications of fungi in various sectors**						
CO4	**Students will be able to learn about keratonophilic and endophytic fungi**						

UNIT-I

Fungal biotechnology : Fungi and Fungus-like Organisms—Introduction and Classification. Historical Development of Mycology.

Fungal Diversity—Kingdom Fungi. Phylum *Chytridiomycota* Phylum *Zygomycota* Phylum *Zygomycota* Class *Trichomycetes.* Phylum *Ascomycota* Introduction. Phylum *Basidiomycota* Introduction. Anamorphic Fungi (Deuteromycetes). Fungi as symbionts-Lichens.

UNIT-II

Fungal Diversity- Kingdom *Straminipila* (Heterokont Zoosporic Organisms). Phylum *Oomycota, Hyphochytriomycota, Labyrinthulomycota* (Net Slime Molds). *Plasmodiophoromycota* (Endoparasitic Slime Molds), *Dictyosteliomycota.* (Dictyostelid Cellular Slime Molds, *Acrasiomycota* (Acrasid Cellular Slime Molds). *Myxomycota* (Plasmodial or True Slime Molds).

UNIT-III

Fungi as Saprotrophs and their Role in Nutrient Cycling and Bioremediation**.** Fungal Biotechnology–Introduction and Applications in agriculture, food, medicine and industry.

Opportunities of fungal applications in pulp and paper manufacturing. Role of fungi in bioremediation. Fungi in bioremediation of toxic metals from waste water. Recycling of agro-wastes for protein production through mushroom cultivation. *Curvularia lunata* : A versatile organism for biotransformation of organic compounds

UNIT-IV

Fungi in enzyme industries. Starch hydrolysing enzymes of thermophilic moulds. Production and application of fungal Xylanases.

Keratinophilic fungi : Diversity and sensitivity to some medicinal plants Current trends in aeromycological research

Endophytic Fungal Biology- Present Status and Future prospective in Biotechnology.

References:

1. Rai, M. K. and Deshmukh S. K. Fungi: Diversity and Biotechnology. Scientific Publishers.
2. Aneja, K. R. and Mehrotra, R.S. Fungal Diversity and Biotechnology

MTBT-111A	BIOMATERIAL TECHNOLOGY						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to understand the role of gene therapy in treatment of severe diseases.						
Course Outcomes (CO)							
CO1	Students will learn about basics of Biomaterials, need of biomaterials, types of biomaterials, techniques for characterization of biomaterialas and their potential applications						
CO2	Students will learn about biomaterial degradation, cell interaction with biomaterial and process to improve biocompatibility						
CO3	Students will have knowledge about Biomaterial implantation, imuune and infalammatory response to biomaterial, tests for hemocompatibility						
CO4	Students will have learn about the risk of Infection, tumorigenesis and calcification Associated with biomaterials						

UNIT I

Introduction to biomaterials: Definition of biomaterials, History and current status of the field, Types of biomaterials, Important properties of biomaterials. Characterization techniques (X-ray diffraction, UV-VIS, IR and NMR Spectroscopy, Mass spectrometry, HPLC- Size exclusion chromatography).

UNIT II

Biomaterial degradation in Biological environment; Biodegadable materials: Ceramics and polymers; Processing to improve biocompatibility: sterilization and fixation. Cell interactions with biomaterials: Introduction: Cell-surface interactions and cellular functions. Techniques: Assays to determine effects of cell-material interactions: Cytotoxicity assays, DNA and RNA assays and Protein production assays- Immunostaining.

UNIT III

Biomaterial implantation and Immune response to biomaterials. Undesired immune responses to biomaterials: innate vs. acquired responses to biomaterials and hypersensitivity reactions. Clinical signs of acute inflammation against biomaterials. In vitro assays for inflammatory response. Biomaterials and thrombosis: Tests for hemocompatability.

UNIT IV

Infection, tumorigenesis and calcification of biomaterials. Overview of potential problems with biomaterial implantation, steps to infection, techniques for infection experiments. Biomaterial related tumorigenesis, In vitro and in vivo models for tumorigenesis experiments, pathologic calcification of biomaterials and techniques for pathologic calcification experiments.

Text/References:

1. Temenoff, I.S. and Mikos, A.G. Biomaterials: The Intersection of Biology and Material Science. Pearson Education, India. 2009 Indian ed.
2. Ratledge C and Kristiansen B, Basic Biotechnology, Cambridge University Press, 2nd Edition, 2001.
3. J B Park, Biomaterials - Science and Engineering, Plenum Press, 1984.
4. Sujata V. Bhat, Biomaterials, Narosa Publishing House, 2002.
5. C.P.Sharma & M.Szycher, Blood compatible materials and devices, Technomic Publishing Co. Ltd., 1991.
6. Piskin and A S Hoffmann, Polymeric Biomaterials (Eds), Martinus Nijhoff Publishers. (Dordrecht. 1986)
7. Eugene D. Goldbera, Biomedical Ploymers. 8. Specific journals and published references.

MTBT-113A	BIOSENSOR						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective	To enable students to formulate project, set up a business in field of biotechnology and will be able to understand ethical issue associated it.						

Course Outcomes (CO)	
CO1	To familiarize with basic concepts of general properties of transducers and other analytical instruments
CO2	Students will come to know about bioassay design and implementation and basic concepts of automation and robotics
CO3	This unit will enable the students to learn about data retrieval, handling and integration of databases and basics of human cardiac and vascular system
CO4	Students will be able to know the basic concepts and applications of various types of biosensors

UNIT-I

Introduction: Electrical quantities and units, functional elements of an instrumentation system, static and dynamic characteristics, principle of analog and digital meters, CRO, energy meters, time and frequency meters, multimeters.

Transducers: Classification, resistive strain gauges, RTD, LVDT, Piezoelectric transducers, Electromagnetic transducers, Optical transducers, Transducers for biomedical science and their applications.

Analytical Instruments: pH meters, radiometric devices, fluorescence spectrophotometers, chromatology (chromatographic techniques- GC and HPLC), electrophoresis, lab on a chip – related instrumentation, Validation, commissioning and maintenance of the above equipments.

UNIT II

Assay Technologies and Detection methods: Introduction, bioassay design and implementation, radiometric assay, scintillation proximity assay, fluorescence methodology to cover all types of fluorescence measurements and instrumentation, Reporter gene assay applications. Bio-analytical applications.

Automation and Robotics: Introduction: management and services issues of a centralized robotics HTS (high throughput screening) core, flexible use of people and machines, Bar-code technology and a centralized database, factors for the successful integration of assays, equipment, robotics and software. Perspectives on scheduling.

UNIT III

Data retrival, handling and integration: Database systems, systems integration, data management and tracking

Cardiac and Vascular system: Overview of cardiovascular system, types of blood pressure sensors, Lumped parameters modeling of a catheter- sensor/system, heart sounds, cardiac catheterization, indirect measurement of blood pressure, measuring blood flow rate, measuring blood volume, pacemakers, defibrillators, cardiac-assist devices and heart valves- related instrumentation of equipments and involved sensors.

Respiratory system: Modeling the respiratory system, measuring gas flow rate and lung volume, tests of respiratory mechanics, measuring gas concentration, tests of gas transport, ventilators, anesthesia machines- related instrumentation of equipments and involved sensors.

UNIT IV

Biosensors: Introduction to biosensors: concepts and applications, biosensors for personal diabetes management, micro fabricated sensors and the commercial development of biosensors, electrochemical sensors, chemical fibrosensors, Ion-selective FETs, noninvasive blood-gas monitoring, blood-glucose sensors. Noninvasive biosensors in clinical analysis, Applications of biosensors based instruments to the bioprocess industry. Applications of biosensors to the environmental samples, Introduction to biochips and their application to genomics, BIA core- an optical biosensors

Text Books:

1. Introduction to Bio-analytical Sensors by Alice J Cunningham New York, John Wiley, 1998.
2. Applied Biosensors by DolandL.Wise, 1989
3. Advances in Laboratory Automation – Robotics, Eds. J.R.Strimataitis and J.N. Little, Zymark Corporation, Hopkinton, MA 1991.

Reference Books-

1. Instrument methods of analysis by H W Willard, L LMerrit, J A Dean and F A Sttle. VI edition, East- West publishers. 1992.
2. Biosensors and their applications by C Yang Victor &TNgo That, Plenum Press NY, 2000.
3. Biosensors- An Introduction by R.Eggins Brain.
4. Automation technologies for genome characterization, edited by Tony J Beugelsdijk, John Wiley & Sons, Inc.2002.
5. Transducers and instrumentation by D V S Murthy, Prentice Hall, 1995.
6. Commercial sensors by Graham Ramasay, John Wiley & Son, INC, 1998.
7. Biosensors by Jon Cooper and Tony Cass, Oxford university Press, 2004.

MTBT-115A	PROTEIN ENGINEERING						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The course aims at imparting knowledge on protein structure characterization, structure prediction and strategies to design the novel protein of industrial importance						

Course Outcomes (CO)	
CO1	Students will learn about basics of protein engineering and various characterization techniques
CO2	Students will be able to predict and design novel protein structure
CO3	Students will learn about various protein engineering strategies
CO4	Students will have idea about applications of novel engineered protein

UNIT I

Protein Structure Characterization: Introduction to protein engineering, structure and properties of amino acids, primary, secondary, tertiary and quaternary structure of proteins, analysis of protein structure by CD spectroscopy, NMR, X ray diffraction crystallography,

UNIT II

Protein Structure Prediction: Protein prediction of protein structure using bioinformatics approach, protein sequence and structure relationship, predicting the conformation of proteins from sequence data Protein Folding – Molecular Energy and Forces,
Strategies for design of novel proteins-strategies for the design of structure and function, computer methods in protein modeling, mutations and their effects on protein folding,

UNIT III

Protein Engineering Strategies and Techniques: protein engineering - methodology, application and interpretation, Directed evolution and Rational design (Computer modeling).
Protein Evolution - Cell surface and phage display technologies, Cell-free protein engineering technologies

UNIT IV

Engineering the Proteins and Their Application: Effect of amino acids on structure of proteins, prediction of structure function relations of enzymes and other proteins, gene shuffling methods such as RACHITT, ITCHY, SCRATCHY

Examples of engineered proteins:, Engineering fluorescent proteins/molecular probes, Engineering multi-functional proteins, Antibody engineering

Text Books: 1. Cleland JL and Craik CS, Protein Engineering: Principles and Practice, WileyLiss. (1996).
2. Lutz S and Bornscheuer U T, Protein Engineering Handbook, Wiley-VCH (2009)
3. Paul R. Carey , Protein engineering and design, academic press, 1996, 361 pages.

Reference Books: 1. Primrose SB and Twyman RM, Principles of Gene Manipulation and Genomics, Blackwell Publishing (2006).

MTBT-117A	BIOANALYTICAL TECHNIQUES LAB						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with various biophysical and bioanalytical techniques and their applications in Biotechnology**						
Course Outcomes							
CO1	**Learner will know about concept of pH, preparation of buffers and measurement of pH.**						
CO2	**Students will be able to learn about concept of centrifugation and various kinds of chromatographic techniques**						
CO3	**Students will understand the concept of electrophoresis and Immunochemical techniques**						
CO4	**Students will be able to learn about spectroscopy and biosensors**						

LIST OF EXPERIMENTS

1. Concept of pH, preparation of buffers, measurement of pH.

2. Centrifugation: Principle and technique.

3. Chromatographic techniques: TLC, Gel Filtration Chromatography, Ion exchange Chromatography, Affinity Chromatography.

4. Electrophoretic techniques - Agarose and PAGE (nucleic acids and proteins).

5. Immunochemical techniques – general principles and applications of immunodiffusion, immunoelectrophoresis, radioimmunoassay, enzyme linked immunosorbent assay, fluorescence immunoassay.

6. Spectroscopy Concepts of spectroscopy, Visible and UV spectroscopy, Laws of photometry. Beer-Lamberts law, Principles and applications of colorimetry.

7. Biosensors and their applications.

Text/ References-

1. Ausubel FM, Brent R, Kingston RE, Moore DD, Seidman JG, Smith JA & Struhl K. 2002. *Short Protocols inMolecular Biology*. John Wiley.
2. Sambrook J, Russel DW & Maniatis T. 2001. *Molecular Cloning: A Laboratory Manual*. Cold Spring Harbour Laboratory Press.

MTBT-119A	FERMENTATION TECHNOLOGY LAB						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with various experiments on microbial fermentation processes**						
Course Outcomes							
CO1	**Learner will know about concept of bioreactor and its operation.**						
CO2	**Students will be able to learn about techniques of isolation and screening of bacteria, actinomycetes and fungi for secondary metabolite production.**						
CO3	**To understand the effect of pH, temperature, Carbon and Nitrogen Sources on secondary metabolite production.**						
CO4	**Students will be able to learn the use of statistical tools in fermentation technology**						

LIST OF EXPERIMENTS

1. Study of bioreactor and its operations.
2. Isolation and screening of bacteria, actinomycetes and fungi for secondary metabolite production such as antimicrobial metabolites and enzymes.
3. Studying the effect of pH, temperature, C and N Sources on secondary metabolite production by microorganisms.
4. Partial Purification of secondary metabolite production by microorganisms.
5. Studying the statistical analysis of fermentation experiments by using various tools.
6. Isolation of genomic DNA of bacteria, fungi and actinomycetes.

Text/Reference Books-

1. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.
2. Demain L. Manual of Industrial Microbiology and Biotechnology. ASM Press

MTRM-111A	Research Methodology and IPR						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*						
Course Outcomes (CO)							
CO1	Understand research problem formulation.						
CO2	Analyze research related information						
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.						
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.						

Unit 1

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'.
2. C.R. Kothari, "Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

MTBT-102A	DRUG DISCOVERY AND DEVELOPMENT						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with the concept of drug discovery and development**						
Course Outcomes							
CO1	**To understand the mechanism of action of drugs and lead optimization strategies**						
CO2	**To understand the concept of rational drug design**						
CO3	**To learn the concept of clinical research**						
CO4	**Students will be able to learn about assisted reproductive technologies.**						

UNIT I

Introduction to Drug Discovery and Development. Lead Optimization and validation strategies.
Mechanism of Drug Actions: Inter and intramolecular interactions: Weak interactions in drug molecules; Chirality and drug action; Covalent, ion, ion-dipole, hydrogen bonding, C-H hydrogen bonding, dihydrogen bonding, van der waals interactions and the associated energies. Cation-and OH- interactions. Drug-receptor interactions: Occupancy theory, rate theory, induced fit theory, macromolecular perturbation theory, activation-aggregation theory. Topological and stereochemical consideration.

UNIT II

Rational Drug Design: Structure activity relationships in drug design, Molecular modeling, Molecular docking and dynamics, Electronic structure methods and quantum chemical methods, De novo drug design techniques and Informatics methods in drug design. Optmization of ADME characteristics and physicochemical properties. Xenobiotic Drug Metabolism.

UNIT III

Clinical Research- definition and basic concept. Pharmacological Screening and Assays : General principles of screening, correlations between various animal models and human situations. Pharmacological screening models for therapeutic areas. Correlation between in-vitro and in-vivo screens; Special emphasis on cell-based assays, high through put screening, specific use of reference drugs and interpretation of results. Clinical trials and their regulations.

UNIT IV

Concept of Assisted Reproductive Technologies (Artificial Insemination, *In Vitro*Fertilziation, Gamete Intrafallopian Transfer and Zygote Intrafallopian Transfer), Gene Therapy- Concept and Applications. Concept of Eugenics.

Texts/References-

1. Hill, R. (2012). Drug Discovery and Development- Technology in Transition. 2nd Edition. Churchill Livingstone, London, UK.
2. Hinchliffe, A.(2003). Molecular Modelling for Beginners. John Wiley & Sons
3. Leach, AR (1996). Molecular Modelling: Principles and Applications. Longman.

MTBT-104A	Biomedical Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on different areas of Medical Biotechnology. To train the Students in a hospital based setup and familiarize them with the clinical diagnostics of diseases.						

Course Outcomes (CO)	
CO1	Students will be able to explain insights about genetic diseases and also about the molecular aspects related to human disease
CO2	Students will be able to gain new insights into molecular mechanisms of nucleic acid and gene therapy
CO3	Students will be able to gain knowledge about therapeutic recombinant proteins and immunotherapy
CO4	Students will be able to study processes of treatment of Biomedical waste

Unit 1

Introduction: Classification of genetic diseases: Chromosomal disorders – Chromosomal instability syndromes. Gene controlled diseases – Autosomal and X-linked disorders, Mitochondrial disorders. Molecular basis of human diseases: - Pathogenic mutations Gain of function mutations: Oncogenes, Huntingtons Disease, Pittsburg variant of alpha 1 antitrypsin. Loss of function - Tumour Suppressor. Genomic. Dynamic Mutations - Fragile- X syndrome, Myotonic dystrophy. Mitochondrial diseases

Unit 2

Gene therapy: Ex-vivo, In vivo, In situ gene therapy, Strategies of gene therapy: gene augmentation Vectors used in gene therapy Biological vectors – retrovirus, adenoviruses, Herpes Synthetic vectors– liposomes, receptor mediated gene transfer. Gene therapy trials – Familial Hypercholesterolemia, ADA, AIDS, Cystic Fibrosis, Solid tumors. Artificial organs and biocompatibility-Overview ,design consideration and evaluation process.

Unit 3

Recombinant & Immunotherapy; Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors, Monoclonal antibodies and their role in cancer; Role of recombinant interferons; Immunostimulants; Immunosupressors in organ transplants; Role of cytokine therapy in cancers; Clinical management and Metabolic syndrome: – PKU, Familial Hypercholesterolemia, Rickets, ADA, Congenital hypothyroidism.

Unit 4

Hazards of biomedical waste-Need for disposal specifically communicable diseases, Disease Epidemiology and mode of transmission of disease. Environment pollution by waste-CAUSES, Consequences, Mitigation and remedies. Treatment-Mechanical and chemical disinfection, Conventional treatments-Incineration, Microwave technology, Autoclave tech, Hydroclave system, Electro thermal reactivation- Pyrolysis/gasification WHO guidelines on management and disposal of biomedical waste from hospitals.

Text books 1. Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (2000)
2. Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon
Reference Book 1 Human Molecular Genetics by T. Strachan, Andrew

MTBT-106A	METABOLIC ENGINEERING						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe the improvement of primary and secondary metabolites production with various application of metabolic engineering						

Course Outcomes (CO)	
CO1	Students will learn about the Basic concepts of Metabolic engineering and synthesis of primary metabolites
CO2	Students will learn about synthesis of secondary metabolites and bioconversion
CO3	Students will learn about Regulation of Enzyme Production and Metabolic flux
CO4	Students will learn about Metabolic engineering with Bioinformatics and Applications of Metabolic Engineering

UNIT I

Introduction: Identification of metabolic regulation. Basic concepts of Metabolic Engineering – Overview of cellular metabolism – Different models for cellular reactions, induction – Jacob Monod model and its regulation, Feedback regulation. Synthesis of Primary metabolites. Amino acid synthesis pathways and its regulation at enzyme level and whole cell level, Alteration of feedback regulation, Limiting accumulation of end products.

UNIT II

Biosynthesis of Secondary Metabolites. Regulation of secondary metabolite pathways, precursor effects, prophase, idiophase relationship, Catabolite regulation by passing control of secondary metabolism, producers and applications of secondary metabolites.
Bioconversions: Applications of Bioconversions, Factors affecting bioconversions, Specificity, Yields, Cometabolism, Mixed or sequential bioconversions, Conversion of insoluble substances.

UNIT III

Regulation of Enzyme Production. Strain selection, Genetic improvement of strains, Gene dosage, metabolic pathway manipulations to improve fermentation, the modification of existing - or the introduction of entirely new metabolic pathways
Metabolic flux. Integration of anabolism and catabolism, metabolic flux analysis and its applications, Experimental determination method of flux distribution,

UNIT IV

Metabolic engineering with Bioinformatics. Metabolic pathway modeling, Analysis of metabolic control and the structure metabolic networks,
Applications of Metabolic Engineering. Application in pharmaceuticals, chemical bioprocess, food technology, agriculture, bioremediation and biomass conversion.

Text/References-

1. Wang.D.I.C Cooney C.L., Demain A.L., Dunnil.P. Humphrey A.E. Lilly M.D., Fermentation and Enzyme Technology, John Wiley and sons 1980.
2.Stanbury P.F.,andWhitakerA.,Principles of Ferment Technology, Pergamon Press1984.
3. Specific journals and published references.

MTBT-108A	Biofuel Technology						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe the role of biotechnology in biofuel technology						

Course Outcomes (CO)	
CO1	Student will learn about Historical Development of Bioethanol and Chemistry of Lignocelluloses
CO2	Student will learn about the degradation of lignocelluloses by enzymes
CO3	Student will learn about Biochemical Engineering and Bioprocess Management for biofuel and their downstream processing.
CO4	Student will learn about the improvement of biofuel production by genetic manipulations

Unit 1

Historical Development of Bioethanol as a Fuel, Starch as a Carbon Substrate for Bioethanol Production, The Promise of Lignocellulosic Biomass, Thermodynamic and Environmental Aspects of Ethanol as a Biofuel, Effects on emissions of greenhouse gases and other pollutants, Ethanol as a First-Generation Biofuel: Present Status and Future Prospects. Lignocellulosic Biomass, Biomass as an Energy Source: Chemistry of Lignocellulosic Biomass, Lignocellulose as a chemical resource, Physical and chemical pretreatment of lignocellulosic biomass, Biological pretreatments, Acid hydrolysis to saccharify pretreated lignocellulosic biomass

Unit II

Enzymology of cellulose degradation, Cellulases in lignocellulosic feedstock processing, biotechnology of cellulase production, Hemicellulases and Lignin-Degrading Commercial Choices of Lignocellulosic Feedstocks for Bioethanol Production. Biotechnology of Bioethanol Production, Traditional Ethanologenic Microbes, Yeasts, Bacteria, Metabolic Engineering of Novel Ethanologens

Comparison of industrial and laboratory yeast strains for ethanol production, Improved ethanol production by naturally pentose-utilizing yeasts, Assembling Gene Arrays in Bacteria for Ethanol Production, Genetic and metabolic engineering of bacteria for bioethanol production, Candidate bacterial strains for commercial ethanol production, Trends for Research with Yeasts and Bacteria for Bioethanol Production, "Traditional" microbial ethanologens, "Designer" cells and synthetic organisms

UNIT III

Biochemical Engineering and Bioprocess Management for Fuel Ethanol, Biomass Substrate Provision and Pretreatment, Wheat straw — new approaches to complete saccharification, Switchgrass, Corn stover, Softwoods, Sugarcane bagasse, Other large-scale agricultural and forestry, Fermentation Media, Highly concentrated media developed for alcohol fermentations, Fermentor Design and Novel Fermentor Technologies, Continuous fermentations for ethanol production, Fed-batch fermentations, Immobilized yeast and bacterial cell production designs, Contamination events and buildup in fuel ethanol plants, Simultaneous Saccharification and Fermentation and Direct Microbial Conversion, Downstream Processing and By-Products, Ethanol recovery from fermented broths, Solid by-products from ethanol fermentations

UNIT IV

Genetic Manipulation of Plants for Bioethanol Production, Engineering resistance traits for biotic and abiotic stresses, Bioengineering increased crop yield, Optimizing traits for energy crops intended for biofuel production. Vegetable oils and chemically processed biofuels, Biodiesel composition and production processes, Biodiesel economics, Energetics of biodiesel production, Issues of ecotoxicity and sustainability with expanding biodiesel production, Biodiesel from Microalgae and Microbes, Biohydrogen, The hydrogen economy and fuel cell technologies, Bioproduction of gases, Microbial Fuel Cells

References:

1. David M. Mousdale, Biofuel-Biotechnology, Chemistry, and sustainable Development, 1st Ed., CRC Press Taylor & Francis Group, 2008.
2. Ayhan Demirbas, Green Energy and Technology, Biofuels, Securing the Planet's Future Energy Needs, 1st edition, Springer, 2009.

MTBT-110A	ADVANCED INDUSTRIAL BIOTECHNOLOGY						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to describe the various advance industrial application for the benefit of human life						

Course Outcomes (CO)	
CO1	Students will learn about microbial diversity and screening of microbes
CO2	Students will learn about the fermentation and its improvement
CO3	Students will learn about genetic analysis by using tools of recombinant DNA technology and various applications
CO4	Students will learn about Novel industrial applications, tracking of microbes and monitor their gene expression

UNIT I

Microbial diversity and strategies for its recovery. Bioprospecting for novel compounds. Screening of microbial isolates for bioactivity. Cultivation of hyperthermophilic and extremely thermo acidophilic microorganisms. Instrumentation and monitoring of bioreactors. Culture and analysis using gel microdrops.

UNIT II

Experimental design for improvement in fermentation processes. Software applications in fermentation processes. Methods for biocatalysis. Downstream processing. Introduction to bioprocess simulation. Quality assurance and quality control. Concepts of anaerobic fermentation and contract fermentations.

UNIT III

Introduction to genetic analysis of *Streptomyces* and *Bacillus* spp. using tools of recombinant DNA technology. Applications of rDNA technology in thermophiles. Design and assembly of polycistronic operons in *Escherichiacoli. In vivo* folding of recombinant proteins in *E. coli.* Expression of G protein coupled receptors inmicroorganisms. Selection of suitable hosts for *E. coli* optimized for expression of proteins. Mechanism of mRNA degradation in bacteria and their implication for stabilization of heterologous transcripts. Filamentous fungi in industrial biotechnology. Genetics and genomics of *Saccharomyces cerevisiae*.

UNIT IV

Methods for optimizing industrial enzymes. Cloning and analysis of genes for the biosynthesis of microbial secondary metabolites. Antibiotic resistance mechanisms of bacterial pathogens. Genetics of bacteriocins produced by Lactic acid bacteria and their use in novel industrial applications. Biomarkers and bioreporters to track microbes and monitor their gene expression. Biofilms. Future perspectives in industrial microbial technology.

Textbooks and Reference Books

1. Industrial Microbiology. Casida Jr. , L.E . (1968) New Age International (P)Ltd. New D elhi .
2. Prescott & Dunn's Industrial Microbiology. Ed. E. G. Reed (1987). CBS Publishers, New Delhi .
3. Biotechnology: A Textbook of Industrial Microbiology 2nd Edition. Crueger, W. and Crueger, A. (2000) Panima Publishing Corporation, New Delhi.
4. Demain, A.L. and Davies, 1.E. Manual ofIndustrial Microbiology and Biotechnology 2nd Ed. ASM Press, Washington DC.

MTBT-112A	Biomedical Equipments						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten student's knowledge about biomedical equipments and techniques involved						

Course Outcomes (CO)	
CO1	Students will learn about basics of bioelectric signals and electrodes
CO2	Students will learn about various equipments involved in diagnostic
CO3	Students will be able to understand the working principle of various therapeutic equipments
CO4	Students will have learn calibration and testing of equipments

UNIT I

Bioelectric Signals and Electrodes: Bio-potentials and their origin: ECG, EEG, EMG, ENG, ERG, EOG, MEG. Bio-potential electrodes, generalized medical instrumentation system-Man machine interface.

UNIT II

Diagnostic Equipments: ECG: normal and abnormal waveform, diagnosis interpretation, ECG leads connections, Einthoven triangle, Plethysmography, Blood pressure measurement: direct and indirect methods, Cardiac output measurements, Respiratory volume measurement, Impedance pneumograph, Spirometers, Pneumotachometers. EEG: signal amplitudes and frequency bands, EEG machine. Blood cell counter, Endoscopes, Laparoscopes and Camera pill.

UNIT III

Therapeutic Equipments: Heart lung machine, Dialyzers: basic principle of dialysis, different types of dialyzer, membranes, portable type. Cardiac pacemakers: external and Implantable pacemaker. Cardiac defibrillator: DC defibrillator, implantable defibrillator and defibrillator analyzer. Ventilators, Anesthesia machine, Short wave diathermy, microwave diathermy, ultrasonic therapy unit, electrotherapy

UNIT IV

Patient Safety: Electric shock hazards, leakage currents, electrical safety analyzer, testing of biomedical equipments. Calibration and testing of biomedical equipments. Modern biomedical equipments and systems: Market scenario.

Books Recommended:

1. John G. Webster, "Medical Instrumentation Application and Design" 4th Ed, Wiley, 2011.
2. Joseph J Carr, John M Brown, "Introduction to Biomedical Equipment Technology", Pearson Education, NewDelhi, 2011.
3. L. J. Street, "Introduction to Biomedical Engineering Technology", 2 nd Ed, CRC Press, 2011
4. Khandpur R S, "Medical Instrumentation: Application and Design", 3Rd Ed, John Wiley & Sons, 2009.

MTBT-114A	GENE THERAPY AND GENE EDITING						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to understand the role of gene therapy in treatment of severe diseases.						

Course Outcomes (CO)	
CO1	Students will learn about basics of gene therapy
CO2	Students will learn about viral vectors used in gene therapy
CO3	Students will have knowledge about role of gene therapy in curing of diseases treatment
CO4	Students will have learn about gene editing and its application

UNIT I

Introduction: Basic concept of gene therapy. Somatic and germ line gene therapy. Gene replacement and gene addition. In vivo, ex vivo and in vitro gene therapy. Transgenic animal models. Vichels for gene transferviral vectors, reterovirus, adenovirus and adenoassociated virus.

UNIT II

Viral Vectors: Lentivirus, Recombinant SV40 Virus, Non viral vectors, Naked DNA and Transposons., RNADNA chimera, Gene therapies for Crigler Najjar syndrome.

UNIT III

Gene Therapy and disease: Cystic fibrosis, Duchmne muscular dystrophy, Bleeding disorder, Tryosenemia. Cancer gene therapy

UNIT IV

Genome and Gene Editing: Introduction to Genome and Gene Editing, History of CRISPR, Components of CRISPR/CAS9 system, Editing with homology directed repair, Genome-wide Screening and Regulation of Gene Expression usıng Crispr/Cas9, CRISPR Purification, and Multiplexible Crispr Expression Systems

Text Books:

1. Gene therapy: TwentyFirst Century Medicine. Annu. Rev. Biochem. 2005. 74:71138
2. Gene therapy: Promises and Problems. Annu. Rev. Genomics Hum. Genet. 2001. 2:177211

Reference Books:

1. Primrose SB and Twyman RM, Principles of Gene Manipulation and Genomics, Blackwell Publishing (2006).
Reference Books:
2. Friedman T. 1999. *The Development of Human Gene Therapy* . Cold Spring Harbor,NY: Cold Spring Harbor Lab. Press.
3. Knipe DM, Howley PM, eds. 2001. *Fields Virology.* Philadelphia, PA: Lippincott Williams & Wilkins.
4. Hackett NR, Crystal RG. 2000. Adenovirus vectors for gene therapy. In *Gene Therapy* , ed. NS Templeton, DD Lasic, pp.1739. New York: Marcel Dekker
5. http://www.liebertpub.com/hum .
6. www.nature.com/gt/index.html

MTBT-116A	METAGENOMICS						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The purpose of this course is to provide knowledge about how the metabolic functions, taxonomic distribution, diversity, evenness and species richness of microbial communities varies across environment.						

Course Outcomes (CO)	
CO1	Students will learn about basics of metagenomics and different approaches to metagenomics
CO2	Students will learn about probing of biomarkers and oligonucleotide microarrays
CO3	Students will learn about construction and analysis of metagenomic libraries
CO4	Students will learn about industrial application of metagenomics with case studies

UNIT -I

Environmental Metagenomics – Introduction; Pure culture and in consortium ; Cultivable and Non-cultivable microbial analysis; Molecular fingerprinting techniques (RFLP, T-RFLP, ARISA, DGGE, rDNA library, and FISH); Stable isotope probing (SIP); Suppressive subtractive hybridization (SSH); Differential expression analysis (DEA); Microarrays & Metagenome sequencing; Next-generation sequencing approaches to metagenomics

UNIT II

Stable isotope probing and oligonucleotide microarrays: Direct linking of microbial populations to specific biodegradation and biotransformation processes by stable isotope probing of biomarkers- PhyloChip & GeoChip-Detection of xenobiotic-degrading bacteria by using oligonucleotide microarrays.

UNIT III

Library construction and analysis of metagenomic Libraries: Library Cataloging microbes: phylogenetic tree and construction - Construction of a metagenomic library; Analysis of Metagenomic Libraries; Sequence-based Metagenomics Analysis; Function based Metagenomics Analysis; Phylogenetic analysis and Comparative genomics Softwares & Tools

Unit IV

Metagenomics case studies: Metagenomic analysis of soil microbial communities; marine microbial communities; Microbial Community in Acid Mine Drainage; Bacteriophage; Archaeal Metagenomics: Bioprospecting Novel Genes and Exploring New Concepts; Metagenomics and Its Applications to the Study of the Human Microbiome; Applications of Metagenomics for Industrial Bioproducts

References

1. Diana Marco Universidad Nacional de Cordoba, Argentina, “Metagenomics: Theory, Methods and Applications”, Caister Academic Press, 2010.
2. Diana Marco Universidad Nacional de Cordoba,Argentina “Metagenomics: Current Innovations and Future Trends”, Caister Academic Press, 2011.
3. Joanna R. Freeland, Heather Kirk, Stephen Petersen, “Molecular Ecology”, Mc Graw Hill, 2nd Edition “2012.
4. Beebee T.J.C., D G. Rowe,” An Introduction to Molecular Ecology”, Mc Graw Hill, 2004.

MTBT-118A	Molecular Technique Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	4	4	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To provide hands on training on basic techniques.						
Course Outcomes (CO)							
CO1	Student will learn the basic techniques used in molecular biology						
CO2	Student will learn PCR and detection of food borne pathogenic organisms						

Note: A college must offer 4 of the below listed experiments. The remaining 2 experiments may be Modified by College according to facilities available.

Practical Exercises

1. Extraction of DNA from clinical samples followed by agarose gel electrophoresis.
2. Extraction of double stranded genomic RNA from viral samples.
3. Polyacrylamide gel electrophoresis (PAGE) for detection of segmented genomic RNA.
4. Polymerase chain reaction for detection of pathogens in blood/and other clinical samples.
5. RT-PCR for detection of RNA.
6. Detection of food borne pathogenic organisms from food samples using PCR technology.

Text/ References-

1. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.
2. Sambrook J & Russel DW. 2001. *Molecular Cloning: a Laboratory Manual*. Cold Spring Harbour Lab. Press.
3. Twyman RM. 2003. *Advanced Molecular Biology*. Bios Scientific.
4. Specific journals and published references.

MTBT-120A	Advance Molecular Technique Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**4**	4	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To provide hands on training on advanced techniques.						
Course Outcomes (CO)							
CO1	Student will learn the advance techniques used in molecular biology						
CO2	Student will learn the hybridization and microarray						

Note: A college must offer 5 of the below listed experiments. The remaining 2 experiments may be modified by College according to facilities available.

Practical Exercises

1. Restriction endonuclease profile analysis.
2. Isolation of plasmid DNA from bacteria.
3. Cloning of PCR products followed by nucleic acid sequencing.
4. Analysis of sequenced data.
5. RFLP and RAPD.
6. Southern hybridization/ Northern hybridization.
7. Microarray.

Text/ References-

1. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.
2. Sambrook J & Russel DW. 2001. *Molecular Cloning: a Laboratory Manual*. Cold Spring Harbour Lab. Press.
3. Twyman RM. 2003. *Advanced Molecular Biology*. Bios Scientific.
4. Specific journals and published references.

MTBT-201A	Advanced Food Biotechnology						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	-	-	3	60	40	100	3 Hrs.
Objective	To acquaint with the fundamentals and application of biotechnology in relation to raw materials for food processing, nutrition, food fermentations, waste utilization						
Course outcomes							
CO1	To acquaint with principles of different techniques used in processing and preservation of food						
CO2	To acquaint the students with packaging methods, packaging materials, modern packaging techniques						
CO3	To acquaint with food quality parameters and control systems, food standards, regulations, specifications						
CO4	To develop an understanding of enzymes useful in food product technology and food processing						

UNIT I

Preservation and Processing : Scope of food processing; historical developments; principles of food processing and preservation. Processing and preservation by drying, concentration and evaporation-types of dryers and their suitability for different food products; ultra- filtration, reverse osmosis, convectional and adiabatic drying. Fruit powders using spray drying..

Processing and preservation by non-thermal methods, irradiation, high pressure, pulsed electric field, hurdle technology. Use and application of enzymes and microorganisms in processing and preservation of foods; food fermentations, pickling, smoking etc.

UNIT II

Food packaging systems: Different forms of packaging such as rigid, semirigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.

UNIT III

Quality management : Concept of quality, instrumental methods for testing quality.Concepts of quality management: Objectives, importance and functions of quality control; Quality management systems in India; Sampling procedures and plans; Food adulteration. Food Safety and Standards Act, 2006; Domestic regulations; Global Food safety Initiative; Indian & International quality systems and standards like ISO and Food Codex. Various organizations dealing with inspection, traceability and authentication, certification and quality assurance (PFA, FPO, MMPO, MPO, AGMARK, BIS); Labeling issues.International scenario, International food standards. Quality assurance.

UNIT IV

Enzymes as processing aids: Role of enzymes in cheese making and whey processing; fruit juices (cell wall degrading enzymes for liquefaction,clarification, peeling, debittering, decolourization of very dark coloured juices such as anthocyanases); baking (fungal α-amylase for bread making; maltogenic α-amylases for anti-staling; xylanses and pentosanases as dough conditioners; lipases or dough conditioning; oxidases as replacers of chemical oxidants; synergistic effect of enzymes).

Text & References:

1. Microbiology 5th Edition. Prescott, L.M.; Harley, J.P. and Klein, D.A.(2003) McGraw Hill, USA
2. Food Microbiology: Fundamentals and Frontier 2nd Eds. Ed. Beuchat, Doyle & Montville. (2001). Blackwell Synergy.
3. Food Microbiology. Frazier, W.C. and Westhoff, D.C. (2010) Tata Mc-Graw Hill, New Delhi.
4. Modern Food Microbiology. Jay, J.M. (1996) CBS Publishers and Distributors, New Delhi.
5. Foods: Facts and Principles. (2012) N. Shakuntala Manay and M. Swami. New Age International (P) Ltd, Publishers
6. Biotechnology: Food Fermentation Vol. I & II. Eds. Joshi, V.K. & Pandey, A. (1999) Educational Publishers, Kerala.
7. Biotechnological Strategies in Agroprocessing. Eds. Marwaha S.S & Arora, J.K. (2003)
8. Ray, Bibek (1996). Fundamental Food Microbiology .CRC Press.
9. Food Microbiology 2nd ed, Adam, M. R. and Moss (2003) Panima Pub., New Delhi.

MTAD-101A	English For Research Paper Writing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Student will able to understand the basic rules of research paper writing.*						
Course Outcomes (CO)							
CO1	*Understand that how to improve your writing skills and level of readability*						
CO2	*Learn about what to write in each section*						
CO3	*Understand the skills needed when writing a Title*						
CO4	*Ensure the good quality of paper at very first-time submission*						

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit 4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

References:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

MTAD-103A	Disaster Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Develop an understanding of disaster risk reduction and management*						
Course Outcomes (CO)							
CO1	*Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*						
CO2	*Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*						
CO3	*Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*						
CO4	*critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in*						

Unit 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

References:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep &Deep Publication Pvt. Ltd., New Delhi.

MTAD-105A	Sanskrit for Technical Knowledge						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*						
Course Outcomes (CO)							
CO1	*To get a working knowledge in illustrious Sanskrit, the scientific language in the world*						
CO2	*Learning of Sanskrit to improve brain functioning*						
CO3	*Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*						
CO4	*The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*						

Unit –1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Unit – 2

Order, Introduction of roots,Technical information about Sanskrit Literature

Unit –3

Technical concepts of Engineering: Electrical, Mechanical

Unit –4

Technical concepts of Engineering: Architecture, Mathematics

References

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

MTAD-107A	Value Education						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*						
Course Outcomes (CO)							
CO1	*Knowledge of self-development*						
CO2	*Learn the importance of Human values*						
CO3	*Developing the overall personality*						
CO4	*Know about the importance of character*						

Unit 1

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

Unit 2

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature,Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

References

1.Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

MTAD-102A	Constitution of India						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*						
Course Outcomes (CO)							
CO1	*Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*						
CO2	*Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*						
CO3	*Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*						
CO4	*Discuss the passage of the Hindu Code Bill of 1956.*						

Unit I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

References

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MTAD-104A	Pedagogy Studies						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	*Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*.						
Course Outcomes (CO)							
CO1	*What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*						
CO2	*What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*						
CO3	*How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*						
CO4	*What is the importance of identifying research gaps?*						

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Unit 2

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 3

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

Unit 4

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

References

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

MTAD-106A	Stress Management by Yoga						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress						
Course Outcomes (CO)							
CO1	*Develop healthy mind in a healthy body thus improving social health.*						
CO2	*Improve efficiency*						
CO3	*Learn the Yog asan*						
CO4	*Learn the pranayama*						

Unit – 1

Definitions of Eight parts of yog (Ashtanga).

Unit- 2

Yam and Niyam, Do`s and Don't's in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit- 3

Asan and Pranayam, Various yog poses and their benefits for mind & body,

Unit- 4

Regularization of breathing techniques and its effects-Types of pranayam.

References

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-108A	Personality Development through Life Enlightenment Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
2	**0**	**0**	**0**	**-**	**100**	**100**	**3 Hrs.**
Program Objective (PO)	To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students						
Course Outcomes (CO)							
CO1	*Students become aware about leadership.*						
CO2	*Students will learn how to perform his/her duties in day to day work.*						
CO3	*Understand the team building and conflict*						
CO4	*Student will learn how to become role model for the society.*						

Unit – 1

Neetisatakam-Holistic development of personality: Verses: 19, 20, 21, 22 (wisdom); Verses: 29, 31, 32 (pride & heroism); Verses: 26, 28, 63, 65 (virtue); Verses: 52, 53, 59 (don's); Verses: 71, 73, 75, 78 (do's).

Unit – 2

Approach to day to day work and duties; Shrimad Bhagwad Geeta: Chapter-2: Verses: 41, 47, 48; Chapter-3: Verses: 13, 21, 27, 35; Chapter-6: Verses: 5, 13, 17, 23, 35; Chapter-18: Verses: 45, 46, 48.

Unit - 3

Statements of basic knowledge; Shrimad Bhagwad Geeta: Chapter-2: Verses: 56, 62, 68; Chapter-12: Verses: 13, 14, 15, 16, 17, 18.

Unit – 4

Personality of Role model; Shrimad Bhagwad Geeta: Chapter-2: Verses: 17; Chapter-3: Verses: 36, 37, 42: Chapter-4: Verses: 18, 38, 39; Chapter-18: Verses: 37, 38, 63.

References:

1. Srimad Bhagavad Gita, Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya), P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

MTOE-201A	Business Analytics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	The main objective of this course is to give the student a comprehensive understanding of business analytics methods.						
Course Outcomes (CO)							
CO1	*Able to have knowledge of various business analysis techniques.*						
CO2	*Learn the requirement specification and transforming the requirement into different models.*						
CO3	*Learn the requirement representation and managing requirement assests.*						
CO4	*Learn the Recent Trends in Embedded and collaborative business*						

Unit 1

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst.
Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Unit 2

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit 3

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.
Managing Requirements Assets: Change Control, Requirements Tools

Unit 4

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

References:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

MTOE-203A	Industrial Safety						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the industrial safety.*						
Course Outcomes (CO)							
CO1	*Understand the industrial safety.*						
CO2	*Analyze fundamental of maintenance engineering.*						
CO3	*Understand the wear and corrosion and fault tracing.*						
CO4	*Understanding that when to do periodic inceptions and apply the preventing maintenance.*						

Unit-1

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-2

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-3

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-4

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205A	Operations Research						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.						
Course Outcomes (CO)							
CO1	*Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.*						
CO2	*Students should able to apply the concept of non-linear programming*						
CO3	*Students should able to carry out sensitivity analysis*						
CO4	*Student should able to model the real world problem and simulate it.*						

Unit -1

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit -2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit- 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit -4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207A	Cost Management of Engineering Projects						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the strategic cost management process.*						
CO2	*Students should able to types of project and project team types*						
CO3	*Students should able to carry out Cost Behavior and Profit Planning analysis.*						
CO4	*Student should able to learn the quantitative techniques for cost management.*						

Unit-1

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-2

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-3

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit-4

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209A	Composite Materials						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the composite materials and their properties.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification and characteristics of Composite materials.*						
CO2	*Students should able reinforcements Composite materials.*						
CO3	*Students should able to carry out the preparation of compounds.*						
CO4	*Student should able to do the analysis of the composite materials.*						

UNIT–1:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

UNIT – 2

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–3

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – 4

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

5.

MTOE-211A	Waste to Energy						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	*To enable students to aware about the generation of energy from the waste.*						
Course Outcomes (CO)							
CO1	*Students should able to learn the Classification of waste as a fuel.*						
CO2	*Students should able to learn the Manufacture of charcoal.*						
CO3	*Students should able to carry out the designing of gasifiers and biomass stoves.*						
CO4	*Student should able to learn the Biogas plant technology.*						

Unit-1

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-2

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-3

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-4

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Dissertation Phase – I and Dissertation Phase - II

Teaching Scheme

Lab work : 20 and 32 hrs/week for Dissertation Phase- I (MTBT-203A)and Phase- II (MTBT202A) respectively

Course Outcomes:
At the end of this course, students will be able to

a. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
b. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
c. Ability to present the findings of their technical solution in a written report. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:
The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

1. Relevance to social needs of society

    - Relevance to value addition to existing facilities in the
    - Relevance to industry need

2. Problems of national importance

3. Research and development in various domain

4. The student should complete the following:

    - Literature survey Problem
    - Definition Motivation for study and Objectives

    - Preliminary design / feasibility / modular approaches
    - Implementation and Verification

5. Report and presentation

The dissertation phase- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

Design, fabrication, testing of Communication System.

The viva-voce examination will be based on the above report and work.

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Guidelines for Dissertation Phase – I and Phase-II

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referredliterature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

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Scheme & Syllabus of

M. Tech in Food Technology

Batch 2018 onwards

Kurukshetra University, Kurukshetra

(‘A+’ Grade, NAAC Accredited)

Semester- I

Subject code	SUBJECT	L	T	P	Total	Minor* Test	Major Test	Practical	Cr.	Duration of Exam (Hrs.)
MFT-101A	Advance in Food Technology	3	-	-	3	40	60		3	3
MFT-103 A	Flavor Technology	3	-	-	3	40	60		3	3
PE-I	Elective –I*	3	-	-	3	40	60		3	3
PE-II	Elective-II*	3	-	-	3	40	60		3	3
MFT-117 A	Lab –I (Advance in Food Technology)	-	-	4	4	40		60	2	3
MFT-119 A	Lab –II(flavor Technology)	-	-	4	4	40		60	2	3
MTRM 111 A	Research Methodology and IPR	2	-	-	2	40	60		2	3
AC-I	Audit Course*	2			2	100			0	3
Total	16	8	24			380	300	120	18	
						800				

List of Program Elective (PE) papers for First Semester

Program Elective (PE-I)			Program Elective (PE-II)
Course No.	**Subject**	**Course No.**	**Subject**
MFT-105 A	Food Additives & Contaminant	MFT-111 A	Bioprocess Engg.
MFT-107 A	Advances in cereal science & Technology	MFT-113 A	Neuraceutical&Functional Foods
MFT-109 A	Enzymes In Food Processing	MFT-115 A	Advances In Dairy Engg.

List of Audit Course-I (AC-I) for First Semester

Course No.	Subject
MTAD-101A	English for Research Paper Writing
MTAD-103A	Disaster Management
MTAD-105A	Sanskrit for Technical Knowledge
MTAD-107A	Value Education

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. *** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

Semester – II

Subject code	Subject	L	T	P	Total	Minor* Test	Major Test	Practical	Cr.	Duration of Exam (Hrs.)
MFT-102 A	Novel Food packaging Techniques	3	-	-	3	40	60		3	3
MFT-104 A	Advances In FoodAnalysis.	3	-	-	3	40	60		3	3
PE-III	Elective-III*	3	-	-	3	40	60		3	3
PE-IV	Elective-IV*	3	-	-	3	40	60		3	3
MFT-118 A	Lab-III (Novel Food packaging Techniques)		-	4	4	40		60	2	3
MFT-120 A	.Lab-IV(Advances In Food Analysis)	-	-	4	4	40		60	2	3
MFT-122 A	Mini Project	-	-	4	2	40	60		2	3
AC-II	Audit Course* 2	2			2	100			0	3
Total		14		12	24	380	300		18	3
Total						380	300	120		
						800				

List of Program Elective (PE) papers for Second Semester

Program Elective (PE-III)		Program Elective (PE-IV)	
Course No.	**Subject**	**Course No.**	**Subject**
MFT-106 A	Advance In FoodEngg	MFT-112 A	Biotechnological Tools in Food Analysis
MFT-108 A	Advances in Meat, Fish, Poultry Technology	MFT-114 A	Food Safety and Quality Assurance
MFT-110 A	Technology of frozen Foods	MFT-116 A	Beverage & Snacks Food Technology

List of Audit Course-II (AC-II) for Second Semester	
Course No.	**Subject**
MTAD-102A	Constitution of India
MTAD-104A	Pedagogy Studies
MTAD-106A	Stress Management by Yoga
MTAD-108A	Personality Development through Life Enlightenment Skills.

Note: 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. *** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

3. Students be encouraged to go to Industrial Training/Internship for at least 6-8 weeks during the summer break with a specific objective for Dissertation Part–I (MFT-203 A). The industrial Training/Internship would be evaluated as the part of the Dissertation–I (with the marks distribution as 40 marks for Industrial Training/Internship and 60 marks for Dissertation Part–I).

#4**. Mini project:** During this course the student will be able to understand the contemporary/emerging technologies for various processes and systems. During the semester, the students are required to search/gather the material/information on a specific topic, comprehend it and present/discuss the same in the class. He/she will be acquainted to share knowledge effectively in oral (seminar) and written form (formulate documents) in the form of report. The student will be evaluated on the basis of viva/ seminar (40 marks) and report (60 marks).

Semester – III

Subject code	Subject	L	T	P	Total	Minor* Test	Major Test	Cr.	Duration of Exam (Hrs.)
MFT-201 A	Food Rheology and Microstruture	3	-	-	3	40	60	3	3
OE-I	Open Elective-VI*	3	-	-	3	40	60	3	3
MFT-203 A	Dissertation-I	-	-	20	-	100	-	10	-
		6		20	6	180	120	16	-
						180	120		
Total						300			

List of Open Elective (OE)-I papers for Third Semester	
Course No.	**Subject**
MTOE-203A	Industrial Safety
MTOE-205A	Operations Research
MTOE-207A	Cost Management of Engineering Projects
MTOE-213A	Industerial Statistic
MTOE-215A	Non Conventional Sources of energy
MTOE-217A	Instrumentation & Process Control

Semester – IV

Subject code		L	T	P	Total	Minor* Test	Major Test	Cr.	Duration of Exam (Hrs.)
MFT-202 A	Dissertation-II	-	-	32	-	100	200	16	-
Total				32		100	200	16	-
Total						300		16	

Total credit - 68

SEMESTER - I

MFT-101A	Advance in Food Technology							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on newer technology in Food processing.							
Course Outcomes (CO)								
CO1	Students will be able to know about use of microwave energy in foods.							
CO2	Students will be able to gain knowledge about ultrasonic in food processing.							
CO3	Students will be able to know about techniques of Nanotechnology.							
CO4	Students will be able to study about Modeling of Microbial food spoilage.							

Unit – I

Modeling of Microbial Food Spoilages: Microbial growth dynamics models, partial differentiation equation models, application of models in thermal preservation, Concept, mechanism of microbial destructions, equipments etc.

Membrane Technology: Introduction to pressure activated membrane processes, performance of RO/UF and NF and industrial application.

Unit – II

Supercritical Fluid Extraction: Property of near critical fluids (NCF), solubility and efficiency of NCF extraction, equipment and experimental techniques used in NCF extraction and industrial application

Use of Microwave Energy in Foods: Theory of microwave heating, dielectric properties of food materials, working principle of magnetron, microwave blanching, sterilization and finish drying.

Unit – III

Hurdle Technology: Types of preservation techniques and their principles, concept of hurdle technology and its application.

High Pressure Processing of Foods: Concept of high pressure processing, quality changes, effects of pressure on microorganisms and its application in food processing.

Unit – IV

Ultrasonic in Food Processing: Properties and generation of ultrasonic, ultrasonic imaging, application of ultrasonics as an analytical tool and processing techniques.

Newer Techniques in Food Processing: Application of technologies of high intensity light, pulse electric field, micronization in food processing and preservation.

Nanotechnology: Principles, mechanism and applications in food

References

1. New Methods of Food Preservation (Non Thermal Processing of Foods), G. W. Gould, Springer Science & Business Media, 1995

2. Introduction to Food Engineering, R Paul Singh, R. Paul Singh, Dennis R. Heldman Academic Press, 2008

MFT-103A	Flavour Technology							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
3	0	0	3	60	40	-	100	3 Hrs.
Program Objective (PO	To enlighten the knowledge to Students on Methods of Flavor extraction, isolation, separation.							
Course Outcomes								
CO1	Students will be able to know about flavor Precursors.							
CO2	Students will be gain knowledge of Flavor encapsulation and stabilization.							
CO3	Students will be able to Know about Flavor Precursors, intensifiers, Biogenesis.							
CO4	Students will be able to Know about enzyme and fermentation flavors.							

Unit – I

Introduction: Fundamentals of flavour, Classification of food flavour, flavour profile, factors affecting flavours, bioflavour and reconstituted flavour, flavour release from foods, interaction of flavor compounds with foods

Flavour Extraction: Methods of flavour extraction, isolation, separation and equipment

Unit – II

Flavour Precursors: Flavour Compounds from Carbohydrates and Proteins, Lipid oxidation

Flavour intensifiers: Flavour intensifiers and their effects, Chemistry and technology of various flavour intensifiers

Flavour Biogenesis: Fruit aroma, vegetable aroma, Methyl ketones, diacetyl, acetaldehyde, lactones, terpenes, esters, pyrazines, vanillaflavour, enzyme and fermentation flavors.

Unit – III

Process Flavours: Effect of processing on flavor compounds, Non enzymatic browning, heat reaction flavors

Food Flavours: Flavour constituents: Onion, garlic, cheese, milk, meat, wine, coffee, tea, chocolate, citrus flavour

Unit – IV

Flavor encapsulation and stabilization: Principles and techniques of flavor encapsulation, types of encapsulation, factors affecting stabilization of encapsulated flavor and their applications in food industry, Packaging and flavor compounds interaction, Effect of storage, processing, transportation and environmental conditions on flavor components or constituents.

Reference Book

1. Source Book of Flavors, Gary Reineccius, Springer Science & Business Media, 1998
2. Flavour chemistry and technology, Heath, H. B., Avi publication company,1978
3. Understanding Natural Flavors, Piggott, J. R., Paterson, A., Blackie Academic & professional,1994
4. Food Flavor, Morton, I. D., Macleod A., Elsevier,1990
5. Food Flavourings, Ashurst P.R.,Blackie,Glasgow&London,1991

MFT- 117A	LAB –I (ADVANCE IN FOOD TECHNOLOGY)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test (Practical)**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To familiarize the students with various advance techniques in food technology						
Course Outcomes							
CO1	Learner will know about concept of Filtration.						
CO2	Students will be able to learn about concept of Ultrasonication preservation of food						
CO3	Students will understand the concept of different methods Microwave treatment						
CO4	Students will be able to learn about Microwave treatment.						

Practical Exercises :-

- Filtration of juices for preservation.
- Microbial load estimation in preserved food.
- Ultrasonication preservation of food.
- Microwave treatment of food.
- Estimation of loss of nutrients due to microwave and thermal treatment.
- High temperature processing of the given food material.
- To study the effect of processing on the keeping quality of food.

References

1. New Methods of Food Preservation (Non Thermal Processing of Foods), G. W. Gould, Springer Science & Business Media, 1995

2. Introduction to Food Engineering, R Paul Singh, R. Paul Singh, Dennis R. Heldman Academic Press, 2008

3. Food processing technology, Fellows P. J., Elsevier, 2009

MFT- 119A	LAB –II (Flavour technology)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test (Practical)**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with various techniques of food flavour.**						
Course Outcomes							
CO1	Learner will know about the extraction of essential food flavor.						
CO2	Students will be able to learn about the effect of storage conditioning on flavouring compounds.						
CO3	Students will understand the effect of cooking on flavouringcompunds.						
CO4	Students will be able to learn about development of flvouring foods.						

Practical Exercises :-

- Qualitative identification of different flavouringcompunds.
- Extraction of essential oil / flavouring compound of basil leaves by hydrodistilation.
- To check the effect of cooking on flavor of food samples.
- To check effect of fermentation on food flavor.
- Encapsulation of flavouringcompunds.
- To study the flavor development on roasting / baking.

References ;-

1. Source Book of Flavors, Gary Reineccius, Springer Science & Business Media, 1998
2. Flavour chemistry and technology, Heath, H. B., Avi publication company,1978
3. Understanding Natural Flavors, Piggott, J. R., Paterson, A., Blackie Academic & professional,1994
4. Food Flavor, Morton, I. D., Macleod A., Elsevier,1990
5. Food Flavourings, Ashurst P.R.,Blackie,Glasgow&London,1991

MTRM- 111A	Research Methodology and IPR							
Lecture	**Tutorial**	**Practical**	**Credit**	**Theory**	**Sessional**	**Practical**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.**							
Course Outcomes (CO)								
CO1	Understand research problem formulation.							
CO2	Analyze research related information							
CO3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.							
CO4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.							

Unit 1:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2:

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit 3:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 4:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 ndEdition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor& Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

PROGRAM ELECTIVE (PE-I)

MFT-105A	FOOD ADDITIVES & CONTAMINANTS							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on Food additives**.**							
Course Outcomes (CO)								
CO1	Students will be able to know about the role of food additives in manufacturing of food products.							
CO2	Students will be able to gain knowledge regarding permissible additives and their limits in the processed food							
CO3	Students will be able to know about Perceive the contaminants from various sources.							
CO4	Students will be able to study about Comprehend the effects of contaminants on human health. .							

UNIT-I

Additives in food processing and preservation: Classification, need, properties, functions and safety, quality evaluation of additives, Food labeling, Laws and regulations for food additives

UNIT-II

Chemistry, uses and functions: Chemical preservative, bio-preservatives, fortification, antioxidants, emulsifiers, humectants, stabilizers, chelating agents, pH control agents and acidulants, texturizing agents, plasticizers, flavor enhancers, enzymes, coloring agents, sweeteners, flavoring agents

UNIT-III

Food contaminants: biological, chemical, physical and environmental contaminants, Inorganic and organometallic food contaminants, Sources and their impact on human health.

UNIT – IV

Food contaminants from industrial wastes: Heavy metals, polychlorinated polyphenyls, dioxins, Toxicants formed during food processing polycyclic aromatic hydrocarbons, nitrosamines, veterinary drug residues and melamine contaminations, Pesticide residues in food

Recommended Readings:

1. Branen, A. L., Davidson, P. M. and Salminen, S. (2002). *Food Additives*: Marcel Dekker, New York.
2. Wood, R., Foster, L., Damant, A. and Pauline, K. (2004). *Analytical Methods for Food Additives*:
   Boca Raton, New York.
3. Watson, D. H. (2014). *Food Chemical Safety*: Additives: WP, New Delhi.

MFT-107A	Advances in cereal science Technology							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on recent developments in the cereals science and technology							

Course Outcomes (CO)	
CO1	Students will be able to know about advancement in the major cereal grains quality and processing aspects.
CO2	Students will be able to gain knowledge about basic and advanced milling methods for wheat, rice, maize ultrasonic in food processing.
CO3	Students will be able to know about by-product utilization of various grains..
CO4	Students will be able to Understand the mechanism underlying the interaction of various flour components and their role in end use quality.

UNIT-I

Present status and future prospects of cereal grains in India, food grain production and consumption trends. Coarse grain processing.Wheat kernel structure, wheat grading, roller flour milling, influence of wheat type and grain quality on flour yield, grain hardness and its relevance to end product quality, advances in wheat cleaning, conditioning and milling, wheat flour component interactions (protein-starch, protein-lipid and starch-lipid) and their influence on end product quality, advances in isolation, biochemical characterization, micro-structural and functionality of wheat gluten proteins.

UNIT-II

Advances in role of wheat proteins in dough and gluten visco-elasticity, micro-structure of dough, conversion of dough foam structure to bread sponge structure during bread baking, concept of gas retention in wheat dough during fermentation and baking, advances in bread making processes, effect of wheat components and ingredients on the growth of yeast during fermentation operation, bread staling and its prevention, production of variety biscuits, breads and pasta products.

UNIT-III

Paddy varieties, their composition and quality characteristics, advances in methods of paddy parboiling, advantages and limitation of parboiling, paddy dehusking processes, Rice ageing, accelerated ageing, modern rice milling, factors affecting head rice yields and losses at different stages of milling, rice mill machinery, Rice based products and their quality. Methods of rice bran oil extraction and refining.

UNIT-IV

Dry and wet milling of maize, modern methods of maize processing, gluten and starch separation, maize starch conversion into value added products, acid hydrolysis, enzyme hydrolysis, processing for dextrose, malto-dextrin and other products, Barley varieties,

composition and quality characteristics, malting process and industrial applications of barley malt and malt products.

Recommended Readings:

1. Kulp K. & Ponte J. G. (2014).*Handbook of Cereal Science & Technology,2nd edition*: CRC press.
2. Wrigley C.W. &Batey I. L. (2010).*Cereal grains, assessing and managing quality*, CRC press.
3. Dendy D. A. V. &Dobsasoczyk B. J. (2001).*Cereal and Cereal Products, Chemistry and Technology*: An ASPEN publication.
4. Owens G. (2000).*Cereal Processing Technology*: CRC Press.
5. Faridi H. &Faubin J. M. (1997).*Dough Rheology & Baked product Texture*: CBS Publishers.

MFT-109A	Enzymes in food processing							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on details of enzymes in food processing.							
Course Outcomes (CO)								
CO1	Students will be able to know about the basics of enzymes.							
CO2	Students will be able to gain knowledge different types of enzymes and their use in milk production.							
CO3	Students will be able to know about enzymes in beverage.							
CO4	Students will be able to Understand the use of enzymes in baking industry							

Unit – I

Enzymes: Introduction, classification, properties, characterization. Enzyme kinetics- enzyme concentration, substrate concentration, environment conditions & enzyme immobilization. Enzymesin food industry: commercialization of enzyme processes, alternative method to use the enzymes, types of reaction. Sources of enzymes, legal &implication.

Unit – II

Enzymes in milk production: enzymes in milk preservation, lactose hydrolyses, use of enzymes for determining milk quality, enzymes in cheese manufacturing. Endogenous microbial enzymes, exogenous enzymes. Coagulant technology, enzymes in cheese preservation.

Unit – III

Enzymes in beverage: application of enzymes in tea and coca processing. Application og enzymes in alcoholic beverages as beer, whisky, wine, ciders. Role of the enzymes in fruit juice production. Factors affecting the enzymatic activity.

Unit – IV

Enzymes in baking industry: Introduction, use of proteinases, lipases and pentose in baking industry. Starch degrading enzymes: source, analysis & application of starch degrading enzymes.

Suggested Readings

FlickingerMC& Drew SW. 1999. *Encyclopedia of Bioprocess Technology*. A Wiley- Inter Science Publ.
Kruger JE. *et al*. 1987. *Enzymes and their Role in Cereal Technology*. American Association of Cereal Chemists Inc.
Nagodawithana T & Reed G. 1993. *Enzymes in Food Processing*. Academic
Press. Tucker GA & Woods LFJ. 1991. *Enzymes in Food Processing*.
Whitehurst R & Law B. 2002. *Enzymes in Food Technology*. Blackwell Publ.

MFT-111A	BIOPROCESS ENGG.							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge of the Students on recent concepts of Bioprocess.**							
Course Outcomes (CO)								
CO1	Students will be able to know about the aware of the status of bio-processing in food industry.							
CO2	Students will be able to gain knowledge regarding instrumentation involved in production of bio-processed products.							
CO3	Students will be able to know apprehend about the recovery of bio-processed products.							
CO4	Comprehend the fermentation technology involving design and processing.							

UNIT-I

Introduction to bioprocessing, historical developments, bioenergetics, enzyme kinetics- Micaelismenton model, effect of temperature on reaction rate, microbial growth kinetics- batch culture, continuous culture, fed batch culture and application of fed batch culture, Sterilization and sanitation: thermal death kinetics, medium sterilization (batch and continuous design), sterilization of fermenter, feed and wastes; filter sterilization of media, air and exhaust air; theory of depth filters, isolation, preservation (storage on reduced temp, storage under liquid nitrogen, storage on agar slopes, storage in dehydrated form) and improvement of industrially important micro-organisms.

UNIT-II

Fermenter design- basic functions of fermenters, types of fermenter, construction material, pipes and tubes, valves and steam traps, agitator and impeller, stirrer and bearing (seals and drives), sparger, baffles, achievement and maintenance of aseptic conditions (sterilization of air, exhaust gas and fermenter), sampling port, controlling devices.

UNIT-III

Product recovery- foam separation, precipitation, filtration (batch, continuous, cross flow filtration), filter aids, filteration equipment, filteration theory, centrifugation, centrifuge equipment, centrifugation theory, liquid- liquid extraction– solvent recovery, two phase aqueous extraction, supercritical fluid extraction, chromatography, (adsorption chromatography, gel permeation, ion exchange chromatography, HPLC, RPC, continuous chromatography), membrane processes
(ultrafilteraiton, reverse osmosis, liquid membranes), drying, crystallization, whole broth processing.

UNIT-IV

Bioprocess instrumentation- Offline analytical methods, physical, chemical and biosensors, online sensors.

References

1. Doran, P. M. (1995). *Bioprocess Engineering Principles*: Academic press, New Delhi.
2. Shuler, M. L. (2002). *Bioprocess Engineering Basic Concepts* (2 ed.): PHI, New Delhi.
3. Sablani, S. S., Rahman, M. S., Datta, A. K. and Mujumdar, A. S. (2007). *Handbook of Food and Bioprocess Modeling Techniques*: CRC Publications, New York.

MFT-113 A	NEUTACEUTICAL & FUNCTIONAL FOODS							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge of the Students on nature, type and scope of nutraceutical and functional foods .**							
Course Outcomes (CO)								
CO1	Students will be able to know about the aware of the status of bio-processing in food industry							
CO2	Students will be able to gain knowledge regarding dietary fibers and complex carbohydrates as functional food ingredients.							
CO3	Students will be able to know about protein as a functional food ingredient							
CO4	Marketing and regulatory issues for functional foods and nutraceuticals.							

Unit – I

Defining nutraceuticals and functional foods, Nature, type and scope of nutraceutical and functional foods Nutraceutical and functional food applications and their health benefits, Nutraceutical compounds and their classification based on chemical and biochemical nature with suitable and relevant descriptions

Unit – II

Nutraceuticals for specific situations such as cancer, heart disease, stress, osteoarthritis, hypertension etc. Antioxidants and other phytochemicals, (isoflavones, lycopenes), their role as nutraceuticals and functional foods, Dietary fibers and complex carbohydrates as functional food ingredients

Unit – III

Protein as a functional food ingredient, Probiotic foods and their functional role, Herbs as functional foods, health promoting activity of common herbs. Cereal products as functional foods – oats, wheat bran, rice bran etc. Functional vegetable products, oil seeds, spices and sea foods.Coffee, tea and other beverages as functional foods/drinks and their protective effects

Unit – IV

Effects of processing, storage and interactions of various environmental factors on thepotentials of such foods. Marketing and regulatory issues for functional foods and nutraceuticals .Recent development and advances in the areas of nutraceutical and functional foods.

References

1) Functional Foods, R. Chadwick,S. Henson,B. Moseley,G, Springer Science & Business Media, 2003
2) Methods of Analysis for Functional Foods and Nutraceuticals ,W. Jeffrey Hurst CRC Press, 2008
3) Handbook of Functional Dairy Products Functional Foods, Colette Shortt, John O'Brien, CRC Press, 2003
4) Handbook of Nutraceuticals and Functional Foods, Robert E.C. Wildman, Robert Wildman, Taylor C. Wallace, CRC Press, 2006

MFT-115A	Advances in Dairy Technology							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on different techniques of milk**.**							
Course Outcomes (CO)								
CO1	Students will be able to know about the aware of the status of preservation of raw milk.							
CO2	Students will be able to gain knowledge regarding UHT processed milk products.							
CO3	Students will be able to know about homogenization and their applications in dairy industry.							
CO4	Students will be able to know about different types of dehydration.							

Unit - I

Useof bio-protective factors for preservation of raw milk: effects onphysicochemical, microbial and nutritional properties of milk and milk products.Present status of preservation of raw milk by chemical preservatives; thermal processing for preservation.

Unit - II

Methods of determining lethality of thermal processing, UHT processed milk products, their properties and prospects, types of UHT plants, aseptic fillers, heat stability and deposit formation aspects, effect on milk quality; techno- economic considerations; retort processing.

Unit - III

Principles and equipment for bactofugation and Bactotherm processes, Microfluidization of milk: Principle, equipment, effects and applications, Homogenization and their applications in dairy industry.

Unit - IV

Dehydration: advances in drying of milk and milk products; freeze concentration, freeze dehydration: physicochemical changes during freeze drying and industrial developments.

Suggested Readings

Burton H. 1998. *Ultra-high Temperature Processing of Milk and Milk Products*. Elsevier. Fellow P. 1988. *Food Processing Technology*. EllissHorwood Ltd.

Gould GW. 1995. *New Methods of Food Preservation*. Blackie.

IDF Bulletin 1981. *New Monograph on UHT Milk*. Document No. 133, Intern. Dairy Fed., Brussels. Smit G. 2003. *Dairy Processing–Improving Quality*. CRC-Woodhead Publ.

Troller JA & Christian HB. 1978. *Water Activity and Food, Food Science and Technology*. A Series of Monograph Academic Press, London.

Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS. 1999. *Dairy Technology–Principles ofMilk Properties and Processes*. Marcel Dekker.

AUDIT COURSE –I (AC-1)

MTAD-101A	English For Research Paper Writing							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)								
Course Outcomes (CO)								
CO1	Understand that how to improve your writing skills and level of readability							
CO2	Learn about what to write in each section							
CO3	Understand the skills needed when writing a Title							
CO4	Ensure the good quality of paper at very first-time submission							

Units 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Units 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Units 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.
key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Units 4

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions
Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Suggested Studies:

- Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
- Day R (2006) How to Write and Publish a Scientific Paper, CambridgeUniversity Press
- Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
- Adrian Wallwork, English for Writing Research Papers, Springer New YorkDordrecht HeidelbergLondon, 2011

MDAD-103A	Disaster Management							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)								
Course Outcomes (CO)								
CO1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.							
CO2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.							
CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.							
CO4	critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in							

Units 1

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Units 2

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Units 3

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Units 4

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

SUGGESTED READINGS:

- R. Nishith, SinghAK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
- Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
- Goel S. L., Disaster Administration And Management Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi.

MTAD-105A	Sanskrit for Technical Knowledge							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students							
Course Outcomes (CO)								
CO1	To get a working knowledge in illustrious Sanskrit, the scientific language in the world							
CO2	Learning of Sanskrit to improve brain functioning							
CO3	Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power							
CO4	The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature							

Unit 1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit 2

Order, Introduction of roots, Technical information about Sanskrit Literature

Unit 3

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Suggested reading

- "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
- "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
- "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

MTAD-107A	Value Education							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character							
Course Outcomes (CO)								
CO1	Knowledge of self-development							
CO2	Learn the importance of Human values							
CO3	Developing the overall personality							
CO4	Know about the importance of character							

Unit 1

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments.

Unit 2

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit 3

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labor. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 4

Character and Competence –Holy books vs Blind faith. Self-management and Good health.
Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Suggested reading

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

SEMESTER –II

MFT-102A	Novel Food Packaging Techniques							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge of the Students about the recycling of packaging materials, biodegradable packaging materials and safety and legislative aspects.**							
Course Outcomes (CO)								
CO1	Students will be able to know about the various types of scavengers and emitters for improving the food shelf life.							
CO2	Students will be able to gain knowledge on the properties and production of various packaging materials and effect of various indicators used in supply chain management to indicate the food quality.							
CO3	Students will be able to know about consumer response about new packaging systems and safety nd legislative requirements.							
CO4	Learn about Acquaint about food-package interaction between package-flavour, gas storage systems for food storage, recycling							

Unit – I

Active and intelligent packaging: Active Packaging Techniques and intelligent Packaging Techniques, current use of novel Packaging Techniques, consumers and novel Packaging

Oxygen, ethylene and other scavengers: Oxygen scavenging technology, selecting right types of oxygen scavenger, ethylene scavenging technology, corbon dioxide and other scavengers

Antimicrobial food packaging: Antimicrobial agents, constructing antimicrobial packaging systems, factors affecting the effectiveness of antimicrobial packaging

Unit – II

Non-migratory bioactive polymers (NMBP) in food packaging: Advantages of NMBP, Inherently bioactive synthetic polymers: types and application, Polymers with immobilized bioactive compounds and their applications

Time Temperature indicators (TTIs): Defining and classifying TTIs, Requierments for TTIs, development of TTIs, Maximizing the effectiveness of TTIs, Using TTIs to monitor shelf life during distribution

The use of freshness indicator in packaging: Compounds indicating the quality of packaged food products, freshness indicators, pathogen indicators, other methods for spoilage detection

Unit – III

Packaging-flavour interaction: Factors affecting flavourabsorpstion, role of food matrix, role of differing packaging materials,flavour modification and sensory quality

Moisture regulation: Silica gel, clay, molecular sieve, humectants, salts, irreversible adsorption

Developments in modified atmosphere packaging (MAP): Novel MAP gas, testing novel MAP applications, applying high oxygen MAP

Recyling packaging materials: Recyclability of packaging plastics, improving the recyclability of plastics packaging, testing safety and quality of recycled materials, using recycled plastics inPackaging.

Unit – IV

Green plastics for food packaging: Problems of plastic packaging wastes, range of biopolymers, developing novel biodegradable materials

Integrating Intelligent packaging, storage and distribution: Supply chain for perishable foods, role of packaging in the supply chain, creating integrated packaging, storage and distribution: alarm systems and TTIs

Testing consumer responses to new packaging concepts: New packaging techniques and the consumers, methods for testing consumer responses, consumer attitudes towards active and intelligent packaging

Safety and legislative aspects of packaging: Regulatory considerations, plastic, metal, paper and glass package.

References

1. Novel Food Packaging Techniques, Ahvenainen,Elsevier, 2003
2. Food Packaging, Robertson, CRC Press, 2012.
3. Handbook of Package Engineering, Joseph F. Hanlon, Robert J. Kelsey, HallieForcinio CRC Press, 1998
4. A Handbook of Food Packaging, Frank A. Paine, H.Y. Paine published by Springer Science & Business Media, 1992

MFT-104A	Advances in food Analyses							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students about the advanced analytical and instrumental techniques							
Course Outcomes (CO)								
CO1	Students will be able to know about the bio-chemical analysis of food components.							
CO2	Students will be able to gain knowledge about the applications various analytical and instrumental techniques.							
CO3	Students will be able to know about technical exposure in chromatographic techniques.							
CO4	Students will be able to know about the spectroscopic and microscopic techniques.							

UNIT-I

Spectroscopy: UV-Visible spectroscopy, Atomic absorption spectroscopy, Flame photometry, Fluorescence spectroscopy, Emission spectroscopy, Mass-spectroscopy, Fourier Transform Infra-Red.

UNIT-II

Methods of separation and analysis of biochemical compounds and macromolecules:Principles and applications of Gas Chromatography, High Performance Liquid Chromatography, Thin layer chromatography.

UNIT-III

Microscopic techniques: Light microscopy, Scanning electron microscopy, Transmission electron microscopy, particle size analysis, Thermal techniques in food analysis: Differential scanning calorimetry and Thermo gravimetric analysis.

UNIT-IV

Electrophoresis: Different kinds of electrophoresis, western blotting, gel documentation, DNA analysis: DNA purification, PCR-based analysis, DNA fingerprinting.

Recommended Readings:

1. Pare, J. R. J. and Bélanger, J. M. R. (2015). *Instrumental Methods of Food Analysis*: Elsevier
2. Pomeranz, Y. and Meloan, C. E. (1996). *Food Analysis: Theory and Practice* (3 ed.): CBS Publications, New Delhi.
3. Winton, A. L. (2001). *Techniques of Food Analysis:* Agrobios, Jodhpur.
4. Sharma, B. K. (1994). *Instrumental Methods of Chemical Analysis*: Krishna, Meerut.
5. Skoog, D. A., Holler, F. J. and Nieman, T. A. (1998). *Principles of Instrumental Analysis* (5 ed.): Harcourt, Singapore.
6. Gopalan, R., Subramanian, P. S. and Rangarajan, K. (2008). *Elements of Analytical Chemistry*: Sultan Chand & Sons

MFT- 118A	LAB –III (NOVEL FOOD PACKAGING)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test (Practical)**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	**To familiarize the students with various recent techniques of food packaging used in industries.**						
Course Outcomes							
CO1	Learner will aware about symbols used in food industries.						
CO2	Students will be able to learn about the role and effectiveness of various packaging systems.						
CO3	Students will understand the different types of food packaging.						
CO4	Students will be able to learn about shelf life evaluation of packaged foods						

Practical Exercises :-

- Testing of properties of different packaging materials (paper, plastic, glass and metal).
- To study of symbols and labels used on food packages.
- To study the different types of packaging (vacuum packaging, form-fill- seal packaging).
- Estimation of shelf life of food under different packaging materials.
- Determination of changes in packaged foods.
- To study the packaging of foods under different conditions.
- **References**

1. Novel Food Packaging Techniques, Ahvenainen,Elsevier, 2003
2. Food Packaging, Robertson, CRC Press, 2012.
3. Handbook of Package Engineering, Joseph F. Hanlon, Robert J. Kelsey, HallieForcinio CRC Press, 1998
4. A Handbook of Food Packaging, Frank A. Paine, H.Y. Paine published by Springer Science &Business Media, 1992

MFT- 120A	LAB –IV (Advances in food Analysis)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test (Practical)**	**Minor Test**	**Total**	**Time**
-	**-**	**4**	**2**	**60**	**40**	**100**	**3 Hrs.**
Program Objective (PO)	To familiarize the students with various applications of current analytical and instrumental techniques**.**						
Course Outcomes							
CO1	Learner will aware about basic preparation of solutions and buffers.						
CO2	Students will be able to understand the functioning and principle of various analytical instruments.						
CO3	Students will understand the advanced analytical methods.						
CO4	Students will be able to learn about spectrophotometric and chromatographic techniques.						

Practical Exercises :-

- Preparation of solutions and buffers.
- Determination of titratable acidity in foods using a potentiometric titration.
- Atomic absorption spectroscopic analysis of heavy metals in foods.
- Secondary structure analysis of starch and proteins using Fourier Transform Infra-Red (FTIR).
- Separation and identification of food constituents using HPLC.
- Extraction of different types of proteins and identification using electrophoresis.
- DNA isolation and fingerprinting of plant tissues.

References

1. Fundamentals of Engineering Heat and mass transfer, R.C. Sachdeva, New Age Science, 2009
2. Fundamentals of Food Process Engineering, R.T. Toledo, Springer Science & Business Media, 2007
3. Food Engineering Operations, Brennan, J.G. and J.R.Cowell published by **Elsevier,1990**
4. Food Process Engineering, Heldman,D.R. and R.P.Singh , Avi Pub. Cop., 1981
5. Elements of Food Engineering, Harper J.C., Van Nostrand Reinhold, 1988
6. Fundamentals of Food Engineering, Stanley E. Charm , Avi Pub. Cop., 1971

PROGRAM ELECTIVE (PE-III)

MFT-106 A	Advance in Food Engg.							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge of the Students on various aspects of food engineering**.**							
Course Outcomes (CO)								
CO1	Students will be able to able to calculate through different dimensions.							
CO2	Students will be able to able to calculate freezing time.							
CO3	Students will be able to know of food engineering to design new process.							
CO4	Students will be able to understand pump selection and velocity of flowing fluids.							

Unit – I

Fluid Foods: Material and energy balance, Flow of fluids foods. Hygienic design concepts, sanitary pipe fittings, pumps and fans, bulk milk coolers, milk collecting and chilling centers, milk tanks, stirrers and mixers, milk reception equipment, pasteurizers, sterilizers and treatment by irradiations, CIP system, corrosion process and their controls.

Unit – II

Separators: Centrifugation, separation, cyclone separators, homogenizers, ultra-filtration, reverse osmosis and electrodialysis, Equipment for cheese, ice cream, butter manufacture, and other special milk products.

Unit – III

Thermal Processing: Thermal processing, sterilization classification U.H.T. systems and recent advances, factors affecting spoilage of different types of food products and design of thermal processes. Survival curves, thermal death curves, analysis of thermal resistance data, process time evaluation, Design of batch and continuous sterilization cycles in vat, inter-relationship between batch and continuous reactors, design calculations.

Unit – IV

Refrigeration: Refrigeration cycles, performance of refrigeration compressors, refrigeration system balance and multiple evaporation systems. Flash cooling, design of condensors, evaporators, cooling towers, thermo-electric cooling, cryogenics, different refrigeration systems for ultra low refrigeration.

Thermodynamics of Food Freezing: Properties o frozen foods, freezing point depression, Ice crystal formation, Enthalpy change during freezing, experimental related numerical problems, Predicting rates of product freezing and design of food freezing equipments.

Energy Management: Energy audit and management strategies in food process industries

References

1. Fundamentals of Engineering Heat and mass transfer, R.C. Sachdeva, New Age Science, 2009
2. Fundamentals of Food Process Engineering, R.T. Toledo, Springer Science & Business Media, 2007
3. Food Engineering Operations, Brennan, J.G. and J.R.Cowell published by **Elsevier,1990**
4. Food Process Engineering, Heldman,D.R. and R.P.Singh , Avi Pub. Cop., 1981
5. Elements of Food Engineering, Harper J.C., Van Nostrand Reinhold, 1988
6. Fundamentals of Food Engineering, Stanley E. Charm , Avi Pub. Cop., 1971

MFT-108A	Advances in Meat, Fish & Poultry Technology							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge of the Students on processing technology of meat, poultry, fish and eggs.**							
Course Outcomes (CO)								
CO1	Students will be able to able to understand the technology for raw material characteristics, handling, processing, and preservation.							
CO2	Students will be Perceive the knowledge regarding transportation and storage practices.							
CO3	Students will be able to know comprehend the food standards in relation to these food commodities.							
CO4	Students will be able to know Grasp by-product utilization of meat, poultry, fish and egg products.							

UNIT-I

Production, Processing and consumption trends, Prospects of meat industry, Meat spoilage, Endogenous and exogenous infections, Hygiene and sanitation, Meat composition from different sources, Post-mortem muscle chemistry and composition, Intramuscular fat, Rigor mortis, The conversion of muscle into meat. Animals' stunning methods, ante-mortem and post-mortem examination, Design of handling facilities: Slaughtering and dressing, Consequences of circulatory failure, Proteolytic and other chemical changes, Operational factors affecting meat quality, Effects of processing on meat tenderization, Chilling, freezing and preservation, prepared meat products, intermediate moisture and dried meat products, The eating quality of meat: color, flavors and retention, water holding capacity, juiciness, texture and taste, meat eating and health, Inedible by-products

UNIT-II

Quality characteristics of poultry products, Lay-out and design of poultry processing plants, Plant sanitation, Poultry meat processing operations and equipment for de-feathering, bleeding, scalding etc., Poultry meat products, Refrigerated storage of poultry meat, by-products

UNIT-III

Egg structure, structural abnormalities, functions of egg in food system, egg products, whole egg powder, egg yolk products, by-products, their packaging and storage, eating quality of eggs, Inspection and grading, preservation and safe handling

UNIT-IV

Commercially important marine products from India, Product export and its sustenance, Processing operations, Basic biochemistry, Preservation of postharvest fish freshness, Transportation in refrigerated vehicles, Deodorization of transport systems, Design of refrigerated and insulated trucks, Grading and preservation of shell fish, pickling and preparation of fish protein concentrate, fish oil and other byproducts

Refrences books:

1. Lawrie, R. A. (1998). *Lawrie's Meat Science* (6 ed.): Woodhead Publications, Cambridge.
2. Alan, H. V. and Jane, P. S. (1995). *Meat and Meat Products: Technology, Chemistry and Microbiology*: Champan& Hill, London.
3. Carmen, R. O. and George, J. M. (1997). *Poultry Meat and Egg Production*: CBS Publications, New Delhi.

4. Winton, A. L. and Barberwinton, K. (1999). *Fish and Fish Products*: Agrobios, Bikaner.

MFT-110 A	Technology of Frozen Foods							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge to understand suitability of different packaging materials for packing of frozen foods.**							
Course Outcomes (CO)								
CO1	Students will be able to able to understand the technology for raw material characteristics, handling, processing, and preservation.							
CO2	Students will be gain knowledge on different properties and microbiology of frozen foods.							
CO3	Students will be able to Know about different freezing methods, equipment and transportation of frozen foods.							
CO4	Students will be able to Gain knowledge on quality and safety of different frozen foods.							

Unit – I

Fundamentals of Freezing: Glass transitions in frozen foods and biomaterials,
Microbiology of frozen foods, Thermo -physical properties of frozen foods, Freezing loads and Freezing time calculation, Freezing methods and equipment. Innovations in freezing process.

Unit – II

Facilities for the Cold Chain:, Cold store design and maintenance, Transportation of frozen foods, Retail display equipment and management, Household refrigerators and freezers, Monitoring and control of the cold chain.

Unit – III

Quality and Safety of Frozen Foods: Quality and safety of frozen meat and meat product, Quality and safety of frozen poultry and poultry products, Safety and quality of frozen fish, Shellfish, and related products, Quality and safety of frozen vegetables, Quality and safety of frozen fruits, Quality and safety of frozen dairy products, Quality and safety of frozen ready meats, Quality and safety of frozen bakery products, Quality and safety of frozen eggs and egg products

Unit – IV

Monitoring and Measuring Techniques for Quality and Safety: Chemical Measurements, Sensory analysis of frozen foods, Foodborne illnesses and detection of pathogenic microorganisms, Shelf-life prediction of frozen foods.

Packaging of Frozen Foods: Introduction to frozen food packaging, Plastic packaging of frozen foods, Paper and card packaging of frozen foods, Packaging of frozen foods with other materials, Packaging machinery

References

1) Quality in Frozen Foods, Marilyn C. Erickson,Yen-Con Hung , Springer Science & Business Media, 1997.
2) Handbook of Frozen Foods, Y. H. Hui, Isabel Guerrero Legarretta, MiangHoong Lim, K.D. Murrell, Wai-Kit Nip, CRC Press, 2004.
3) Managing Frozen Foods, Kennedy Chris J, Elsevier
4) Frozen Food Technology, C.P Mallete, Springer Science & Business Media, 1993

PROGRAM ELECTIVE (PE-IV)

MFT-112 A	BIOTECHNOLOGICAL TOOLS IN FOOD ANALYSIS							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge to Students on Biotechnology & Genetic Engg.**							
Course Outcomes (CO)								
CO1	Students will be able to know PCR							
CO2	Students will be gain knowledge of serology.							
CO3	Students will be able to Know about Biosensor							

Unit – I

Introduction: Concept of Biotechnology, history, old vs new Biotechnology, Different food borne pathogens

Genetic Engineering: Concept, different vector systems used in gene cloning, gene cloning procedures: isolation of DNA fragment, joining to vector, expression & selector of recombinant with suitable example, DNA fingerprinting, Method of DNA fingerprinting, Identification techniques, Practical applications

Unit – II

Polymerase Chain Reaction: Introduction and principle, process of PCR, Development of a PCR assay, PCR optimization, Practical modifications to the PCR technique, Advantages and disadvantages, Applications, Application of PCR in the detection of different pathogen species, MPCR analysis

Unit – III

ELISA: Concept of Antigen & Antibody, ELISA, Types of ELISA, Methods, ELISA kits, Applications in food and agriculture

Immunoassay kits: Types of Immunoassays, Principle of detection of kits, Monoclonal Antibodies-antigen, antibody, Nomenclature, Production of monoclonal antibodies-in vitro and in -vivo, merits and demerits, application in food industries

Unit – IV

Biosensor: Types of biosensor- Calorimetric, Potentiometric, Amperometric, Optical, Piezoelectric, Immunosensors, Principle of detection, Application, Biosensors in food analysis

References

1. Biotechnology :Food Fermentation, V.K.Joshi&Pandey, Educational Publishers & Distributors, 1999
2. Biotechnology in Food Industry, M.P.Tombs, Open University Press, 1990
3. Modern Concepts of Biotechnology, H. D. Kumar, Vikas Publishing House (P) Ltd.
4. Elements of Biotechnology, P. K. Gupta, Rastogi Publications
5. Modern Food Micro-Biology, ed. J.M. Jay, 1986, Van Nostrand Reinhold Company, New York
6. Recombinant DNA, ed. James D Watson and Michael Gilman, 2001, W. H Freeman and Company NY.
7. Molecular Biotechnology: Principles and Application of Recombinant DNA,ed.Bernard R Glick and Jack J.Pasternak, ASM press Washington DC
8. Essentials of Diagnostic Microbiology, ed. Lissa Anne Shimeld.
9. Methodology of immunochemical and immuno-logical research, ed. Kwapinski- Willey inter science
10. Commercial Biosensors, ed. Graham Ramsay, John Wiley Publishers

MFT-114 A	FOOD SAFETY AND QUALITY ASSURANCE							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge to Students on food safety, food quality, food laws and regulations in Food industry.							
Course Outcomes (CO)								
CO1	Students will be able to know nationals and international food laws and regulations.							
CO2	Students will be gain knowledge offood quality managements systems.							
CO3	Students will be able to Know about exemplify different food adulterants.							

UNIT-I

Sampling, specification, labeling,safety and quality assessment of fruits and vegetable, cereals, dairy products, meat, fish, poultry and processed food products, Sensory evaluation: Introduction, panel screening, selection methods, interaction and thresholds.

UNIT-II

Developments, objective and functions of food safety and quality assurance, Quality enhancement models, Statistical Quality Control for food industry, Food Quality Management Systems, implementation of quality control programmes, Quality control tools, Quality control charts for food plant sanitation, Food Safety Management Systems, Causes of failure of Food Safety Programs.

UNIT-III

Indian food laws and regulations, Food safety acts, Regulations for waste disposals, Codex alimentarious, ISO series, World Trade Organization, Food and Agricultural Organization, World Health Organization, Food safety and legislation in USA and Europe, Technical Barriers in Trade, Enforcers of food laws approval process for food additives, additives food labeling, Intellectual Property Right, HACCP and its application.

UNIT-IV

Food adulteration: Types of adulterants, Common adulterants for foods like milk and milk products, honey, wheat flours, edible oils, cereals, condiments (whole and ground) pulses, coffee, tea, confectionery, baking powder, non-alcoholic beverages, vinegar, besan and curry powder

Recommended Readings:

1. Lawless, H. T. and Heymann, H. (2013). *Sensory Evaluation of Food: Principles and Practices*: Springer, New Delhi.
2. Shapton, D. A. and Shapton, N. F. (1993). *Principles and Practice for the Safe Processing of Foods*: Heinemann, Oxford.
3. Schmidt, R. H. and Rodrick, G. E. (2003). *Food Safety Handbook*: John Wiley, New Jersey.
4. Rees, N. and Watson, D. (2000). *International Standards for Food Safety*: Aspen, Americ

MFT-116 A	BEVERAGES & SNACKS FOOD TECHNOLOGY							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	**To enlighten the knowledge to types of beverages , snacks and their importance,**							
Course Outcomes (CO)								
CO1	Students will be able to able to understand Alcoholic beverages							
CO2	Students will be gain knowledge on Technology for grain based snacks, whole grains.							
CO3	Students will be able to Know about Packaged and drinking water							
CO4	Students will be able to Gain knowledge Formulation and processing technology for fruit and vegetable based snacks.							

Unit I

Types of beverages and their importance- Status of beverage industry in india, manufacturing technology for juice-based beverages, synthethic beverages, still, carbonated, low calorie and dry beverages, isotonic and sports drinks.

Role of various ingredients of soft drinks, carbonated soft drinks, Speciality beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, dairy and imitation dairy based beverages.

Unit II

Alcoholic beverages- type, manufacture and quality evaluation, the role of yeast in beer and other alchoholic beverages, ale type beer, lager type beer technology of brewing process, equipment used for brewing and distillation, wine and related beverages, distilled beverages, distilled spirits

Packaged and drinking water- definition, types, manufacture and quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water, mineral water, natural spring water, flavoured water, carbonated water.

Unit- III

Technology for grain based snacks, whole grains- roasted, toasted, puffed, popped and flakes, coated grains- Salted, spiced and sweetened. Flour based – batter and dough products, savoury, spiced and sweetened, formulated chips and wafers, papads, instant premixes of traditional Indian snack foods.

Unit- VI

Formulation and processing technology for fruit and vegetable based snacks:- Chips, wafers, coated nuts- salted, spiced and sweetened ,chikkis, extruded snack foods. Colouring, flavouring and packaging techniques, Equipment for frying, baking & drying, toasting, roasting and flaking, popping, blending, coating, chipping.

References

1. Extrusion of food Vol 2, Harper JM, CRC Press,1981.
2. Bakery technology & engineering, Matz SA, AVI Pub,1960
3. Beverages: Technology, Chemistry and Microbiology ; A. Varnam, J.M. Sutherland; Chapman & Hall
4. Snack Food Technology, Samuel AM.1976 AVI Publ
5. Beverages: Carbonated and Non Carbonated. Woodroof JG & Phillips GF, AVI Publ.1974

AUDIT COURSE –II (AC-II)

MTAD-102 A	Constitution of India							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	• Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.							
Course Outcomes (CO)								
CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.							
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.							
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.							
CO4	Discuss the passage of the Hindu Code Bill of 1956.							

Unit I

History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble , Salient Features

Unit 2

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.
Organs of Governance: Parliament , Composition, Qualifications and Disqualifications , Powers and Functions , Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit 3

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested reading

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MTAD-104A	Pedagogy Studies							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers and Identify critical evidence gaps to guide the development.							
Course Outcomes (CO)								
CO1	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?							
CO2	• What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?							
CO3	• How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?							

Units 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching.

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

Units II

Evidence on the effectiveness of pedagogical practices , Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Units III

Professional development: alignment with classroom practices and follow-up support, Peer support Support from the head teacher and the community. Curriculum and assessment , Barriers to learning: limited resources and large class sizes,

Units IV

Research gaps and future directions :Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

Suggested reading

- Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
- Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
- Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
- Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

MTAD-106A	Stress Management by Yoga							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To achieve overall health of body and mind and to overcome stress							
Course Outcomes (CO)								
CO1	Develop healthy mind in a healthy body thus improving social health.							
CO2	Improve efficiency							
CO3	learn the Yogasan							
CO4	Learn the pranayama							

Unit I

Definitions of Eight parts of yog. (Ashtanga)

Unit II

Yam and Niyam. Do`s and Don't's in life.

i) Ahinsa, satya, astheya, bramhacharya and aparigraha

ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit III

Asan and Pranayam

i) Various yog poses and their benefits for mind & body

ii) Regularization of breathing techniques and its effects-Types of pranayam

Suggested reading

- 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur
- "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

MTAD-108A	Personality Development through Life Enlightenment Skills							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
2	**0**	**0**	**0**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students							
Course Outcomes (CO)								
CO1	Students become aware about leadership.							
CO2	Students will learn how to improve communication skills							
CO3	Understand the team building and conflict							
CO4	Student will learn how to manage the time.							

Unit 1

Leadership Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in Administration. Interpersonal: Introduction to Interpersonal Relations, Analysis Relations of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Unit II

Communication: Introduction to Communication, Flow of Communication, Listening, Barriers of Communication, How to overcome barriers of communication.
Stress Introduction to Stress, Causes of Stress, Impact Management Stress, Managing Stress

Unit III

Group Dynamics and team Building: Importance of groups in organization, Interactions in group, Group Decision Taking, Team Building, Interaction with the Team, How to build a good team?
Conflict: Introduction to Conflict, Causes of Conflict, Management Managing Conflict

Unit IV

Time Management: Time as a Resource, Identify Important Time Wasters, Individual Time Management Styles, Techniques for better Time Management.
Motivation: Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

Suggested reading

- E.Berne, Games People Play, Grove Press Inc., 1964; Penguin, 1968.
- Hargreaves, G. Stress Management, Marshall Publishing, London 1998
- Barker D, TA and Training, Gower Publishing Company Ltd., 1982.
- JONGEWARDM D & SEYER P C CHOOSING SUCCESS John Wiley & Sons Inc.1978
- Arnold, JHC Feldman, D.C. Organizational Behaviour IRWIN/McGRAW-HILL 1986
- Chandan, J.S., Organizational Behaviour. Vikas Publishing House PVT LTD 1994
- Statt, D.A. Using Psychology in Management Training, Taylor and Francis Inc.2000
- Luthans F., OrganisationalBehaviour, IRWIN/McGRAW-HILL 1998

SEMESTER –III

MFT-201 A	Food Rheology & Microstructure							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge to Student onFood Rheology & Microstructure**.**							
CO1	Students will be able to know about food Structuring.							
CO2	Students will be able to gain knowledge about heat & Mass transfer.							
CO3	Students will be able to know about Examining food Microstructure.							
CO4	Students will be able to study about Microstructure Approach.							

Unit – I

Examining Food Microstructures: History of Food Microstructure Studies, Light Microscopy, Transmission Electron Microscopy, Scanning Electron Microscopy, Other Instrumentation and Techniques

Basic rheological concepts : stress, strain, stiffness and hooke's law, yield, ductility and necking, strain rate , poisson's ratio, strength, shear deformation, uni-axial compression and extention, relation between various rheological parameters. Rheological classification of food: Mechanical characterization of food, equilibrium behavior, time dependent flow, time scale effects.

Unit – II

Image Analysis: Image Acquisition, Image Processing, Measurement Analysis

Food Structuring: Introduction, factor affecting texture, effect of enzyme on texture, Approaches to Food Structuring, Extrusion and Spinning, Structuring Fat Products, Structure and Stability, Gels, Gelation Mechanisms, Mixed Gels, The Microstructure of Gels, Structure-Property Relations in Gels

Unit – III

Microstructural Components and Food Assemblies: Water and Ice, Proteins, Lipids, Carbohydrates, Cells and Cell Membranes, Structural Aspects of Animal Tissue, Structural Aspects of Plant Tissue.

Food Microstructure and Quality: Measurement of Texture, Structural Aspects of Food Texture,Quality and Structure.

Unit – IV

Microstructure and Mass Transfer: Solid-Liquid Extraction: Fundamental Aspects of Extraction,the Extraction process, Extraction of Food Materials, Modifying Microstructure, Modeling the Extraction Process.

Simultaneous Heat and Mass Transfer: Dehydration: Basic Concepts, The Drying Process, Osmotic Dehydration, Influence of Drying on Structural Properties, Frying of Foods.

The Micro-structural Approach: Structure-Property Relationships. The Micro-structural Approach

References Books ;

1. Microstructural Principles of Food Processing & Engineering, José Miguel Aguilera, David W. Stanley,Springer Science & Business Media, 1999
2. Food Texture by Moskowitz , CRC Press,1987Principles of Food Processing Dennis R. Heldman, Richard W Hartel, Springer Science & Business Media,1997
3. Phase Transitions in Foods, Yrjö H. Roos , Academic Press,1995

MTOE-203A	Industrial Safety							
Lecture	**Tutorial**	**Practical**	**Credit**	**Theory**	**Sessional**	**Practical**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the industrial safety.							
Course Outcomes (CO)								
CO1	Understand the industrial safety.							
CO2	Analyze fundamental of maintance engineering.							
CO3	Understand the wear and corrosion and fault tracing.							
CO4	Understanding that when to do periodic inceptions and apply the preventing maintance.							

Unit-I:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-II:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-III:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-IV:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

- Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
- Maintenance Engineering, H. P. Garg, S. Chand and Company.
- Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
- Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

MTOE-205A	Operations Research							
Lecture	**Tutorial**	**Practical**	**Credit**	**Theory**	**Sessional**	**Practical**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it.							
Course Outcomes (CO)								
CO1	Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.							
CO2	Students should able to apply the concept of non-linear programming							
CO3	Students should able to carry out sensitivity analysis							
CO4	Student should able to model the real world problem and simulate it.							

Unit 1:

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 3

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 4

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

- H.A. Taha, Operations Research, An Introduction, PHI, 2008
- H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
- J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
- Hitler Libermann Operations Research: McGraw Hill Pub. 2009
- Pannerselvam, Operations Research: Prentice Hall of India 2010
- Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

MTOE-207A	Cost Management of Engineering Projects							
Lecture	**Tutorial**	**Practical**	**Credit**	**Theory**	**Sessional**	**Practical**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.							

Course Outcomes (CO)	
CO1	Students should able to learn the strategic cost management process.
CO2	Students should able to types of project and project team types
CO3	Students should able to carry out Cost Behavior and Profit Planning analysis.
CO4	Student should able to learn the quantitative techniques for cost management.

Unit-I

Introduction and Overview of the Strategic Cost Management Process
Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-II

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit-III

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit-IV

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

- Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
- Charles T. Horngren and George Foster, Advanced Management Accounting
- Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
- Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
- N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

MTOE-209 A	Industerial statistics							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge to Student on BasicIndusterial statistics.							

Course Outcomes (CO)	
CO1	Students will be able to able to measures of Central
CO2	Students will be gain knowledge about classification of Data.
CO3	Students will be able to Know test of Significance.
CO4	Students will be able to Gain knowledGraphical Representation of Biometric Data

UNIT- I

Classification of Data:

1 Introduction purpose and scope
2 Statistics terms & notations
3 Presentation of frequency distribution table
4 Some basic rules in preparation frequency
5 Distribution table
6 Exercise

Graphical Representation of Biometric Data:

1 Introduction and unit of representation
2 Quantitative and continuous data
3 Histogram
4 Frequency polygon
5 Frequency curve
6 Cumulative Frequency curve or ogive
7 Scatter or dot diagram
8 Quantitative and discontinuous data
9 Bar diagram
10 Pie chart and sector diagram
11 Exercise

UNIT-II

Measures of Central Tendency:

1 Introduction
2 Mathematical average
3 Arithmetic mean
4 Geometric mean
5 Harmonic mean
6 Averages of position
7 Median
8 Mode

9 Exercise

Measures of Dispersion:

1 Introduction
2 Range
3 Quartile Deviation
4 Mean Deviation
5 Standard Deviation
6 Variance
7 Exercise

UNIT-III

Test of Significance:

1 Introduction definition and uses of standard error of mean
2 Standard error of mean (SE_M) in ungrouped data.
3 Standard error of mean (SE_M) in grouped data.
4 Standard error of Standard deviation in ungrouped data.
5 Standard error of Standard deviation in grouped data.

Student's Test:

1 Introduction
2 Unpaired or uncorrected T- Test.
3 Paired or corrected T- Test.
4 T- Test from Paired grouped data.

The CHI- SQUARE Test:

1 Introduction, definition and common application of Chi- Square.
2 Pre – requisites of Chi- Square test and method to draw inference.
3 Calculation of Chi Square Test
4 Exercise.

UNIT – IV

Probability:

1 Introduction
2 Terminology related to probability.

3 Definition of probability.
4 Calculation of probability of simple events.
5 Rules probability of simple events.
6 Rules of probability
7 Conditional probability distribution.
8 Theoretical probability distribution. 9Types of probability distribution.
10 TheBinomial distribution.
11 The poission distribution.
12 The normal distribution.
13 Deviation from the normal Distribution - Skew ness.
14 Kurtosis 15 Exercise.

Correlation:

1 Introduction
2 Positive, negative and linear correlation
3 Correlation coefficient
4 Method of studying correlation
5 Types of correlation
6 Pearson's products moment method
7 Spearman's rank difference method
8 Standard error of correlation coefficient and verification. 9Signification of correlation coefficient.

Regression :

1 Introduction and difference between correlation and Regression
2 Objective of Regression analysis
3 Liner Regression
4 Regression Equation
5 Regression coefficient
6 Calculation of Regression equation from values of deviation mean of two variables
7 Standard deviation for the Regression line.

MTOE-211A	Non Conventional Sources of energy							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
4	**0**	**0**	**4**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enable students to aware about the sources of energy.							
Course Outcomes (CO)								
CO1	Students should able to learn the Classification of energy sources.							
CO2	Students should able to learn the Solar radiation.							
CO3	Students should able to uses of gasifiers							
CO4	Student should able to learn the Characterization of biomass.							

Unit-1

Classification of energy sources; Introduction to renewable energy sources and technologies, theirimportance for sustainable development and environmental protection, production and potentia

Unit 2

Solar radiation, measurement of solar radiation, types of solar collectors and their uses, solar thermal energy conversion and storage.

Unit 3

Solar PV cells, modules, arrays, conversion process of solar energy into electricity, applications Wind energy, potential & process of conversion, types of wind energy conversion systems

Unit 4

Characterization of biomass; briquetting of biomass, biomass combustion, pyrolysis, gasification,types and uses of gasifiers,.

MTOE-213 A	INSTRUMENTATION & PROCESS CONTROL							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
3	**0**	**0**	**3**	**60**	**40**	**-**	**100**	**3 Hrs.**
Program Objective (PO)	To enlighten the knowledge to Student on Basic Building Blocks of any Instrumentation System.							

Course Outcomes (CO)	
CO1	Students will be able to able to Definitional and Classification of transducers
CO2	Students will be gain knowledge about Basic Control Loops and Characteristics.
CO3	Students will be able to KnowControl System Components .
CO4	Students will be able to Gain know led Temperature Measurement

UNIT – I

Basic Building Blocks of any Instrumentation System :- Scope and necessity of instrumentation. Names of important process variable, their units.Building blocks of instrumentation system. Various testing signals

Basic Concepts :-Definition of the terms accuracy, precision sensitivity, Linearity, hysteresis gauge factor etc.

Definitional and Classification of transducers :-Selection criteria of transducers. Variable Resistance transducers.Construction, working, principle and application of potentiometers, strain gauge, load cell. Hot wire anemometer, photo resistor, humidity sensor. Resistor temperature transducers

Thermistors :- Carbon microphones. Variable inductance Transducers.Basic Principles. Electromagnetic pick up. Induction potentiometer.Linear variable differential transformer (LVDT).Variable Reluctance Transducers. Variable Capacitance Transducers

a. Basic principles
b. Capacitance Pick up
c. Condenser microphones
d. Differential Capacitor Pick up

UNIT-II

Piezoelectric Transducers :-Basic Principals of Piezoelectric Transducers Piezoelectric crystals and their properties. General forms of Piezoelectric Transducers. Seismic pick up

Magneto – strictive Transducers :- Magneto elastic property of nickel and perm alloy, construction of magnetostrictivetransducers.Other types of Transducers. Transducers based on hall effect, eddy current, ionization Optical Transducers – photo diode, Photo transistor, Photo voltaic cell, LDR Digital transducers-single shaft encoders. Tacho generator

UNIT-III

Basic Control Loops and Characteristics :-Introduction, R, L, C elements in pneumatic, hydraulic and electrical system. Simple process like:

a) Single capacity pressure system
b) Single capacity temperature system
c) Single capacity level system
d) Single flow loop system

Control system :- Basic elements of a feedback control system, open loop, feedback and lead forward linear and non-linear, continuous and sampled data control systems digital control, practical examples of the above.

Control System Components :-DC and AC servomotors, tacho-generator, potentiometer, synchros, stepper motor, gyroscope, AC position control system. Trends in process control, safety aspects in instrumentation and control system, economics of process instrumentation, selection of key variables for process controls pneumatic and electronic instrumentation.

Flow Measurement :-Flow measurement with orifices, magnetic, ultrasonic, vortex flow meters. Level Measurements. Level detectors, float level devices, level gauges, optical level devices, radiation level sensors, thermal level sensors.

UNIT-IV

Temperature Measurement :-Temperature sensors-thermocouples, RTD, thermistors, radiation thermometry, IR detectors, fiber-optic temperature sensor; acoustic pyrometer. Pressure measurement.Pressure sensors, below, diaphragm, bourdon and helical types, electronic pressure sensor, manometers, pressure gauges, vacuum sensor, high pressure sensors, pressure repeaters.Measurement systems for density, pH, humidity, moisture and weight.Instrumentation and safety. Alarm and shutdown devices, safety interlock systems. Computer control system – introduction to SDC and DDC and their application in process industries.

TEXT BOOKS:

1 Mechanical and Industrial Measurement by RK . Jain, Khanna Publishers, New Delhi

2 Industrial Instrumentation by Donald P Eickman

3 Electrical and Electronic Measurement and Instrumentation by AK Sawhney, DhanpatRai and company

REFERENCE BOOKS:-

1 Automatic Control System by Kuo, BC, Prentice Hall of India, New Delhi

2 Modern Control Engg. by Ogata K, Prentice Hall of India, New Delhi

Theory and Problems of Feedback control system by Schaumseries,Schajit Publishing Co, New.

Dissertation Phase – I and Dissertation Phase - II

Teaching Scheme

Lab work : 20 and 32 hrs/week for Dissertation Phase- I (MFT -203A)and Phase- II (MFT-202 A) respectively

Course Outcomes:
At the end of this course, students will be able to

a. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
b. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
c. Ability to present the findings of their technical solution in a written report. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:
The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

1. Relevance to social needs of society

    - Relevance to value addition to existing facilities in the
    - Relevance to industry need

2. Problems of national importance

3. Research and development in various domain

4. The student should complete the following:

    - Literature survey Problem
    - Definition Motivation for study and Objectives

    - Preliminary design / feasibility / modular approaches
    - Implementation and Verification

5. Report and presentation

The dissertation phase- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

Design, fabrication, testing of Communication System.

The viva-voce examination will be based on the above report and work.

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Guidelines for Dissertation Phase – I and Phase-II

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.

The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referredliterature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

Bachelor of Technology (Civil Engineering) Kurukshetra University, Kurukshetra

SCHEME OF STUDIES/EXAMINATIONS ***(w.e.f. 2015-16 onwards)***

Semester – VII

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	CE-401 N	Designof Concrete Structures-II	4	1	0	5	75	25	0	100	4
2	CE-403 N	Irrigation Engineering-II	3	1	0	4	75	25	0	100	3
3	CE-405 N	Transportation Engineering-II	3	1	0	4	75	25	0	100	3
4	CE-407 N	Sewerage &Sewage Treatment	3	0	0	3	75	25	0	100	3
5		DEC –I*	3	1	0	4	75	25	0	100	3
6	CE-409N	Concrete Structures-II (Drg.)	0	0	3	3	0	40	60	100	3
7	CE-411N	Irrigation Engg. Design &Drawing	0	0	2	2	0	40	60	100	3
8		DEC-II*	3	1	0	3	75	25	0	100	3
9	CE-429N	Project-I**	0	0	6	6	0	40	60	100	3
10	CE-435N	Field Training-2 (Viva-Voce)***	0	0	0	0		40	60	100	3
		Total	**19**	**05**	**11**	**35**	**450**	**270**	**280**	**1000**	

** The students should select two Departmental Elective Courses (DEC) from the following list.*

Course No.	DEC-I	Course No.	DEC-II
CE-413N	Hydro Electric Power Development	CE-421N	Elements of Earthquake Engineering
CE-415N	River Mechanics & Flood Control	CE-437N	Energy Resource And Technology
CE-417N	IT & CAD Applications in Civil Engineering	CE-439N	Estimation & Accounts
CE-419N	Rock Mechanics	CE-441N	Energy Efficient Building

***The project should be initiated by the students in the beginning of VII^{h} semester and will be evaluated at the end of the semester on the basis of a presentation and report.*

****The performance of the student will be evaluated after the presentation delivered and the report submitted by the student related to field training-2 undertaken after VIth semester.*

Bachelor of Technology (Civil Engineering) Kurukshetra University, Kurukshetra

SCHEME OF STUDIES/EXAMINATIONS ***(w.e.f. 2015-16 onwards)***

Semester – VIII

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	CE-402N	Bridge Engineering	4	2	0	6	75	25	0	100	3
2	CE-404N	Railway & Airport Engineering	3	2	0	5	75	25	0	100	3
3	CE-406N	Industrial Waste Water Treatment	3	2	0	5	75	25	0	100	3
4		DEC-III*	3	1	0	4	75	25	0	100	3
5		DEC-IV*	3	1	0	4	75	25	0	100	3
6	CE-426N	Transportation Engineering-II (P)	0	0	2	2	0	40	60	100	3
7	CE-428N	Environment Engineering-II (P)	0	0	2	2	0	100	100	200	3
8	CE-430N	Project-II**	0	0	6	6	0	40	60	100	3
9	CE-434N	Seminar	0	1	0	1	0	50	0	50	3
10	CE-436N	Comprehenssive Viva-Voice	0	0	0	0	0	0	75	75	3
11	CE-438N	General Fitness & Professional Aptitude	0	0	0	0	0	0	75	75	3
		Total	**16**	**9**	**10**	**35**	**375**	**295**	**330**	**1000**	

**The student should select two Departmental Elective Courses (DEC) from the following list.*

Course No.	DEC-III	Course No.	DEC-IV
CE-414N	Geosynthetics Engineering	CE-418N	Ground Water Hydrology
CE-440N	Non Conventional Energy Resources	CE-420N	Design of Hydraulic Structures
CE-442N	Pre Stressed Concrete Structure	CE-422N	Environmental Impact Assessment
CE-444N	Instrumentation & Sensor Technologies	CE-424N	Remote Sensing & GIS

The project should be initiated by the students in the beginning of VIIIth semester and will be evaluated at the end of the semester on the basis of a presentation and report.* ***Note: *Project-II should not be related to Project-I unless it involves large amount of work, time and effort.*

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: DESIGN OF CONCRETE STRUCTUTRES-II					
L	T	P/D	Total	**Subject Code: CE-401N**	Max. Marks: 100
4	1	0	5		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 4 hrs.
Course Objective		Students will acquire the knowledge about the design of concrete structures like Beam,Slabs, Stair case, Water Tanks and Building frames.			
UNIT		**Course Outcomes**			
I		Students will be able to study behavior in the Beam and Prestressed concrete –moments,shear and design of beam.			
II		Students will be able to design different types of Slabs,Stair case and Foundations.			
III		Students will be able to design of Water tanks, Silos and Bunkers.			
IV		Students will be able to analyze the frames structures			

UNIT-I

Continuous Beams:

Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plan-analysis for torsion, redistribution of moments for single and multi-span beams, design examples.

Prestressed Concrete:

Basic principles, classification of prestressed members, various prestressing systgems, losses in prestress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, I:S:Specifications .

End blocks-Analysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.

UNIT-II

Flat slabs and staircases:

Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design of various types of staircases, design examples.

Foundations:

Combined footings, raft foundation, design of pile cap and piles, under-reamed piles, design examples.

UNIT-III

Water Tanks, Silos and Bunkers:

Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples.

Silos and Bunkers-Various theories, Bunkers with sloping bottoms and with high side walls, battery of bunkers, design examples.

UNIT-IV

Building Frames:

Introduction, Member stiffnesses, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductility of beams, design and detailing for ductility, design examples.

Yield Line Theory:

Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

Note for Paper-setter:

EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Plain and Reinforced Concrete, Vol.2, Jai Krishna & O.P.Jain, Nem Chand & Bros.,Roorkee.
2. Pre-Stressed Concrete, N.Krishna Raju, TMH Pub.,N,.Delhi.
3. Design of Prestressed Concrete Structures, T.Y.Lin, John Wiley & Sons., N.Delhi.
4. Reinforced Concrete-Limit StaTge Design, A.K.Jain, Nem Chand & Bros., Roorkee.
5. IS 1343-1980,IS Code of Practice for Prestressed Concrete.
6. IS 3370-1976(Part I to IV), Indian Standard Code of Practice for Liquid Retaining Structures.
7. IS 456-2000, Indian Standard of Practice for Plain and Reinforced Concrete, IS 1893, 4326 &

13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: IRRIGATION ENGINEERING-II					
L	T	P/D	Total	**Subject Code: CE-403N**	Max. Marks: 100
3	1	0	4		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	To Impart knowledge irrigation water requirement and ability to understand the hydraulic structures.				
UNIT	**Course Outcomes**				
I	Students will be able to understand the design properties of differerent types of Falls and Canals				
II	Students will be able to study the Cross drainage work and canal headworks				
III	Students will be able to study about different types of dams and their design				
IV	Students will be able to study about Spillways and Energy Dissipaters				

UNIT-I

Regulation works:

Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, and design of straight Glacis fall. Off-take alignment, cross-regulator and distributory, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.

UNIT-II

Cross drainage works:

Classification and their selection, hydraulic design aspects of aqueducts, syphon aqueducts, super passage, canal syphon and level crossing, design of transitions.

Diversion canal headworks:

Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

UNIT-III

Storage Headworks:

Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketchs, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

UNIT-IV

Spillways and Energy Dissipaters:

Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

Note for Paper-setter:

EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Irrigation, Water Resources and Water Power Engineering by P.N.Modi.
2. Fundamentals on Irrigation Engineering by Bharat Singh.
3. Irrigation Engineering and Hydraulic Structures by S.K.Garg.
4. Theory and Design of Irrigation Structures Vol.I & II by R.S.Varshney, Gupta & Gupta.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: TRANSPORTATION ENGINEERING -II					
L	T	P/D	Total	Subject Code: CE-405N	Max. Marks: 100
3	1	0	4		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The study of safe and optimum geometric design of highways and fundamental parameters of highway materials.				
UNIT	Course Outcomes				
I	Students will able to study about different types of pavement and their design				
II	Students Will study about highways construction using bituminous and non bituminous pavement				
III	Students Will study about highway maintenance and hill road design				
IV	Students Will study about highway economics and tunnels				

UNIT-I

Design of Flexible Pavements:

Types of pavements. Flexible and rigid pavements. Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method (including latest IRC guidelines), riaxial method and Burmister's method.
T

Design Of Rigid Pavements:

Westergaard's theory, critical locations of loading, load and temperature stresses. Critical combination of stresses. IRC guidelines for determination of thickness of a rigid pavement. Joints: requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.

UNIT-II

Highway Construction : Non-Bituminous Pavements:

Brief introduction to earthwork machinery: shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM. WMM. Construction of cement concrete pavements. Slip-form pavers. Basic concepts of the following: soil stabilized roads, use of geo-synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted oncrete pavements and fibre reinforced concrete pavements.

Construction of Bituminous Pavements:

Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for costruction of bituminous roads: bitumen boiler, sprayer, pressure distributer, hot-mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MOST specifications.

UNIT-III

Highway Maintenance:

Pavement failures. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Pavement evaluation. Benkleman beam. Introduction to arious types of overlays.

Highway Drainage and Hill Roads:

Surface drainage: types, brief design. Types of sub-surface drainage. Special characteristics of hill roads: geometrics, hair pin bends, construction of hill roads, drainage of hill roads, maintenance problems of hill roads

UNIT-IV

Highway Economics and Finance:

Need of economic evaluation. Highway user benefits and costs. Methods of economic evaluation: benefit cost ratio method, net present value method, internal rate of return method, comparison. Highway finance.

Tunnels:

Sections of tunnels: advantages, limitations and suitability of each section. Shaft. Pilot tunnel. Driving tunnel in rocks: sequence of construction operations, full face method, heading and bench method, drift method. Driving tunnels in soft ground: sequence of onstruction operations, needle beam method, shield tunneling, compressed air tunneling.

Note for Paper-setter: *EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.*

Books :

1. *Highway Engg by S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.*
2. *Principles and Practice of Highway Engg. by L.R.Kadiyali, Khanna Publishers, Delhi.*
3. *Principles of Pavement Design by Yoder,E.J & Witczak,M.W., John Wiley and Sons, USA.*
4. *Tunnel Engineering by S.C.Saxena, Dhanpat Rai Publications, N.Delhi.*
5. *A text book of Tunnel, Bridges and Railway Engg. by S.P.Bindra, Dhanpat Rai Delhi.*

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: SEWERAGE AND SEWAGE TREATMENT					
L	T	P/D	Total	**Subject Code: CE-407N**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The aim of study is the Collection, Treatment and Disposal of Sewage				
UNIT	**Course Outcomes**				
I	Students will study the importance of sanitation and sewer design				
II	Students will study the physical, chemical and bacteriological properties of Sewage				
III	Students will study the methods of treatment of Sewage				
IV	Students will study the methods of safe Sewage disposal				

UNIT-I

Collection of sewage:

Importance of sanitation, Systems of sewerage – separate, combined and partially separate. Quantity of sanitary sewage and variations. Shapes of sewer – circular and egg shaped. Design of sewers, self-cleansing velocity and slopes, Construction and testing of sewer lines. Sewer materials. joints and appurtenances.

UNIT-II

Sewage Characterization:

Quality parameters- BOD, COD, Solids, D.O., Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land.

UNIT-III

Sewage Treatment:

Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment- activated sludge process & its modifications, Tricking filter, sludge digestion and drying beds.
Stabilization pond, aerated lagoon, UASB process , septic tank and Imhoff tank.

UNIT-IV

Disposal of Sewage:

Disposal of sewage by dilution – self-purification of streams. Sewage disposal by irrigation (sewage treatment).

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Waste Water Engineering: Metcalf and Eddy.
2. Sewage and Sewage Treatment: S.K. Garg.
3. Sewage and Sewage Treatment: S.R. Krishansagar.
4. Waste Water Engineering: B.C. Punmia.
5. Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.

B. Tech. VII Semester (Civil)
CE-409N CONCRETE STRUCTURES-II (DRG.)

L T P/D: 0 0 3
Total Marks: 100 Sessional: 40 marks
Viva-voce: 60 marks Duration: 3 hrs.

Preparing drawing sheets showing reinforcement details in case of:

1. Flat slabs
2. Underground and Overhead Water Tanks.
3. Combined Footings, Pile Foundations, Raft foundation.
4. T-Beam Bridge.
5. Silo/Bunker.

B. Tech. VII Semester (Civil)
CE-411N Irrigation Engg. Design &Drawing

L T P/D: 0 0 2
Total Marks: 100 Sessional: 40 marks
Viva-voce: 60 marks Duration: 3 hrs.

Complete design and drawing of the following:

1. Design of weirs and barrages on permeable foundation for surface and sub surface flow conditions.
2. Design of Guide Banks.
3. Flood Routing using step by step method.
4. Design of Syphon Aqueduct.
5. Design of Sarda type fall & sloping glacis fall.
6. Seepage line in a homogeneous earth dams on impermeable foundation with horizontal drainage.
7. Design of Ogee Spillway and stilling basin.

Note: Emphasis would be given to the computer aided designs of some of above structures.

DEC-I

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: CE-413N HYDRO ELECTRIC POWER DEVELOPMENT					
L	**T**	**P/D**	**Total**	**Subject Code: CE-413N**	Max. Marks: 100
3	**1**	**0**	**4**		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The aim of study is the Sources of power, Elements of Hydro power, Intake structures, Penstocks.				
UNIT	Course Outcomes				
I	Students will study the estimation of water power, necessity and importance				
II	Students will study the Elements of Hydro power, classification of hydro-power plants				
III	Students will study about Intake structures, trash racks.				
IV	Students will study the methods Penstocks, surge tank, surges in canals.				

UNIT-I

Introduction:

Sources of power, estimation of water power, necessity and importance of harnessing small hydro power, flow duration and power duration curves, load curve, load factors, capacity factors, utilization factors, firm and secondary power.

Types of Hydro Power Plants:

Elements of Hydro power, classification of hydro-power plants, run-of-river plants, storage plants diversion canal development, pumped storage plants, tidal power plants, base load and peak load plants in a power grid.

UNIT-II

Intakes:

Intake structures, functions and their types, components of intakes-forebay, trash racks, gates and valves, force required to operate gates.

Conveyance System:

Penstocks, design criterion, economical diameter anchor blocks, cradles and footings, water hammer, instantaneous closure of power canal, surge tank, surges in canals.

UNIT-III

Turbines:

Types of turbines, specific speed and classification of turbines, synchronous speed, scroll casing, flumes and draft tubes, dimensions of scroll sassing and draft tubes, setting of turbines

UNIT-IV

Power House: General layout and arrangements of hydro-power number and size of units, sub-structure, spacing of super-structure, underground power stations, tidal power.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unitBooks:

1. Water Power Engineering, Dandekar, M.M. Sharma, K.N.
2. Hydro-Electric Engineering Practice Vol. I, II & III Brown
3. Water Power Engineering, Borrows, H.K.
4. Water Power Development, Vol. I & II, Mosonyi, E.
5. Water Power Engineering, M.M. Deshmukh.

CE-415N RIVER MECHANICS & FLOOD CONTROL

L T P/D	Total Max.Marks: 100
3 1 – 4	Theory: 75 marks
	Sessionals: 25 marks
	Duration: 3 hrs.

UNIT-I

Introduction:
Indian rivers, flood, flood problems, river morphology behavior of river flow, role of sediments in rivers, changes in regimes, river gauging, causes of flood and losses, alleviation of flooding.

Hydrologic Statistics:
Probabilistic treatment of hydrologic data, frequency & probability functions, statistical parameters, fitting a probability distribution, probability distribution fort hydrauli

UNIT-II

Flood Mitigation by River Protection:
Basis of river engineering, flow types, resistance flow, energy slope, backwater effect, three dimensional flow, circular and helicoidal flow, river improvement works, river survey, protection by embankment, discharge capacity, design of dyke, stability analysis of dykes, bank protection, bank recession, types of bank protection works, channel improvement, cutoffs diversion, bypass channel, cutoff channel, floored ways, flood plain zeroing, spreading grounds.

UNIT-III

Flood Mitigation by Reservoirs:
Design factors, storage capacity determinations, sequent peak algorithm method, live storage, ripple mass curve flood routing, flood storage, dead storage, reservoir classification, reservoir sedimentation, distribution of sediment load measurement, Mood's method, life of reservoir, reservoir operation based on annual storage and regulation, single and multi purpose reservoirs, gate operation schedule, maximum and minimum flow operation, multi purpose reservoir operation, reservoir economics-cost benefit ratios, optimization of benefits.

UNIT-IV

Flood Forecasting & Warning:
Basic data, communication network, forecasting techniques and procedures, forecast of rainfall, runoff from rainfall, forecasting stages, peak travel time, forecast reporting, flood warning, Engineering methods for flood fighting.

Engineering Economics of Flood Control:
Estimation of flood damages, estimation of benefits of flood contr4ol, cost benefit analysis of flood control project.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit

Books:

1. Flood Control & Drainage Engg. By S.N. Ghosh
2. Hydrology & Flood control Engg. By S.K.Garg

DEC-II

CE-421N ELEMENTS OF EARTHQUAKE ENGINEERING

L T P/D
3 1 – 4

Total Max.Marks: 100
Theory: 75 marks
Sessionals: 25 marks
Duration: 3 hrs.

UNIT-I

Seismology: Introduction, plate tectonics, earthquake distribution & mechanism, seismicity, seismic wave, earthquake magnitude & intensity, seismic zoning & seismometry.

Single degree of freedom systems: Various types of dynamic loads, vibration of single degree of freedom system, free or forced vibrations, types of damping, critical damping, transmissibility, vibration measuring instruments, response spectrum.

UNIT-II

Multi-degree of Freedom (MDOF) systems: Equation of motion, normal modes & natural frequencies, semi-definite systems, dynamic vibration absorbers, vibration dampers, principle of orthogonally, Stodolas method, Holzer's method, matrix method, modal analysis & its limitations, Mode superposition method.

UNIT-III

Seismic Analysis and Design: General principles, assumptions, Seismic coefficient method, response spectrum method, strength and deflection, design criterion for structures, significance of ductility, codal provisions, and design examples.

UNIT-IV

Seismic performance, Repair and strengthening: Methods for assessing seismic performance, influence of design ductility and masonry infills, criterion for repair and strengthening techniques and their applications, addition of new structural elements.

Vibrational control: General features of structural control, base isolation, active and paasive control system, earthquake resistance design as per IS: 1893, IS: 4326 and: 13920.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

2. Elements Of Earthquake of Engineering, Jai Krishna, A. R. Chandershekaran & Brajesh Chandra, South Asian Pub New Delhi.
3. Dynamics of Structures, Clough & Penzion, McGraw Hill.
4. Earthquake Engineering, Y-X Hu, S-C. Liu and W. Dong, E and FN Sons., Madras.
5. Earthquake Resistant Concrete Structures, George G. Penelis and J. Kapoors, E and FN Sons., Madras.
6. Structural Dynamic, Mario Paz, CBB Pub. N.Delhi.

CE-437N ENERGY RESOURCES & TECHNOLOGY

L T P/D
3 1 – 4

Total Max.Marks: 100
Theory: 75 marks
Sessionals: 25 marks
Duration: 3 hrs.

UNIT-I

ENERGY SOURCES & AVAILABILITY:

World energy situation. Indian energy scenario. Comparative study of thermal, hydro, nuclear and gas power plants. Impact of thermal, gas, hydro and nuclear power stations on environment, air and water pollution, green house effect (global warning) geothermal, hydrogen energy, fuel cells,

UNIT-II

SOLAR ENERGY:

Solar constant, solar radiation geometry, local solar time, day length, solar radiation measurement, radiation on inclined surface, solar radiation data & solar charts., solar water heating, solar dryers, solar stills, solar cooling and refrigeration. Conversion of heat into mechanical energy. Active and passive heating of buildings. Solar cells.

UNIT-III

BIOMASS ENERGY:

Introduction to biomass, biofuels & their heat content, biomass conversion technologies. Aerobic & anaerobic digester, Factors affection biogestion, biogas plants - types & description. Utilisation of biogas - Gasifiers, Alternative liquid fuels –ethanol and methanol. Ethanol production.

UNIT-IV

HYDRO POWER ENERGY

Sources of power, estimation of water power, necessity and importance of harnessing small hydro power, flow duration and power duration curves, load curve, load factors, capacity factors, utilization factors, firm and secondary power. Elements of Hydro power, classification of hydro-power plants, run-of-river plants, storage plants diversion canal development, pumped storage plants.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit

TEXT BOOKS:

1. Electric Power Generation, B.R.Gupta
2. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons,1984.
3. Power Plant Engg: G.D. Rai

REFERENCE BOOKS:

1. Renewable Energy Resources: John Twidell and Tony Weir
2. Renewable Energy Resources Conventional & Non- Conventional: M.V.R Koteswara

B. Tech. VII Semester (Civil Engineering)					
CE-439N Estimation and Accounts					
L	T	P/D	Total	**Subject Code: CE-439N**	Max. Marks: 100
3	1	0	4		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The aim of study is to get knowledge about estimation of different civil works.				
UNIT	**Course Outcomes**				
I	Students will study the different methods of estimation				
II	Students will study about different types of specification used in civil works				
III	Students will study about rate analysis of different items				
IV	Students will study the terms used in civil works and public works accounts				

UNIT-I

Estimate:

Principles of estimation, units, items of work, different kinds of estimates, different methods of estimation, estimation of materials in single room building, two roomed building with different sections of walls, foundation, floors and roofs, R.B. and R.VC.C. works, Plastering, White-washing, Distempering and painting, doors and windows, lump sum items, Estimates of canals, roads etc.

UNIT-II

Specification of Works:

Necessity of specifications, types of specifications, general specifications, specification for bricks, cement, sand, water, lime, reinforcement; Detailed specifications for Earthwork, Cement, concrete, brick work, floorings, D.P.C., R.C.C., cement plastering, white and colour washing, distempering, painting.

UNIT-III

Rate Analysis:

Purpose, importance and requirements of rate analysis, units of measurement, preparation of rate analysis, procedure of rate analysis for items:- Earthwork, concrete works, R.C.C. works, reinforced brick work, plastering, painting, finishing(white-washing, distempering).

UNIT-IV

Public Works Account:

Introduction, function of P.W. department, contract, guidelines, types of contracts, their advantages and disadvantages, Tender and acceptance of tender, Earnest money, security money, retention money, performance guarantee, secured advance, mobilization advance, measurement book, cash book, preparation, examination and payment of bills, first and final bills, administrative sanction, technical sanction. Maintenance of muster ROLL precaution filling preparation of pay bill, measurement of book for payment of contractors, different types of payment, first & final, running advance and final payment

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books

1. Estimating & Costing in Civil Engg..: Theory & Practice by B.N.Dutta, S.Dutta & Co., Lucknow.
2. Civil Estimating and Costing by A.K Upadhyay, S.K Kataria & Sons, Daryaganj, New Delhi
3. Estimating, Costing & Specification in Civil Engg. by M.Chakarborty, Calcutta.
4. Estimating and Costing for Building & Civil Engg.Works by P.L.Bhasin, S.Chand & Co., N.Delhi.
5. Building Construction Estimating by George H.Cooper, McGraw Hill Book Co., New York

CE-441N ENERGY EFFICIENT BUILDINGS

L T P/D
3 1 – 4

Total Max.Marks: 100
Theory: 75 marks
Sessionals: 25 marks
Duration: 3 hrs.

UNIT I

Introduction: Fundamentals of energy - Energy Production Systems - Heating, Ventilating and air conditioning –Solar Energy and Conservation - Energy Economic Analysis - Energy conservation and audits -Domestic energy consumption - savings -Energy use in buildings - Residential - commercial buildings.

Environmental: Energy and Resource conservation - Design of green buildings - Evaluation tools for building energy - Embodied and operating energy - Peak demand - Comfort and Indoor air quality - Visual and acoustical quality - Land, water and materials - Airborne emissions and waste management.

UNIT II

Design:

Natural building design consideration - Energy efficient design strategies - Contextual Factors - Longevity and process Assessment -Renewable energy sources and design. **Advanced building Technologies** - Smart buildings - Economies and cost analysis.

Services: Energy in building design - Energy efficient and environment friendly building – Thermal phenomena - thermal comfort - Indoor Air quality - Climate, sun and Solar radiations.

UNIT III

Energy audit:

Types of energy audit - Analysis of results - Energy flow diagram – Energy consumption/ Unit production - Identification of wastage -Priority of conservative measures - Maintenance of management programme.

UNIT IV

Energy Management:

Energy management of electrical equipment - Improvement of power factor, management of maximum demand - Energy savings in pumps - Fans - Compressed air systems Energy savings in Lighting systems - Air conditioning systems - Applications.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit

Text Books

1. Moore F., Environmental Control System McGraw Hill, Inc., 1994.
2. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.

Reference Books

1. Cook, J, Award - Winning passive Solar Design, McGraw Hill, 1984.

SEM-VIII

B. Tech. VIII Semester (Civil Engineering)					
SUBJECT: BRIDGE ENGINEERING					
L	T	P/D	Total	**Subject Code: CE-402N**	Max. Marks: 100
4	2	0	6		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	Students will acquire the knowledge about the design of Railway, R.C.C and Steel Bridge and its foundation				
UNIT	**Course Outcomes**				
I	Students will be able to study Specifications for Roads and Railways Bridges				
II	Students will be able to design consideration for R. C. C. Bridges				
III	Students will be able to design consideration for Steel Bridges				
IV	Students will be able to Hydraulic & Structural design of Bridge				

UNIT-I

Introduction:

Definition, components of bridge, classification of bridges, selection of site , economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges:

General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads and railway bridges, detailed explanation of IRC standard live loads.

UNIT-II

Design Consideration for R. C. C. Bridges:

Various types of R.C.C. bridges(brief description of each type) , design of R.C.C. culvert and T-beam bridges.

UNIT-III

Design Consideration for Steel Bridges:

Various types of steel bridges (brief description of each), design of truss and plate girder bridges.

UNIT-IV

Hydraulic & Structural Design:

Piers, abutments, wing-wall and approaches.

Brief Description:

Bearings, joints, articulation and other details.

Bridge Foundation:

Various types, necessary investigations and design criteria of well foundation.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Essentials of Bridge Engineering, D.J.Victor, Oxford & IBH Pub.N.Delhi.
2. Design of Bridges, N.Krishna Raju, Oxford & IBH, N.Delhi.
3. Bridge Deck Analysis, R.P.Pama & A.R.Cusens, John Wiley & Sons.
4. Design of Bridge Structures, T.R.Jagadish & M.A.Jairam, Prentice Hall of India, N.Delhi.

B. Tech. VIII Semester (Civil Engineering)					
SUBJECT: Railway & Airport Engineering					
L	T	P/D	Total	**Subject Code: CE-404N**	Max. Marks: 100
3	2	0	5		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		Students will acquire the knowledge about the design of Railways and Air port			
UNIT		**Course Outcomes**			
I		Students will be able to study different types of Rails,Sleepers and Ballast			
II		Students will be able to design different components of Railways			
III		Students will be able to know Geometric design of track			
IV		Students will be able to analyze the frames structures			

UNIT-I

Introduction, Permanent Way And Rails

Rail transportation and its importance in India. Permanent way: requirements and components. Gauges in India and abroad. Selection of gauge. Coning of wheels. Adzing of sleepers. Rails: functions, composition of rail steel, types of rail sections, requirements of an ideal rail section, length of rails. Defects in rails. Creep of rails. Long welded rails and continuously welded rails.

Sleepers, Fastenings And Ballast

Sleepers: functions, requirements of an ideal sleeper. Types of sleepers: wooden, cast iron, steel and concrete sleepers, advantages, disadvantages and suitability of each type. Sleeper density. Fastenings for various types of sleepers: fish plates, spikes, bolts, bearing plates, keys, chairs, jaws, tie bars. Elastic fastenings. Ballast: functions, requirements, types of ballast and their suitability.

UNIT-II

Points And Crossings

Necessity. Turnout: various components, working principle. Switch: components, types. Crossing: components and types. Design elements of a turnout, design of a simple turnout. Layout plan of track junctions: crossovers, diamond crossing, single-ouble slips, throw switch, turn table, triangle.

Signaling, Interlocking And Train Control

Signals: objects, types and classification. Semaphore signal: components, working principle. Requirements / principles of a good interlocking system. Brief introduction to devices used in interlocking. Methods of control of train movements: absolute block system, automatic block system, centralized train control and automatic train control systems.

UNIT-III

Geometric Design Of The Track

Gradients, grade compensation. Super elevation, cant deficiency, negative super elevation. Maximum permissible speed on curves. Tractive resistances, types. Hauling capacity of a locomotive.

Stations, Yards And Track Maintenance

Stations: functions and classification. Junction, non-junction and terminal stations. Yards: functions, types. Marshalling yard: functions, types. Maintenance of railway track: necessity, types of maintenance. Brief introduction to mechanized maintenance, M.S.P and D.T.M.

UNIT-IV

Introduction And Airport Planning

Air transportation, its importance and characteristics, status in India. Layout plan of an airport and its basic elements: terminal area, apron, taxiway, runway, hanger. Aircraft characteristics, their effect on elements of an airport. Site selection of an airport. lassification of airports.

Runway Layout And Pavement Design

Runway orientation, Wind Rose diagram. Basic runway length. Corrections to basic runway length. Runway patterns. Difference between highway and runway pavement. Types of runway pavements. Design factors for runway pavement. Brief introduction to design of thickness of a runway pavement.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. A text book of Railway Engineering *by* S.C.Saxena and S.P.Arora, Dhanpat Rai Publicatios, N.Delhi.
2. Railway Track Engg. *by* J.S.Mundray, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
3. Airport Planning and Design *by* S.K.Khanna, M.G.Arora, Nem Chand Bros., Roorkee.
4. The Planning and Design of Airports *by* Robort Hornjeff, McGraw Hill Book Co.
5. Air Transportation Planning and Design *by* Virender Kumar & Satish Chandra, Galgotia Publications, N.Delhi.

B. Tech. VIII Semester (Civil Engineering)					
SUBJECT: Industrial Waste Water Treatment					
L	T	P/D	Total	**Subject Code: CE-406N**	Max. Marks: 100
3	2	0	5		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The aim of study is to understand the effect of Industrial waste water on environment and its treatment				
UNIT	**Course Outcomes**				
I	Students will study the effect of waste water on streams				
II	Students will study the working process of treatment plant				
III	Students will study about the standard for disposal				
IV	Students will study the types of industry responsible for waste generation				

UNIT-I

Effects of industrial wastes on streams, sewerage systems and wastewater treatment plants.

UNIT-II

Minimizing the effects of industrial effluents on waste water treatment plants and receiving streams-conservation of water, process change, reuse of waste water, volume reduction, strength reduction, neutralization, equalization and proportioning.

UNIT-III

Population equivalent. Industrial effluent standards for disposal into inland surface water sources and on land for irrigation.

UNIT-IV

Study of the following Industries from waste generation, quality and its treatment including brief overview of manufacturing process:

Textile, tannery, sugar mill, distillery, dairy, pulp & paper, metal plating, oil refinery, nitrogenous fertilizers, thermal power plants and radio active wastes.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Industrial and Hazardous Waste Treatment by N.L.Nemerow & A.Dasgupta.
2. Industrial Effluents by N.Manivasakam.
3. Waste Water Treatment by M.N.Rao & A.K.Dutta.

B. Tech. (Civil) VIII Semester
CE – 426N TRANSPORTATION ENGINEERING – II (P)

L T P/D 0 0 2
Total Marks: 100 Sessional: 40 marks
Viva-voce: 60 marks Duration: 3 hrs.

LIST OF EXPERIMENTS

1. Flakiness and Elongation Index of aggregates.
2. Specific gravity and water absorption test on aggregates.
3. Specific gravity of bitumen.
4. Proportioning of aggregates.
5. Marshall's stability test.
6. Stripping test on aggregates.
7. Determination of bitumen content.
8. CBR lab test on soil.
9. Traffic volume study using videography technique.
10. Traffic speed study using videography technique.

B. Tech. VIII Semester (Civil)
CE-428N ENVIRONMENTAL ENGINEERING-II(P)

L T P/D 0 0 2
Total Marks: 100 Sessional: 40 marks
Viva-voce : 60 marks Duration: 3 hrs.

LIST OF EXPERIMENTS

1. To determine the acidity of a sewage sample.
2. To determine the alkalinity of a sewage sample.
3. To determine total, suspended, dissolved and settable solids in a sewage sample.
4. To determine volatile and fixed solids in a sewage sample.
5. To determine oil and grease in a sewage sample.
6. To determine the chloride concentration in a sewage sample.
7. To determine the sulphate concentration in a sewage sample.
8. To determine the B.O.D. of a given sewage sample.
9. To determine the C.O.D. of a given sewage sample.
10. To determine the T.O.C. of a given sewage sample.
11. To determine the fecal count of a given sewage sample.
12. Microscopic studies of a sewage.

DEC-III

B. Tech. VIII Semester (Civil Engineering)					
SUBJECT: GYOSYNTHETICS ENGINEERING					
L	T	P/D	Total	**Subject Code: CE-414N**	Max. Marks: 100
3	2	0	5		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		The aim of study is to understand the application of Geosynthetic material,types of material			
UNIT		**Course Outcomes**			
I		Students will study the Historical Development, The Nomenclature, Function			
II		Students will study the Manufacutinr Methods			
III		Students will study about Erosion Control with Geogrids			
IV		Students will study about Application of Geosynthetics in Water Resource Project			

UNIT I

Basic Description of Geosynthetics:
Historical Development, The Nomenclature, Function, Use around the World, Applications, Development in India.
Raw Materials – Their Durability and Ageing:
Raw Materials, Durability, Degrading Agencies, Polymers, Biological Resistance, Chemical Resistance, Weathering Resistance

UNIT II

Manufacutinr Methods:
Fibres, Yarn, Nonwoven Geotextiles, Woven Geotextiles, D.S.F. Fabrics.
Geogrids- Testing and Evaluation:
Factors influencing Testing, Sampling, Physical Properties, and Mechanical Properties under Uniaxial loading, Creep Testing

UNIT III

Erosion Control with Geogrids:
Wind Erosion, Rain Water Erosion, Erosion Control Measures, Placement of Geogrid
Bearing Capacity Improvement with Geogrids:
Advantages, Mechanism, Modes of Failure, Friction Coefficient, Experimental Studies.

UNIT IV

Application of Geosynthetics in Water Resource Projects: Case Study: Dharoidam, Hiran II Dam, Meda Creek Irrigation Scheme, Lining of Kakarpar Canal

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Designing with Geosynthetics, (Prentice Hall) by Robert M. Koerner.
2. Engineering with Geosynthetics, (Tata MacGraw Hill) by G.V. Rao & G.V.S. Raju.

CE-440N NON-CONVENTIONAL ENERGY RESOURCES

L T P/D **Max.Marks: 100**
3 1 – 4 **Theory marks: 75**
Sessional: 25
Duration: 3 hrs.

UNIT-I

Introduction Various non-conventional energy resources Introduction, availability, classification ,relative merits and demerits.

Solar Cells:

Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

Solar Thermal Energy:

Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants,
thermal energy storage for solar heating and cooling, limitations.

UNIT-II

Geothermal Energy:

Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Magneto-hydrodynamics (MHD):

Principle of working of MHD Power plant, performance and limitations.

Fuel Cells:

Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-III

Thermo-electrical and thermionic Conversions:

Principle of working, performance and limitations.

Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors,

Concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

UNIT-IV

Bio-mass:

Availability of bio-mass and its conversion theory.

Ocean Thermal Energy Conversion (OTEC):

Availability, theory and working principle, performance and limitations.

Wave and Tidal Wave:

Principle of working, performance and limitations.

Waste Recycling Plants.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit

Text/References Books:

1. Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.
2. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
3. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
4. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
5. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.

CE-442N Prestressed Concrete Structure

L T P/D
3 1 – 4

Max.Marks: 100
Theory marks: 75
Sessional: 25
Duration: 3 hrs.

UNIT I

Introduction: Basic concepts of prestressing, terminology, advantages and applications of prestressed concrete.Materials for Prestressed Concrete: High strength Concrete, permissible stresses in concrete, high strength steel, permissible stresses in steel. **Prestressing Systems**: Prestensioning and post tensioning systems, various types of tensioning devices, Lec-Macall systems, Magnel Blaton post tensioning, Freyssinet systems, Gifford Udal system.

UNIT II

Losses of Prestress : Types of losses of prestress, loss due to elastic deformation of concrete, loss due to shrinkage of concrete, loss due to creep of concrete, loss due to relaxation of stress in steel, loss due to friction, loss due to anchorage slip, total loss in pretensioned and post tensioned members. **Analysis of Prestress and Bending stresses**: Basic assumptions, resultant stresses at a section, concept of load balancing, cracking moment.

UNIT III

Deflections: Factors influencing deflections, short term deflections of un-cracked members, deflections of cracked members, prediction of long term deflections.
Shear and Torsional Resistance: Ultimate shear resistance of prestressed concrete members, prestressed concrete members in torsion, design of reinforcements for torsion, shear and bending.

UNIT IV

Design of Flexural Members : Dimensioning of flexural members, design of pre-tensioned and post tensioned beams, design of partially prestressed members, design of one way and two way slabs, continuous beams.Design for axial tension, compression and bending, bond and bearing.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Text Books

1. Prestressed Concrete by N. Krishna Raju, TMH Publishing Company, New Delhi,
2. Prestressed Concrete by P. Dayartnam, Oxford and IBH Publication, New Delhi.

Reference books 1.Design of Prestressed Concreet Structures by T Y Lin& Ned H. Burns

CE-444N Instrumentation & Sensor Technologies for Civil Engineering Applications

L T P/D
3 1 – 4

Max.Marks: 100
Theory marks: 75
Sessional: 25
Duration: 3 hrs.

UNIT-I

Fundamentals of Measurement, Sensing and Instrumentation covering definition of measurement and instrumentation, physical variables, common types of sensors; Describe the function of these sensors; Use appropriate terminology to discuss sensor applications; and qualitatively interpret signals from a known sensor type, types of instrumentation, Sensor Specifics, Permanent installations, Temporary installations;

UNIT-II

Sensor Installation and Operation covering to: i) Predict the response of sensors to various inputs; ii) Construct a conceptual instrumentation and monitoring program; iii) Describe the order and methodology for sensor installation; and iv) Differentiate between types of sensors and their modes of operation and measurement and v) Approach to Planning Monitoring Programs, Define target, Sensor selection, Sensor siting, Sensor Installation & Configuration, Advanced topic, Sensor design, Measurement uncertainty

UNIT-III

Data Analysis and Interpretation covering **a)** Fundamental statistical concepts, b) Data reduction and interpretation, c) Piezometer, Inclinometer, Strain gauge, etc. d) Time domain signal processing, e) Discrete signals, Signals and noise and f) a few examples of statistical information to calculate are: Average value (mean), On average, how much each measurement deviates from the mean (standard deviation), Midpoint between the lowest and highest value of the set (median), Most frequently occurring value (mode), Span of values over which your data set occurs (range)

UNIT-IV

Frequency Domain Signal Processing and Analysis covering Explain the need for frequency domain analysis and its principles; Draw conclusions about physical processes based on analysis of sensor data; Combine signals in a meaningful way to gain deeper insight into physical phenomena, Basic concepts in frequency domain signal processing and analysis, Fourier Transform, FFT (Fast Fourier Transform), Example problems: Noise reduction with filters, Leakage, Frequency resolution

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Text/Reference Books:

1) Alan S Morris (2001), Measurement and Instrumentation Principles, 3rd/e, Butterworth Hienemann
2) David A. Bell (2007), Electronic Instrumentation and Measurements 2nd/e, Oxford Press
3) S. Tumanski (2006), Principle of Electrical Measurement, Taylor & Francis
4) Ilya Gertsbakh (2010), Measurement Theory for Engineers, Springer

DEC-IV

CE-418N GROUND WATER HYDROLOGY

L T P/D **Max.Marks: 100**
3 1 – 4 **Theory marks: 75**
Sessional: 25
Duration: 3 hrs.

UNIT-I

Properties of Aquifers, Formation constants, compressibility of aquifers, Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers, Dupit's assumptions. Unconfined flow with a recharge, tile drain problem. Ground water exploration and methods of investigations.

UNIT-II

Effect of Boundaries, interference of water, leaky aquifers, Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers. Partial penetration of an aquifer by a well, spherical flow in a well. Non equilibrium formula for aquifer (unsteady radial flows).

UNIT-III

Tubewells, optimum capacity, silting of tubewell, design of Tubewells in different aquifers, tubewell types, parts, bore hole, strains, its types, well pipe, causing pipe, blind pipe. Construction and working of tubewells, site selection, drilling operation, cable tool method, hydraulic method, rivers Rotary Method and drilling fluids, well screen assembly installation, verticality and alignment of tubewells, gravel packing, development of tubewells, sickness, in construction and corrosion and failure of tubewells, Pumping equipment and hydraulic testing of pumps.

UNIT-IV

Artificial Recharge of Ground Water, considerations and methods, recharge techniques induced infiltration, water spreading, flooding, basins, ditching, modification of natural channels, irrigation, recharge pits, shafts and recharge wells.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1 Groundwater Hydrology, D.K. Todd, John Wiley & Songs Inc. New York.
2 Groundwater H.M. Raghunath, Wiley Eastern Ltd., N.Delhi.

CE-420N DESIGN OF HYDRAULIC STRUCTURES

L T P/D **Max.Marks: 100**
3 1 – 4 **Theory marks: 75**
Sessional: 25
Duration: 3 hrs.

UNIT-I

Gravity Dams: Dam parameters, Criteria for selection of dam sites, Joints & keys, Cooling arrangement. Water stops at joints, Closing gaps, forces acting on dams, Types of loads, Elementary profile of a gravity dam, Step by step method, Stability analysis methods, Safety criteria, Gravity analysis, Internal stress calculation, Graphical determination of shear stress, Effect of foundation elasticity on stresses, Galleries, Behavior of concrete gravity dam subjected to earthquakes, Thermal stresses.

UNIT-II

Arch Dams: Development of arch dam, Valleys suited for arch dams, Arch dams layout, Types of arch dams, Appurtenant works, Thin cylinder theory and most economical central angle, Design of arch dam, Suitability at abutments, Effects of foundation elasticity on behaviours of arch dam.

Buttress Dams: Types of buttress dam, Selection of type of buttress dam, Most economical profile having no tension, Design principles, Butterss design by Unit column theory, Basic shape of buttress, Design of multiple arch dam, Provision of spillways and outlet works.

UNIT-III

Spillways and Energy Dissipaters: Factors affecting design, Components of spillways, Types of spillways, Design principles. Hydraulic design ogee spillway, Side channel spillway, Chute spillway, Syphon spillway, Shaft-spillway, Energy dissipation below spillways, Bucket type energy dissipaters, Design of various types of stilling basins.

UNIT-IV

Weirs and Barrages: Design of weirs & barrages on permeable foundation, Khosla theory of independent variable. Upstream and downstream protection, Flownets, design of sloping Glacis weir, calculation for hydraulic jump and uplift pressure.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Engineering for Dams by Creager, Justin & Hinds, Wiley Eastern Pvt. Ltd. Delhi.
2. Concrete Dams by R.S. Varshney, Oxford & IBH Pub. Co. Delhi,
3. Dams Part – I Gravity Dams by K.B. Khushalani, Oxford & IBH, Delhi
4. Design of Weirs on Permeable foundations, CBIP Pub. No. 20. Delhi
5. Hydraulic Design of Spillways, ASCE Technical Engg. No. 2, Design Guides as Adapted from the US army Corps.

CE-422N ENVIRONMENTAL IMPACT ASSESSMENT

L T P/D **Max.Marks: 100**
3 1 – 4 **Theory marks: 75**
Sessional: 25
Duration: 3 hrs.

UNIT-I

Environment and Human Activity: Resources, pollution, reuse and environmental management.

Management of Aquatic Environment: Water quality controls. Drainage basin activities and water pollution. The impact of human activity on aquatic resources. The control measures, regional planning.

UNIT-II

Air Quality Management: Atmosphere, effect of human activity on air quality, waste disposal alternative. Optimization, planning of waste disposal.

UNIT-III

Waste Management: Waste disposal methods, impact of waste disposal of human activity.

Land Use Management: Impact of land use on human life. Control, of hazards in land use, management of land use.

UNIT-IV

Environmental Assessment: National environmental policy, implication of environment assessment in design process. Preparation of assessment, quantification. General requirements of environmental standards. Techniques of setting standards.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1 Environmental Impact Analysis by R.K. Jail and L.V. Urban.
2 Environmental Impact Assessment by Canter
3 Environmental Impact Assessment by J.Glasson.

Bachelor of Technology (Electrical Engineering) w.e.f. Session 2018-19											
Scheme of Studies/ Examination VII semester											
S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs)
			L	T	P	Hrs/Week	Theory	Sessional	Practical	Total	
1	EE-401N*	Utilization of Electrical Energy	3	1		4	75	25		100	3
2	EE-403N	Transducers & Their Applications	3	1		4	75	25		100	3
3	EE-405N	High Voltage Engineering	4	1		5	75	25		100	3
4	**	Elective-I	4	1		5	75	25		100	3
5	***	Elective-II	4	1		5	75	25		100	3
7	EE-415N	Transducers Applications Lab			3	3		40	60	100	3
8	**	Elective-I Lab			3	3		40	60	100	3
9	EE-423N	Minor Project			3	3		75	75	150	3
10	EE-425N	IndustrialTraining- II			1	1		100		100	
		Total	18	5	10	33	375	380	195	950	

Note: 1. * Subject Common with VII Semester. B.Tech. [Electrical Engg.] Scheme, K.U.K.

2. The Minor Project should be initiated by the student in the VII th semester beginning and will be evaluated in the end of the semester on the basis of a presentation and report submitted to the department.

3. Industrial Training-II undergone by the students after VI sem is to be evaluated during VII sem as (EE-425N) through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.

Elective-I with corresponding lab:

**	Elective-I		Elective-I Lab	
Set-I	EE-407N	ProgrammableLogicControllers&Applications	EE-417N	ProgrammableLogicControllersLab
Set-II	EE-409N	Advanced Programming	EE-419N	Advanced Programming Lab

***	Elective-II
EE-411N	Electrical Estimation and Costing

EE-413N	Power System Operation and Control
EE-421N	Operations Research

Bachelor of Technology (Electrical Engineering) w.e.f. Session 2018-19

Scheme of Studies/ Examination
VIII semester

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam(hrs)
			L	T	P	Hrs/Week	Theory	Sessional	Practical	Total	
1	EE-402N	Computer Methods in Power System	4	1		5	75	25		100	3
2	EE-404N	HVDC Transmission	4	1		5	75	25		100	3
3	**EE-406N***	**Special Electrical Machines**	3	1		4	75	25		100	3
4	**	Elective-III	4	1		5	75	25		100	3
5	***	Elective-IV	3	1		4	75	25		100	3
6	EE-416N	Power System Lab			2	2		40	60	100	3
7	EE-418N	Computer methods in Power System Lab			3	3		40	60	100	3
8	EE-420N	Major Project			6	6		75	75	150	3
9	EE-422N****	General Fitness & Professional Aptitude							100	100	3
		Total	18	5	11	34	375	280	295	950	

Note: 1. * Subjects Common with VIII Semester. B.Tech. [Electrical Engg.]Scheme, K.U.K.

2. The Major project should be initiated by the student in continuation of the VII semester and will be evaluated in the end of the semester on the basis of a presentation and Report.
3. **** A viva of the students will be taken by external examiner (Principal/Director/Professor/or any senior Person with Experience more than 10 years) at the end of the semester.

****Elective-III**	EE-408N	Electrical Energy Conservation and Auditing
	EE-410N	Fuzzy logic and Neural Network
*****Elective-IV**	EE-412N	Embedded system

	EE-414N	Power Management

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-401N	**Utilization of Electrical Energy**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Illumination:Term used in illumination, Law's of illumination, sources of Light, arc lamp incandescent lamp, discharge lamp, sodium vapour, mercury vapour lamp, fluorescent tubes, lightening schemes, method of lightning calculation.

UNIT II

Electrical Heating:Advantages of Electrical Heating, various types of Electrical heating, Power frequency and High frequency heating, Degree of heating element, Equivalent circuit of arc furnace, Resistance heating, Arc heating, Induction heating, dielectric heating etc.

Electric Welding:All types of electrical welding, resistance welding, arc welding, electrical winding equipment, Comparison between AC & DC welding, types of electrodes, advantages of coated electrodes.

UNIT III

Electroplating:Basic principle, faraday's law of electrostatics, terms used, Application of electrolysis, factors governing electro deposition, power supply.

Refrigeration & Air Conditioning:Basic principle, various compression cycle & system its application, electric circuit of refrigerator, air conditioner.

UNIT IV

Traction Motors :Different system of electric traction, comparison between AC & DC system, block diagram of traction system ,Starting-Speed control and braking- Speed control and braking –Speed time curves,-Mechanics of Train movement-Tractive effort for acceleration – Power and energy output from driving axles-Specific energy output and consumption-Train resistance.

SuggestedBooks:

1. Dr.S.L.Uppal, Electrical Power ,Khanna Publishers, New Delhi,1980.
2. M.L.Soni,P.V.Gupta,U.S.Bhatnagar,A.Chakrabarti,A Text Book On Power System Engineering, DhanpatRai&Co,New Delhi1997-98
3. H.Pratap, Art and Science of Utilization of Electric Energy, DhanpatRai& Sons, New Delhi,1980.
4. G.C.Garg, Utilization of Electric Power and Electric Traction, Khanna publishers, New Delhi,1995.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-403N	**Transducers & Their Applications**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT - I

I**NTRODUCTION**: Definition of transducer. Advantages of an electrical signal as out-put. Basic requirements of transducers, Primary and Secondary Transducer; Analog or digital types of transducers. Resistive, inductive, capacitive, piezoelectric, photoelectric and Hall effect transducers.

UNIT-II

CHARACTERISTICS OF A TRANSDUCER: Static characteristics - Accuracy, Precision, Sensitivity, Linearity, Hysteresis,Threshold, Resolution, Dead time, Dead zone, Scale range, Scale span.
Dynamiccharacteristics - Speed of response, Measuring lag, Fidelity, Dynamic error mathematicalmodel of transducer - Zero, I&IIorder transducer-Response to step,ramp&impulse inputs**.**

UNIT - III

RESISTANCE TRANSDUCERS: Principle of operation, construction, characteristics and applications ofpotentiometer, loading effects, Strain gauge - theory, types, temperature compensation, applications.
INDUCTIVE AND CAPACITIVE TRANSDUCERS: Self-inductance, Mutual inductance transducer ,Induction potentiometer ,Variablereluctance transducers , LVDT, RVD, Capacitivetransducers - Variable air gap type -Variable area type - Variable permittivity type
Capacitor displacement transducer , Capacitor microphone and itsapplications.

UNIT - IV

ANALOG AND DIGITAL TRANSDUCERS Thermo electric transducer ,Photovolatic cell-Hall effect, Sound sensor , Seismictransducer ,Piezo electric ,Magnetostrictive, Fibre optic , Digital displacementtransducer , Shaft angle encoder , Digital speed transducer , Introduction to MEMS and NANO sensors.

Suggested Books:

1. B.C. Nakra, K.K. Chaudhry, "Instrumentation Measurement and Analysis," . Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Thomas G. Beckwith etc. all, "Mechanical Measurements (International Student Edition), Addison-Wesley Longman, Inc. England.
3. A.K. Sawhney, " A Course in Electrical and Electronic Measurements and Instrumentation,"

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-405N	**High Voltage Engineering**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Conduction &Breakdown in Gases, Liquid &Solid Dielectrics: Gases - Ionization process, town sends current growth equation. 1^{5t}&2nd ionization coefficients. Town sends criterion for breakdown. Streamer theory of breakdown.Paschen's law of gases. Gases used in practice.

Liquid Dielectrics - Conduction &breakdown in pure &commercial liquids, suspended particle theory, stressed oil volume theory, liquid dielectrics used in practice.

Solid Dielectrics - Intrinsic, electromechanical, &thermal breakdown, compos it dielectric, solid dielectrics used in practice.

UNIT II

Insulating materials:Insulating materials in power transformers, rotating machines, circuit breakers, cables &power capacitors.

Generation of high D.C., A.C. impulse voltage & impulse currents.Tripping & control of impulse generators.

Measurement of high D.C., A.C. (Power frequency &high frequency) voltages, various types of potential dividers, generating voltmeter, peak reading A.C. voltmeter, Digital peak voltmeter, electrostatic voltmeter, Sphere gap method, factors influencing the spark voltage of sphere gaps.

UNIT III

High Voltage Testing of Electrical Apparatus: Testing of insulators, bushings, circuit breakers power capacitors &power transformers. Over voltage Phenomenon &Insulation Co-ordination:

Theory of physics of lightning flashes &strokes. Insulation co-ordination, volt time and circuit time characteristics. Horn gap single diverters, ground wires, surge absorbers.

UNIT IV

EHV Transmission &Corona Loss: Need for E.H.V. transmission, use of bundled conductors, corona characteristics of smooth bundled conductors with different configurations, corona loss, factors, affecting the corona. Shunt & Series compensation of E.H.V. lines.Tuned power lines.& H.V.D.C. Transmission:

Advantages, disadvantages &economics of H.V.D.C. transmission system.Types of D.C. links, converter station equipment, their characteristics.

Suggested Books:

1. Kamaraju&Naidu, "HV Engg."
2. RS Jha, "HV Engg."
3. Bagmudre "EHV AC Transmission Engg."
4. Kuffel&Abdullah, "HV Engg."
5. Kimbark, "HVDC Transmission

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-409- N	**Advanced Programming**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Review: Review of C language, standard library, basics of C environment, pre-processors directives, illustrative simple C programs, header files.
Review of elementary data structures arrays, stacks, queues, link list with respect to storage representation and access methods.

UNIT II

Searching Method:Sequential, binary, indexes searches.
Sorting:Internal and external sorting, methods, bubble, insertion, selection, merge, heap, radix and quick sort.Comparison with respect to their efficiency.

UNIT III

Introduction to C++, C++ environment: objects, classes & their associations, object modeling techniques, namespaces, basics of OOP concepts: data encapsulation, abstraction, inheritance, reusability, polymorphism (compile time & run time). Illustrative C++ programs on the above topics.

UNIT IV

Topic in C++: Access specifiers: public, private & protected, Constructor: constructor with default arguments, parameterized constructors, copy constructors, destructors, function overloading, operator overloading, friend function & classes, types of inheritance, virtual functions. Illustrative C++ programs on the above topics.

Suggested Books:

1. Trembley and Sorenson, “An Introduction of data structures with application” MGH
2. Goodman, S.E. and Hetedniemi, S.T. “Introduction to the design and Analysis” MGH
3. Herbert Schildt, “C++ complete reference” TMH

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-407N	**ProgrammableLogicControllers&Applications**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

Introduction:Programmable Logic Controller; Block diagram of PLC, advantages of PLCs Over Relay System; input output Section – Fixed input output, Modular input output**,** Discrete input output Modules, Analog input output Modules.Applications of PLC.

UNIT-II

Ladder Diagram & PLC Programming**:** Ladder Diagram Rules; Writing Diagram; LadderDiagram; Basic Stop / START Circuit; Digital Logicgates; Sequenced Motor Starting; Relay TypeInstruction; Programming a PLC; PLC Peripherals.

UNIT-III

PLC Instructions: Bit logic instructions, Logical instructions, mathematic instruction, move instruction, sequential and shift register instruction

Program Control Instructions:Master Control Relay Instructions; Latching Relay instruction; immediate input output instruction; Jump and Label Instruction.

UNIT-IV

Programming Timer & Counters:Cascading Timers, On delay timer, Off delay timer, retentive timer, example of timer application, AllenBradley PLCs Counters; Up counter, down counter, cascading counter, Combining Timer &Counters, examples of counter industrial applications.

SUGESTED Books

1. Hackworth, John. R. and Hackworth, Jr. Frederick D., “Programmable Logic Controllers: Programming Methods and Applications”, Pearson Education, 2004.
2. Webb, John W., & Reis, Ronal A., “Programmable Logic Controllers: Principles & Applications”, Pearson Education / Prentice Hall, 2008.
3. Dunning, Gary, “Introduction to Programmable Logic Controllers”, Delmar Thomson Learning, 2004.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-413N	**Power System Operation and Control**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Automatic Generation Control: Load frequency control (single area case); load frequency control and economic dispatch; optimal load frequency control; load management.

UNIT II

Economic Load Despatch:Introduction; Optimal Operation of Generators of Bus bar; Unit Commitment; Reliability Considerations; Optimal Generation Schedule Hydro thermal optimal scheduling.

UNIT III

Power System Stability:Steady state; transient and dynamic stabilities; equal area criteria; effect of fault clearing time on transient stability; dynamics of synchronous machine;factors affecting transient stability.

UNIT IV

Automatic Voltage Control & Excitation Systems:AVRs; role of AVR ontransient stability of system; type 0 and 1 excitationsystem; power system stabilizers.Voltage Stability:Basic concept; Voltage collapse; modelling and prevention.

Suggested Books:

1. E.W. Kimbark, “Power System Stability”, John Wiley & Sons, 2001

2. P.Kundur, “Power System Control and Stability”, Tata McGraw Hill, 2006

3. B.R.Gupta, “Power System Analysis & Design”, S. Chand & Sons, 2008

4. S.Rao “EHV-AC/DC Transmission System” ;KhannaPulishers, 1999.

5. William D. Stevenson, Jr., “Elements of Power System Analysis”, Mc-Graw Hill International, Fourth Edition,1982

6. Nagrath .I.J. and Kothari. D.P. “Power System Engineering”, Tata Mcgraw Hill,. 2006

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-411N	**Electrical Estimation and Costing**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Design Considerations of Electrical Installations: General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections, Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT II

Electrical Installation for Different Types of Buildings and Small Industries: Electrical installations for residential buildings — estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT III

Overhead and Underground Transmission and Distribution Lines: Introduction, Supports for transmission lines, Distribution lines — Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT-IV

Substations: Introduction, Types of substations, Outdoor substation — Pole mounted type, Indoor substations — Floor mounted type.

Suggested Books:

- Electrical Design Estimating and Costing, K. B. Raina, S. K. BhattAcharya, New Age International Publisher.
- Design of Electrical Installations, Er. V. K. Jam, Er. Amitabh Bajaj, University Science Press.
- Electricity Pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P. E., CRC Press.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-421N	**Operation Research**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

Development of operation research, characteristics and scope of operation research, operation research in Management, model in operation research, model formation, types of mathematical models, limitation of operation research. L.P. models, simplex method, the algebra of simplex method, (Minimization problems), the big M method, post optimality analysis, essence of duality theory, Application of sensitivity analysis.

UNIT-II

Introduction to model, matrix terminology, formulation and solution of Transportation model (least cost method, Voyel's Approximation method), least time transportation problem, Assignment problems. Introduction to net work logic, Numbering of events (Fulkerson Rule), PERT calculation Forward Path, back-ward path, Slack, probability, comparison with PERT, Critical path, Floats, Project cost, crashing the net work, updating (PERT and CPM)

UNIT-III

Introduction, applications of simulation, advantages and limitations of simulation techniques, generation of random numbers, Time-flow mechanism, simulation languages.

Steps in decision theory approach, Decision Machinery environment, Decision machining under certainly and uncertainly, Decision machining under condition of risk, Decision trees, minimum enchained criteria, advantage and limitations of decision tree solutions, post optimality, Definition of arguments models, comparison with transport model, Mathematical representation of assignment model, Formulation and solution of argument models, variation of the argument model, Alternate optimal solutions.

UNIT-IV

Introduction, Applications of queuing theory, waiting time and idle time costs, single channel queuing theory and multi channel queuing theory with Poisson, arrivals, and exponential services, Numerical on single channel and multi channel queuing theory.

Theory of games, competitive games, Rules and terminology in game theory, Rules for game theory-saddle point, dominance, mixed strategy(2x2games), mixed strategy (2x n games or m x 2 games), mixed strategy (3x 3 games), two person zero sum games, n-person zero sum games.

Suggested books:

1. Introduction to operation research- by Hillier and Lieberman, McGraw Hill.

2. Operations Research – by P.K. Gupta and D.S Hira.
3. Linear Programming by N.P. Loomba.

Code	Nomenclature of Subject		P	Int.	Ext.	Total	Time
EE-415N	**Transducers Application Lab**		**3**	**40**	**60**	**100**	**3 Hr**

List of Experiment

1. To Measure Temperature using RTD.
2. To Measure Displacement using L.V.D.T.
3. To Measure Load using Load Cell.
4. Pressure Measurement using Cantilever.
5. Light Measurement using LDR &Photo Cell.
6. To Measure Angular Displacement using Capacitive Transducer.
7. To Measure the Variation in Water Level using Capacitive Transducer.
8. To Measure Speed of DC Motor using Reluctance Method.
9. To Measure Strain using Strain gauge.
10. To Measure Speed using Photo Interrupter Method.

NOTE: At least 9 experiments are to be performed.

Code	Nomenclature of Subject		P	Int.	Ext.	Total	Time
EE-417N	**Programmable Logic Controller Lab**		**3**	**40**	**60**	**100**	**3 Hr**

List of Experiment

1. To study hardware and software used in PLC.
2. To implement Logic Gates.
3. To realize a Direct-on-line (DOL) starter.
4. To implement an On-delay timer.
5. To implement an Off-delay timer
6. To realize an Up-down counter.
7. To conceptualize the arithmetic instructions used in PLC.
8. To design the operation of PID controller.
9. To design the operation for Star-delta Starter

.**NOTE:** At least 7 experiments are to be performed.

Code	Nomenclature of Subject		P	Int.	Ext.	Total	Time
EE-419N	**Advanced Programming LAB**		**3**	**40**	**60**	**100**	**3 Hr**

List of Experiment

1. Write a programme to implement stack.
2. Write a programme to implement queue.
3. Write a programme to perform following operation on linked list a) insertion of a node b) deletion of a node.
4. Write a programme to find addition and multiplication of two matrix using classes.
5. Write a programme to implement searching techniques.
6. Write a program to implement following sorting methods a) insertion sort b) quick sort c) bubble sort.
7. Create two classes' dm and db which store the value of distance, dm stores distance in metres and centimetres and db in feet and inches.
8. Write a program to read a value for the class object and add one object of dm with another object of db.
9. Write a programme shows the use of copy constructor and destructor.
10. Implement a programme using compile tile polymorphism (function overloading and operator overloading).
11. Write a programme which shows the use of inheritance (multiple and multilevel).

NOTE: At least 8 experiments are to be performed.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-402N	**Computer Methods In Power System**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

General: Impact of computers, orientation of engineering problems to computers, review of matrices and matrix operations.

Incidence and Network Matrices: Network graph, various incidence matrices, generalized element representation, primitive network and primitive network matrices, formation of various network matrices by singular transformations, inter- relations between various incidence matrices and network.

UNIT-II

Bus Impedance and admittance matrices: Building algorithms for bus impedance matrix, modification of bus impedance matrix for change of reference bus and for network changes, formation of bus admittance matrix and modification of three-phase network elements, treatment under balanced and unbalanced excitation, transformation matrices, and unbalanced elements.

UNIT-III

Short-Circuit Studies: Introduction, network short circuit studies using Z bus, short circuit calculations using symmetrical components for various types of faults.
Load-Flow Studies: Introduction, importance of load flow studies, classification of buses, load flow equations, iterative methods, computer algorithms and load flow solutions using Gauss Seidel and

Newton Raphson methods, decoupled and fast decoupled load flow solutions, representation of regulating and off nominal ration transformers, comparison of load flow solution methods.

UNIT-IV

Sparsity: Introduction, optimally ordered triangular factorization, schemes of optimal ordering Stability Studies: Algorithms flow chart and transient stability solution using modified Euler method.
Power System Security: introduction, contingency analysis using Z bus and various distribution factors.

Suggested books:

1. Glenn W.Stagg and Ahmed EI-Abiad, "Computer Methods in Power System Analysis", McGraw Hill.
2. George L.Kusic, "computer-Aided Power Systems Analysis", PHI.
3. John J Grainger and William D. Stevenson, " Power System Analysis", Jr. McGraw Hill.
4. IJ Nagrath and D.P. Kothari, "Power System Engg.", Tata McGraw Hill

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-404N	**HVDC Transmission**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

DC Power Transmission Technology:Introduction; comparison of AC and DC transmission; application of DC transmission; description of DC transmission system; planning for HVDC transmission; modern trends in DC transmission.

UNIT-II

Thyristor Valve & Analysis of HVDC Converters:Introduction; thryistor device; thyristor value; value tests; recent trends; pulse number; choice of converter configuration;simplified analysis of Graetz circuit; converter bridge characteristics; characteristics of twelve pulse converter; detailed analysis of converters.

UNIT-III

Converter and Hvdc System Control:General; principles of DC link control; converter control characteristics; system control hierarchy; firing angle control; current and extinction angle control; starting and stopping of dc link; power control; higher level controllers; telecommunication requirements.

UNIT-IV

Reactive Power Control, Harmonic and Filters: **I**ntroduction; reactive power requirement in steady state; sources of reactive power; static var systems; reactive power control during transients; introduction of harmonic and filters; generation of harmonics; design of AC filters; DC filters; carrier frequency and RI noise

Suggested Books:

1. Padiyar, K.R., "HVDC Power Transmissions Systems", New Age International, 2001

2. Rao,S., “EHV-AC, HVDC Transmission & Distribution Engineering”, Khanna Publishers, 1999

3. Tagare, D.M., “Reactive Power Management”, Tata McGraw Hill, 1996

4. Dubey, G.K., “Power Semi-conductor Controlled Drives”, Prentice Hall, 1999.

5. Arrillaga, J., “High Voltage D.C.Transmission”, Peter Peregrinus Ltd, 1996

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-406N*	**Special Electrical Machines**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Different types of FHP motors and uses in domestic & industrial applications, Single phase Induction motor, Qualitative examination starting and running performance of I-Phase Induction Motors.

UNIT II

Linear Induction Motors and Actuators and its principle of operation, Linear Levitated machine & applications, Permanent magnet motors, High performance energy efficient machines, Effect of E.M.F injected into secondary circuits , quantitative study, discharge motor.

UNIT III

Special Induction generations, Special motors and generators associated with Wind, Solar, Tidal, Biogas and other unconventional energy forms and their applications.

UNIT IV

Synchronous motors, Series universal motors, Stepper motor, Permanent magnet D.C. motor, Permanent magnet AC motors, Switch reluctance motors. Servo motor, shaded pole motor, brush less D.C motor, Typical applications in Computers, Electronics, Communications and Information Technologies.

Suggested Books:

1. Generalized Electrical Machines by P. S. Bhimbra

2. Generations of Electrical Energy by A. E. Fitzgerald/Charles, Kingsley J. R.

3. The Performance &design of A.C Commutator Motor by O.E .Taylor

4. Performance & Design of A.C machines by M.G. Say.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-408N	**Electrical Energy Conservation and Auditing**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

Introduction: Energy Scenario, Energy Analysis of Fuels, Energy Needs of Growing Economy, Long Term Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy and Environment: Air Pollution, Climate Change, Energy Security, Energy Conservation and its Importance, Energy Strategy for the Future, Energy Conservation Act-2001 and its Features.

UNIT-II

Basics of energy and it's various forms: (a) thermal (b) Electricity (c) Non-Conventional Sources Thermal: Different Fuels & its Energy Contents, Temperature & Pressure, Heat Capacity. Steam and Moist Air.

Electricity: AC & DC, Load Management, Maximum Demand Control, Aggregated Technical & Commercial Losses (ATC), Electricity Tariffs.

UNIT-III

Energy Management: Need for Energy Management, Various Approaches, Cost Effectiveness, BenchMarking, Optimization of Energy Requirements and Maximization of System Efficiencies. Fuel andEnergy Substitution..A Few Case Studies of Real Systems.

UNIT-IV

Energy Audit: Definition, Requirements for Energy Audit, Different Approaches viz, Preliminary andDetailed Energy Audit, Case Studies for Real Systems.

Suggested Books:

.1Albert : Plant Engineers & Managers Guide to Energy Conservation.

2. Wayne C. Turner Energy management handbook, John Wiley and Sons.

3. Guide to Energy Management, Cape Hart, Turner and Kennedy

4. Cleaner Production – Energy Efficiency Manual for GERIAP, UNEP, Bangkok prepared by NationalProductivity Council

5. M.K.Lahiri : Saving of Electricity by System Management. M.K. Lahiri Publication

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-414N	**Power Management**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

Introduction:Power scenario; power development; planning; power resources; environment- power matters plan; pre-feasibility and feasibility studies; state relations for power etc; electricity industry structure and safety regulations bill - state and central power boards / power corporations.

UNIT-II

Resources:Resources; geophysical study; Seismic considerations; environmental restraints; resettlement and rehabilitation.

Procurement:Contracting and procurement; consulting services; types of contracts; project management; organization and economy management; organizational planning and time scheduling; project cost control.

UNIT-III

Engineering:Engineering and general layout of equipments; generator; transformer and switch gear and control equipment; construction methods; operation and maintenance principle; maintenance organization and planning; availability; life cycle cost and future development; visits to sites.

UNIT-IV

Power Sector:Power sector structure in different states; regulatory regime in those states; power utilities in Haryana; grid management; power financing; visit to sites.

Power Station:Management of fuel; water resource electricity deviend scenario; storage and handling; pricing; contract etc.; human resource management; visit to sites..

Suggested Books:

1. Subranmanyam,B. “Power Plant Engineering”, DhanpatRai Pub., 1995

2. Sharma P.C., “Power Plant Engineering”, DhanpatRai Pub., 1997

3. Decenzo, David A., Robbins, Stephen P. ,” Human Resource Management”, Prentice Hill of India, 2004.

4. Nag, P.K., “Power Plant Engg”. Tata McGraw Hill, 2003.

5. Gill, A.B., “Power Plant Performance Management”, British Electricity Authority, 1984.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-412N	**Embedded Systems**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT-I

Introduction:Different types of microcontrollers: Embedded microcontrollers; External memory microcontrollers; Processor Architectures: Harvard V/S Princeton; CISC V/S RISC; microcontrollers memory types; Introduction to Real Time Operating System.

UNIT-II

8051 Microcontroller Architecture:Architecture; memory considerations; Addressingmodes; clocking; i/o pins; interrupts; timers;peripherals; serial communication; Instruction set;simple operations.

UNIT-III

PIC Microcontroller Architecture:Introduction to PIC microcontrollers; Architectureand pipelining; program memory considerations;Addressing modes; CPU registers; Instruction set;simple operations.

UNIT-IV

Interrupts and I/O Ports: Interrupt logic; Timer2 scalar initialization; IntService Interrupt service routine; loop time subroutine; External interrupts and timers; synchronous serial port module; serial peripheral device; O/p port Expansion; I/p port expansion; UART.

Suggested Books:

1. Mazidi, “8051 Microcontroller”, 2nd Edition, Prentice Hall, 2005

2. Predko, “Programming and Customizing the 8051 Microcontroller”, 2nd Edition, McGraw Hill, 2002.

3. Catsoulis John, “Designing Embedded Hardware”, 2nd Edition, O’Media, 2005.

4. Barr Michael, “Programming Embedded Systems in C and C++”, Shroff Pub. and Distr., 3rd Edition, 2003.

5. Ayala A. J.**,** “The 8051 Microcontroller: Architecture, Programming, and Applications”, Pap/Dsk edition, West Publishing Company, 1991

6. Udai Shankar; “8051 Microcontrollers”, CSVTU Research Journal, Chhattisgarh Swami Vivekanand Technical University, 2010.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-410N	**Fuzzy Logic & Neutral Networks**	**4**	**1**	**25**	**75**	**100**	**3 Hr**

Paper Setter Note: 8questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections

UNIT I

Introduction to Fuzzy sets, Crisp sets, Basic concepts of Fuzzy sets, L-fuzzy sets, level 2fuzzy sets, type 2-fuzzy sets. Fuzzy sets Vs. Crisp sets. Fuzzy Arithmetic, Algebraic operations, set-theoretic operations, fuzzy relation on sets &fuzzy set compositions of Fuzzy relations, properties of the minimum-maximum composition.

UNIT II

Introduction to Fuzzy control, Fuzzy logic controller components, Construction of Fuzzy sets (Direct methods, Indirect method), Introduction to Expert system, Case study on fuzzy logic controller, Application of Fuzzy control.

UNIT III

Introduction to Neural Networks, Artificial Neuron model, Neural Network controller, Multilayer Network, Back propagation Algorithm (Forward, Backward), learning control Architecture (Indirect learning, General, Forward Inverse), Simplex matrix operation.

UNIT IV

Application of Neural Network: The traveling salesman problem, Time series prediction.

Suggested Books:

1. James A. Anderson" Introduction to Neural Networks", Prentice Hall India.
2. H.J. Zimmermann" Fuzzy set theory &its Applications ", Allied Publishers Ltd.
3. Nil Junbong" Fuzzy Neural Control Principles &Algorithm", PHI.
4. N.K. Bose" Neural Network Fundamental with Graphics ", TAT A McGraw Hill.
5. Klir George J. " Fuzzy sets and Fuzzy Logic Theory and Applications", PHI.
6. J.M Zurada , " Introduction to Artificial Neural Network" , Jaico Publishers

Code	Nomenclature of Subject	L	P	Int.	Ext.	Total	Time
EE-416N	**Power System Lab**		**2**	**40**	**60**	**100**	**3 Hr**

List of Experiment

1. To find out the dielectric strength of transformer oil.

2. To find zero sequence component of three phase line.

3. To draw the characteristics of thermal overload relay.

4. To study an IDMT over current relay to obtain and plot it's characteristic curves i.e. the graph between current and time.

5. To measure the ABCD parameters of a given transmission line.

6. To plot the power angle characteristics of given transmission lines.

7. To find the string efficiency of a string insulator with/without guard rings.

8. To study the characteristics of transmission line for tNetwork&pie- network.

9. To study and testing of a current transformer.
10. To study various types of distance relay

NOTE: At least 8 experiments are to be performed.

Code	Nomenclature of Subject	L	P	Int.	Ext.	Total	Time
EE–418N	**Computer Methods In Power System Lab**		**3**	**40**	**60**	**100**	**3 Hr**

List of Experiments:

1. Develop a program to do the following mathematical operations:
   i) Transpose of a matrix
   ii) Multiplication of two matrices
   iii) Addition & subtraction of two matrices.
2. The demand estimate is the starting point for planning the further electric power Supply. Mathematical curves of the trend. One of the simplest curve is P= Po exp

{a (t-t0)}, where a is the average per unit growth rate

P is the demand in year 't' in GW

P0 is the given demand at year T0 in GW.

Develop a table to compute the system demand from 1984 to 2005 on yearly basis.

Calculate also the average yearly demand over this period.

3. Write a program to formulate Y-Bus by non- singular transformation Y Bus = [A],T[= y] [A].
4 Develop a program to solve a set of 4 simultaneous liner equations using Gaussian Elimination method.
5. Develop a program to calculate Z bus of a given network using building algorithm. Assume that no mutual coupling is involved in between the different elements.
6. The Gauss Seidel method to find the solution of following equations

X1 + X1X2 + X3 = 10

X1 + X2 + X3 = 6

X1 X2 – X3 = 2

7. You have given with a 6 bus system. Apply load flow technique using Gauss Seidel method to solve up to two iterations.
8. Develop a program to find Eigen Values for given Matrix.
9. Develop a program to determine the bus impedance matrices for the given power system network.
10. Develop a program to determine the admittance matrices for the given power system network.

NOTE: At least 8 experiments are to be performed

KURUKSHETRA UNIVERSITY KURUKSHETRA
SCHEME OF STUDIES/EXAMINATIONS
Bachelor of Technology (Electrical & Electronics Engineering)
VII SEMESTER (w.e.f. 2018-2019)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam
			L	T	P	Hr/ Wk	Theory	Sessional	Practical	Total	(Hrs)
1	**EE-401N***	**Utilization of Electrical Energy**	3	1		4	75	25		100	3
2	EEN-403N	Electronic Instruments and Measurements	3	1		4	75	25		100	3
3	EEN-405N	Advance Programming	3	1		4	75	25		100	3
4	**	Elective - I	3	1		4	75	25		100	3
5	**	Elective - II	3	1		4	75	25		100	3
6	EEN-407N	Electronic Instruments and Measurements Lab			2	2		40	60	100	3
7	EEN-409N	Advanced Programming Lab			2	2		40	60	100	3
8	EEN-411N	Minor Project			3	3		75	75	150	3
9	EEN-413N	Industrial Training-II			2	2		100		100	3
		Grand Total	17	5	9	29	375	380	195	950	

Elective - I		**Elective - II**	
EEN-415N	HVDC Transmission	EEN-421N	Non-Conventional Energy Sources
EEN-417N	Microwave and Radar	EEN-423N	Operating System
EEN-419N	Antenna & Wave Propagation	EEN-425N	Power System Planning

Note: 1. * Subject Common with VII Semester. B.Tech. [Electrical Engg.] Scheme, K.U.K.
2. The Minor Project should be initiated by the student in the VII th semester beginning and will be evaluated in the end of the semester on the basis of a presentation and report submitted to the department.

3. **Industrial Training-II** undergone by the students after VI sem is to be evaluated during VII sem as **(EEN-413N)** through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.

VIII SEMESTER (w.e.f. 2018-2019)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks			Total	Dur. of Exam (Hr)
			L	T	P	Hr/ Wk	Theory	Sessional	Pract.		
1	EEN-402N	Modern Trends in Communication	3	1		4	75	25		100	3
2	EEN-404N	Modeling and Simulation	3	1		4	75	25		100	3
3	**EE-406N***	**Special Electrical Machines**	3	1		4	75	25		100	3
4		Elective - III**	3	1		4	75	25		100	3
5		Elective - IV**	3	1		4	75	25		100	3
6	EEN-408N***	Major Project			3	3		75	75	150	3
7	EEN-410N	Simulation Lab			2	2		40	60	100	3
8	EEN-412N	Electronic Design Lab			2	2		40	60	100	3
9	EEN-414N****	General Fitness & Professional Aptitude							100	100	
		TOTAL	15	5	7	27	375	280	295	950	

Note: 1. * Subjects Common with VIII Semester. B.Tech. [Electrical Engg.] Scheme, K.U.K.

2. ** The students should opt two departmental electives subjects from the list of core elective subjects.
3. ***The Major project should be initiated by the student in continuation of the VII semester and will be evaluated in the end of the semester on the basis of a presentation and Report.
4. **** A viva of the students will be taken by external examiner (Principal/Director/Professor/or any senior Person with Experience more than 10 years) at the end of the semester.

Elective - III		Elective - IV	
EEN-420N	Computer Architecture and Organization	EEN-426N	Digital Image Processing
EEN-422N	Radio & TV Engineering	EEN-428N	Software Engineering
EEN-424N	Advanced Microprocessor and Interfacing	EEN-430N	Fuzzy logic & Neural Networks

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-401N	**Utilization of Electrical Energy**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Illumination: Term used in illumination, Law's of illumination, sources of light, arc lamp incandescent lamp, discharge lamp, sodium vapor, mercury vapor lamp, florescent tubes, lightening schemes, method of lightning calculation.

UNIT II

Electrical Heating: Advantages of Electrical Heating, various types of Electrical heating, Power frequency and High frequency heating, Degree of heating element, Equivalent circuit of arc furnace, Resistance heating, Arc heating, Induction heating, dielectric heating etc.

Electric Welding: All types of electrical welding, resistance welding, arc welding, electrical winding equipment, Comparison between AC & DC welding, types of electrodes, advantages of coated electrodes.

UNIT III

Electroplating: Basic principle, faraday's law of electrostatics, terms used, Application of electrolysis, factors governing electro deposition, power supply.

Refrigeration & Air Conditioning: Basic principle, various compression cycle & system its application, electric circuit of refrigerator, air conditioner.

UNIT IV

Traction Motors: Different system of electric traction, comparison between AC & DC system, block diagram of traction system ,Starting-Speed control and braking- Speed control and braking –Speed time curves,-Mechanics of Train movement-Tractive effort for acceleration – Power and energy output from driving axles-Specific energy output and consumption-Train resistance.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Dr.S.L.Uppal, Electrical Power, Khanna Publishers, New Delhi
2. M.L.Soni,P.V.Gupta,U.S.Bhatnagar,A.Chakrabarti,"A TextBook On Power System Engineering", Dhanpat Rai & Co,New Delhi
3. H.Pratap, Art and Science of Utilization of Electric Energy, Dhanpat Rai & Sons, New Delhi
4. G.C.Garg, Utilization of Electric Power and Electric Traction, Khanna publishers, New Delhi

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-403N	**Electronic Instruments and Measurements**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

C.R.O.: Introduction, Cathode Ray Tube (CRT), Electron Gun, Electrostatic Focusing, Electrostatic Deflection, Post Deflection Acceleration of Electron Beam, Effect of Beam Transit Time, Frequency limitation. Deflection plates, Screens of CRT's Graticule Aquadog, Applications, Storage C.R.O. Digital CRO. Design of delay lines for CRO.

Amplifier Measurement: Amplifier Measurements, Transient response of Amplifiers, Measurements of Noise figure of Amplifier, Harmonic Distortions analyzer, Distortion Meter, Measurement of op- amp parameters.

UNIT II

Digital Instruments: Digital Indicating instruments, comparison with analog type digital display methods, theory and applications of digital voltmeters. Transistor, FET and other type of voltmeters. Electronic Galvanometers, Q-meter.

Frequency Measurements: - Measurements of frequency use cavity wave-meter. Heterodyne frequency meter, comparison of frequency using interpolation method. Digital frequency meter. Frequency measurements using digital means.

UNIT III

Signal Conditioning & Acquisition System: Signal conditioning, A/D converter, D/A Converter, Use of op-amp in signal conditioning, Components of analog data acquisition System. Components of digital data acquisition system, signal conditioning, multiplex special Encoders, Principles of Telemetry, Wire link channels, Ratio channels, and Microwaves Channels.

UNIT IV

Instruments For Signals Generation: Pulse and square wave circuits, Laboratory square wave and pulse generators, Function generators, Random noise generators, Frequency Synthesizer.

Bio-Medical Instruments:- ECG, EEG, EMG & Measurement of BP.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit..

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References:

1. A course in Electrical & Electronics Measurement & Instrumentation: By A.K. Sawhney.
2. Electronics Instruments & Measurements techniques: By Helffrick & Cooper (PHI)
3. Instrumentation devices & Systems: By C.S. Rangan, G.R. Sharma & V.S. Mani.
4. Bio- medical Instrumentation & measurements: By Leslie Cromwell, Fred. J. Weibell, Erich A. Pfeitter (PHI).

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-405N	**Advance Programming**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Review of Elementary Data Structures: arrays, stacks, queues, link list with respect to storage representation and access methods.

UNIT II

Searching Methods: Sequential, binary, Indexes searches**.**

UNIT III

Sorting: internal and external sorting, Methods: bubble, insertion, selection, merge, heap, radix and quick sort. Comparison with respect to their efficiency.

UNIT IV

C++ Programming Language: Concept of object oriented programming, Abstract Data type C classes, Data encapsulation, inheritance, polymorphism, virtual function templates implementation using C++.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Trembley and Sorenson, "An Introduction of data structures with application" McGraw Hill.
2. Goodman, S.E., and Hetedniemi, S.T, "Introduction to the design and Analysis" , McGraw Hill.
3. Herbert Schildt, "C++ Computer reference", TMH.
4. Herowitz E and Sahni S. "Fundamentals of Data Structures".

Code	Nomenclature of Subject	P	Int	Ext.	Total	Time
EEN-407N	**Electronic Instruments and Measurements Lab**	**2**	**40**	**60**	**100**	**3Hr**

List of Experiments:

1. To measure the unknown Inductance in terms of capacitance and resistance by using Maxwell's Inductance bridge.
2. To measure unknown Inductance using Hay's bridge.
3. To measure unknown capacitance of small capacitors by using Schering's bridge.
4. To measure 3-phase power with 2-Wattmeter method for balanced and unbalanced bridge.
5. To measure unknown capacitance using De-Sauty's bridge.
6. To measure unknown frequency using Wein's frequency bridge.
7. To measure unknown low resistance by Kelvin's Double bridge.
8. To test the soil resistance using Meggar (Ohm meter).
9. To calibrate Energy meter using standard Energy meter.
10. To plot the B-H curve of different magnetic materials.
11. To calibrate the Voltmeter using Crompton Potentiometer.
12. To convert the Voltmeter into Ammeter using Potentiometer.
13. Insulation testing of cables using Digital Insulation Tester.

NOTE: At least 9 experiments are to be performed with 8 from above list, remaining may either be performed or designed & set by concerned institution as per the scope.

Code	Nomenclature of Subject	P	Int	Ext.	Total	Time
EEN-409N	**Advance programming lab**	**2**	**40**	**60**	**100**	**3Hr**

List of Experiments:

Write a program to perform following operations on linked list.

1. Insertion of a node
2. Deletion of node.
3. WAP to implement stack.
4. WAP to implement queues.
5. WAP to sort a list using following.
6. Insertion sort and. Quick sort
7. Bubble sort and Merge sort
8. Selection Sort and Radix sort
9. WAP to find roots of quadratic equation using polymorphism.
10. WAP to find addition & multiplication of two matrices using classes.
11. WAP which shows the use of inheritance.
12. WAP to implement the concept of copy constructor & destructor.

NOTE: At least 9 experiments are to be performed with 8 from above list, remaining may either be performed or designed & set by concerned institution as per the scope.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-402N	**Modern Trends in Communication**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Digital Communication: Introduction to sampling theorem for band limited & band pass signals, bit rate, detection levels, Digital filtering, Pulse code modulation, Adaptive data modulation, coding, Coding efficiency, introduction to used codes. Error detection & corrections codes, ASK,FSK, PSK,DPSK,QPSK.

UNIT II

Satellite Communication: Introduction, Satellite orbits, frequency used, station keeping, orientation of satellite, transmission paths & its losses & noise consideration. Satellite systems flux density, effective isotropic radiated power, link budget calculations, multiple accessing techniques.

UNIT III

Fiber Optic Communication: Introduction, advantages & disadvantages, principle of light transmission in a fiber, types of optical fibers, effect of index profile on propagation, modes of propagation. Number of modes via fiber, single mode propagation, Rayleigh scattering losses, absorption losses, mode coupling losses, bending losses, combined losses, effect of dispersion on pulse transmission, inter model dispersion, material dispersion, wave guide dispersion, total dispersion.

UNIT IV

Optical Communication: LEDs, semiconductor laser diode, the PN photodiode, PIN diode. The avalanche photo diode, fiber optic communication system block diagram & loss budget, connectors & Splices.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Dennis Roddy & John Collen: Electronics Communication.(PHI)
2. John Gowar: Optical communication system (PHI)
3. D. C. Aggarwal : Satellite Communication

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-404N	**Modelling and Simulation**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT 1

Introduction: Systems, Models and simulation, concept of model, model classification and mathematical representation, Identification, continuous and discrete, static and dynamic, deterministic and stochastic systems.

UNIT 2

Discrete event systems: Introduction, statistical model in simulation, random number generation, method of generating random variables, discrete random variates, generating correlated random numbers.
Queuing models: Characteristics, queuing notation, single server and multiple server systems.

UNIT 3

Simulation: State space simulation techniques, Digital simulation languages, Analog simulation of linear systems, magnitude scaling, time scaling, simulation equations, transfer function simulator, hybrid simulation. Load flow, short circuit and steady state stability studies. Transmission parameters.

UNIT 4

Matlab: Matlab environment, programming, modeling, with matrices, simulation in Matlab, introduction to dynamic system simulation using SIMULINK, applications of simulink.
Note: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Banks J. Carson J.S and Nelson B: Discrete Event system simulation, PHI.
2. Celler F.E. Continuous system simulation, Springer verilag.
3. Athanasios Papoulis: Probability Random variables and Statistics Processes, Mc-Graw Hill.
4. Reference manual & user's guide on Matlab.
5. Analog computation & simulation (V Raja Raman)
6. System simulation with digital computer (D E O)
7. System simulation (Jorden).
8. System modeling & Computer Simulation by Nain A. Kheir. Marcel Dekker Inc.
9. Discrete Event System Simulation, PHI Banks J. Carson J. S. and Nelson B.
10. Advanced Computer methods for power system Analysis- Stagg and Elabiad.
11. Advanced power System L.P.Singh(New Age Publication.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EE-406N*	**Special Electrical Machines**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Different types of FHP motors and uses in domestic & industrial applications, Single phase Induction motor, Qualitative examination starting and running performance of I-Phase Induction Motors.

UNIT II

Linear Induction Motors and Actuators and its principle of operation, Linear Levitated machine & applications, Permanent magnet motors, High performance energy efficient machines, Effect of E.M.F injected into secondary circuits , quantitative study, discharge motor.

UNIT III

Special Induction generations, Special motors and generators associated with Wind, Solar, Tidal, Biogas and other unconventional energy forms and their applications.

UNIT IV

Synchronous motors, Series universal motors, Stepper motor, Permanent magnet D.C. motor, Permanent magnet AC motors, Switch reluctance motors. Servo motor, shaded pole motor, brush less D.C motor, Typical applications in Computers, Electronics, Communications and Information Technologies.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Generalized Electrical Machines by P. S. Bhimbra
2. Generations of Electrical Energy by A. E. Fitzgerald/Charles, Kingsley J. R.
3. The Performance &design of A.C Commutator Motor by O.E .Taylor
4. Performance & Design of A.C machines by M.G. Say.

Code	Nomenclature of Subject	P	Int	Ext.	Total	Time
EEN-410N	**Simulation Lab**	**2**	**40**	**60**	**100**	**3Hr**

Perform the experiments using C/C++/Matlab Language

List of Experiments:

To develop a Program for Matrix n*n.

1. Add two Matrixes.
2. Multiplication of two Matrixes.
3. Find Inverse of Matrix.
4. Check stability by Routh Hurwitz Criteria.
5. Check stability by Jury Test.
6. Draw a circle for given radius use graphics.
7. Draw a straight-line use graphics.
8. Find Eigen value for given Matrix.
9. To develop a program for Cramer's Rule
10. To develop a program for Tower of Hanoi.

NOTE: At least 7 experiments are to be performed with 6 from above list, remaining may either be performed or designed & set by concerned institution as per the scope.

Code	Nomenclature of Subject	P	Int	Ext.	Total	Time
EEN-412N	**Electronic Design Lab**	**2**	**40**	**60**	**100**	**3Hr**

List of Experiments:

1. Design a single stage R C Coupled amplifier and plot its gain frequency response.
2. Design a two stage R C Coupled amplifier and plot its gain frequency response.
3. Design a R C Phase shift oscillator using IC 741.
4. Design a Wein bridge oscillator.
5. Design a square wave generator using IC 555.
6. Design a 4: 1 multiplexer and 1: 4 Demultiplexer using logic gates.
7. Design a parallel parity bit generator using ICs.
8. Design a digital to analog converter using ICs.
9. Design a digital frequency meter (0-999HZ) using IC 555 for Monoshot, IC-7404,7408,7490,7447.
10. Design a controller such that LEDs glow in pairs sequentially using IC 7490 and LEDs.

NOTE: At least 10 experiments are to be performed with at least 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope of the syllabus.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-415N	**HVDC Transmission**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Merits and Demerits of HVDC over EHVAC, type of HVDC links, Analysis Of 3- phase bridge converter with grid control for U 60 and U 60, derivation of equivalent circuit of HVDC link.

UNIT II

Basic means of control of HVDC link, C.C.A., C.C. and C.E.A, Control Characteristics of a converter, Harmonics in HVDC Operation, types of filters used for harmonic elimination, characteristics harmonics, characteristic AC current harmonics, Non characteristics AC harmonics, harmful effects.

UNIT III

Protection aspects of a HVDC link, types of faults, over current protection, over voltage protection, ground and short circuit fault & their protection.

UNIT IV

Parallel operation of A.C. and D.C. Systems. Corona & R.I characteristics of HVDC link.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. K.P. Padyar, "HVDC Power Transmission Systems", Wiley Eastern Ltd.
2. E.W. Kimbark, "Direct Current Transmission", Vol.I, Wiley Intersect
3. J. Arrillage, "High Voltage Direct Current Transmission", Peter Peregrines
4. S. Rao," EHV-AC and HVDC transmission Engineering Practice", Khanna publishers

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-417N	**Microwave and Radar**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Introduction to microwaves and tubes, Microwave Devices: Advantage of Microwaves, limitation of conventional tubes, Light house tube, Multicavity & Reflex klystron, Magnetron

UNIT II

Tunnel diode, Gunn diode, Parametric amplifier, Masers, TWT, IMPATT, TRAPTT, Microwave solid state devices.

UNIT III

Microwave Circuits: Scattering matrix, impedance transformation & Matching, passive Microwave devices (E-plane &H-plane Tee, Magic Tee, Circulator, Attenuator, isolators, directional coupler, TE, TM & TEM modes in Rectangular wave guides, resonators, phase shifter).

UNIT IV

Radar Engg.: Introduction, Radar range equation, parameters affecting the range, Doppler effect, CW and pulse Doppler Radar, MTI delay lines and canceller, range gate pulse, MTI & Doppler radar, non coherent MTI. Noise and clutter, Radar displays, Radar signal processing, applications of radar, radio aids to navigation.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Liao S.Y.: Microwave Circuit & Devices, PHI.
2. Skolnik M. K.: Introduction to Radar system, McGraw Hill.
3. Siegman A.E. : An introduction to lasers & Masers, McGraw Hill.
4. M. Kulkarni: Microwave & Radar Engineering, Umesh Publication.
5. Gautam A. K. : Microwave Engineering , S.K. Kataria & Sons.

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Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-419N	**Antenna & Wave Propagation**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Basic Principle: Scalar & vector potential for electric & magnetic components, Retardation, retarded vector potential relation between scalar & vector potential current element.

Basic Antennas: Half wave dipole, quarter wave mono pole, short dipole, calculation of radiation resistance, effective length & pointing vector. Current distribution: Linear current & sinusoidal distribution.

UNIT II

Antenna Parameter: Solid angle, radiation intensity, directive gain directivity, power gain, beam width: HPBW, FNBW, band width, Q factor resonance in antenna, antenna as a transmission line, antenna as active component, antenna temp. Radiation pattern, Eplane H plane, efficiency. Effective aperture, scattering aperture, loss aperture, directivity, polarization. Transmission between two Antenna, Reciprocity theorem application of Reciprocity theorem.

Low Freq Antennas: Monopole, folded, loop antenna, biconical antenna, yagi-uda antenna: different antenna used for A.M & FM transmission. VHF & LHF antennas, Resonant Antennas & non-resonant antenna, design parameter of different Antenna.

UNIT III

Microwave Antenna: Parabolic Antenna, Lens Antenna, horn Antenna, Antenna used for tracking & antenna used for satellite communication. E-plane horn, H-Plane horn circulars Horn, pyramidal Horn.

Radio Wave Propagation: Different technique for radio wave propagation: Ground wave propagation, space wave, sky wave, duct propagation, troposcatter.

UNIT IV

Ionosphere propagation: Skip distance, LUF, MUF, Critical freq, Variation of refractive index with height, effect of earth magnetize field on ionospheres propagation, calculation of refractive index dielectric constant & Conductivity for ionospheres. Ionospheres abnormalities.

Antenna Array: Multiplication of Pattern, Significance of Antenna Array, Broadside, and End fired, Uniform, and Parasitic feed in Antenna Array, Calculation of Directivity & B.W for Antenna array. Increased directed directive end fired array. Tapering of Array: Binomial Array, chebyshev array

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Jordan Balmian:- Electromagnetic Field Theory (PHI)
2. Kraus Antenna & Wave propagation (Mc Graw Hill)
3. Antenna & Wave propagation by K.D.Prasad (Satya Prakashan)
4. Collin R.E :- Antenna & Wave Propagation (TMH).

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-421N	**Non-Conventional Energy Sources**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

Unit I

Introduction: Energy demand of world and country and gap analysis, Fossil fuel based systems, Impact of fossil fuel based systems, Non conventional energy – seasonal variations and availability, Renewable energy – sources and features, Hybrid energy systems. Distributed energy systems and dispersed generation (DG).

Unit II

Solar thermal systems: Solar radiation spectrum, Radiation measurement, Technologies, Applications, Heating, Cooling, Drying, Distillation, Power generation; Costing: Life cycle costing (LCC), Solar thermal system.

Solar Photovoltaic systems ,Operating principle, Photovoltaic cell concepts ,Cell, module, array, Series and parallel connections, Maximum power point tracking, Applications ,Battery charging, Pumping , Lighting,Peltier cooling , Costing: Life cycle costing ,Solar PV system

Unit III

Microhydel: Operating principle, Components of a microhydel power plant, Types and characteristics of turbines, Selection and modification, Load balancing, Costing: Life cycle costing -Microhydel

Wind; Wind patterns and wind data, Site selection, Types of wind mills, Characteristics of wind generators, Load matching, Life cycle costing - Wind system LCC

Unit IV

Biomass: Learning objectives, Operating principle, Combustion and fermentation, Anaerobic digester, Wood gassifier, Pyrolysis, Applications, Bio gas, Wood stoves, Bio diesel, Combustion engine, Life cycle costing - Biomass system LCC

Hybrid Systems, Need for Hybrid Systems, Range and type of Hybrid systems, Case studies of Diesel-PV, Wind-PV, Microhydel-PV, Biomass-Diesel systems, electric and hybrid electric vehicles

References:

1. Ashok V Desai, Non-Conventional Energy, Wiley Eastern Ltd, New Delhi
2. Mittal K M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, New Delhi
3. Ramesh R & Kumar K U, Renewable Energy Technologies, Narosa Publishing House, New Delhi
4. Wakil MM, Power Plant Technology, Mc Graw Hill Book Co, New Delhi

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-423N	**Operating System**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Introduction: Operating System Services-types.

File Systems: File concept, File support, Access methods, Allocation methods, Directory Systems, File protection.

CPU Scheduling: Review of multiprogramming concepts, scheduling concepts, Scheduling algorithms, Algorithm evaluation, multiple processor scheduling.

UNIT II

Memory Management: Bare machine concept, Resident monitor, Swapping-Multiple partitions, Paging, Segmentation, Combined systems, Virtual memory, Demand paging, Page replacement algorithms, Thrashing, Cache memory.

UNIT III

I/O Management And Disk Scheduling: Organization of I/O function, Logical structure and I/O buffering, Memory physical characteristics, First come first served scheduling,

Protection: Goals of protection, Mechanisms and policies, Domain of protection, Access matrix, Dynamic protection structure, Language based protection, Protection problems, Security. Round robin, Shortest seek time first scheduling, SCAN, CSCAN, LOOK, CLOOK, Selecting a disk scheduling algorithm, Sector queuing.

UNIT IV

Concurrency: Principle of concurrency, Mutual exclusion, Software support, Dekker's algorithm, Hardware support, Operating system support, Semaphore Implementation, Messages, Deadlock presentation , Deadlock detection, Deadlock avoidance, recovery.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. James L. Peterson and Abraham Silbersachatz, Operating System Concepts, Addison Wesley, World Students Series Edition, Second edition
2. Harvey M. Deitel, An Introduction to Operating Systems, Addison Wesley Publishing Company, Revised First edition
3. John J. Donovan, Systems Programming, McGraw Hill Book Co., International Student Edition

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-425N	**Power System Planning**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Load Forecasting: Introduction, Classification of loads, methods of load forecasting.
Scope of power system planning and design significance: Computer programming for planning, generation, transmission, Investment growth, generation cost.

UNIT II

Reliability of Transmission and Distribution System: Definition of reliability, bath tub Curve, Two state model, failure and repair rate, Probability density function, probabilities of survival and failure, mean time to failure, Mean down time, continuous Markov's process, reliability of series and parallel system, Approximate method, reliability planning, and perception of reliability models.

UNIT III

Reliability Schemes in Power System: Introduction, Marine power plant, Nuclear , Power plant, General Complex systems, Failure modes and effect analysis, Fault free Analysis of power systems.

UNIT IV

Operation and Control of Interconnected Power systems(AGC and SCADA): Main tasks planning , operation , accounting , Tasks of national control center, Regional control center, Generating station control room, Tasks of major substations, AGC- SCADA, Normal state - Restoration, system security, factors affecting security, load flow, state estimation.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Switch gear protection and power system by SUNIL S. RAO.
2. Power System Analysis and stability by S.S. Vadhera.
3. Power System Design and Analysis by B.R. Gupta
4. System Engg. & Reliability by L. S. Srinath

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-420N	**Computer Architecture and Organization**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Evolution of computers: Generation of computer system, different types of computers, characteristics of Von Neumann architecture, Limitation of computer systems, Parallel computer structures.

Instruction formats, addressing modes and instruction types: Principles of linear pipelining, Classifications of pipeline processor, Interleaved memory organizations, Instructions and arithmetic pipelines, Design examples, vector processing requirements, characteristics of vector processing.

UNIT II

Multiprocessor: Architecture, Functional structure, Loosely coupled multiprocessors, Tightly coupled multi processor, Processor characteristics for multiprocessing, Inter- connection networks, Time shared, crossbar switch and multiport memories and multistage networks for multiprocessors, classification of multiprocessor operating system.

UNIT III

AL Unit: Construction, Integer representation, Binary half adder, full adder, Parallel Binary adder, Addition and subtraction in a parallel arithmetic element, Full adder design, BCD adder, Positive and negative BCD number, Shift operations, Basic operations, Logic operations, Multiplexer, High Speed arithmetic.

Control Unit: Construction of an instruction work, Instruction cycle and execution cycle, organization of control registers, Instruction formats, Controlling arithmetic operations, Typical Sequence of operations, Instruction set, Register transfer language, Microprogramming- Micro instruction format, Simple micro program, Microprogramming applications.

UNIT IV

Memory: Basic concepts, memory device characteristics, semiconductor memories, static and dynamic memories. Random access and serial access memories. Memory hierarchies- cache, virtual, interleaved and associative memories.

I/O Devices: Input media, Keyboards, Mouse, Pointing Devices, character recognition (MICR & OCR), Output devices, CRT, Flat panel display, Printers, Tele printer (TTY).

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References:

1. Hay, " Computer Architecture And Organizations" TMH
2. Stalling , "Computer Organization" PHI
3. Tannanbaum, "Structured Computer Organization" TMH

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-422N	**Radio & TV Engineering**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Radio Transmitter: Modulation, AM Transmitter, FM Transmitter; AFC,Sensitivity selectivity, VODAS, Radio Transmitter, Telephone transmitter Privacy device, Radio telegraph transmitter.

UNIT II

Radio receiver: TRF, super-heterodyne, communication receiver, double conversion receiver, SSB Rx, freq synthesis, image freq, selectivity. IF freq tracking AFC & AGC n Rx, FM demodulator, neutralization, freq drift & scintillation, Diversity reception, fading, Armstrong FM Rx.

UNIT III

Monochrome T.V: Introduction, composite video signal picture tube, camera tube image orthicon, vidicon, plumbicon TV Tx & Rx, modulation technique, TV Application CATV, CCTV, Video games Theater T.V., VTR, AGC, Various AGC system

UNIT IV

Color T.V.: Compatibility, three color theory different color picture tube, color signal transmission, NTSC, Color TV, PAL, SECAM

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all selecting at least one question from each unit.

References:

1. Monochrome & color T.V. by R.R.Gulati (Wiley Eastern Ltd.)
2. Radio Engineering by G.K. Mithal (Khanna Publications)
3. A.M Dhaka, " Monochrome & color T.V" (TMH)
4. Skolnik.M.I," Introduction to Radar System" (TMH)

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-424N	**Advanced Microprocessor and Interfacing**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

8086 Microprocessor: 8086 Internal Architecture timing diagram, interfacing 8086 to memory.

UNIT II

8086 Assembly Language Programs: 8086 instruction set, Assembler directive, program development method, writing simple 8086 programs for use with an assembler.

UNIT III

8086 Interrupts: 8086 Interrupts and Interrupt responses, hardware interrupt application.
Interfacing: Digital interfacing, Programming parallel port and handshake I/O, Interfacing a Microprocessor to keyboards & displays, Analog interfacing, introducing to A/D and D/A Converter & applications.

UNIT IV

Introduction to 80286, 80386, 80486 microprocessor and Single chip microcontrollers.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. V. Hall " Microprocessor & Interfacing Programming & Hardware-IInd Edition", TATA Mc Graw Hill.
2. A.P. Mathur ", Introduction Microprocessor–IIIrd Edition", (TMH)
3. Tabak. D," Advanced Microprocessor- Duglas 2nd edition," (TMH)

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-426N	**Digital Image Processing**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Digital Image Fundamentals: Introduction, image model, sampling and Quantization, relationship between pixels, imaging geometry, photographic film, discrete, Fourier transform, properties of two dimensional Fourier transform, fast Fourier transform.

UNIT II

Image Enhancement and Compression: Enhancement by point processing, spatial filtering and enhancement in the frequency domain, pseudo color image processing, image compression models, error free compression, image compression standards.

UNIT III

Image Restorations: Degradation, models, diagonalizations of matrices, inverse filtering, interactive restorations, geometric transformations.

Image Segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region orienting segmentation.

UNIT IV

Representations and Recognition: Representations schemes, boundary descriptors, regional descriptors, morphology, recognition and interpretation, basics.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References

1. Rafael c. Gonzalez and Richard E. Woods, digital image processing, Addison Wesley publishing company
2. William K. Pratt, digital image processing, John Wiley and sons
3. Jain, Fundamentals of digital image processing, PHI
4. Barrie W. Jervis , “digital signal processing (Pearson education India)
5. Prokis, “ digital signal processing” (PHI)

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-428N	**Software Engineering**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT- I

Introduction: Programs vs. Software products, Emergence of Software Engineering, Notable Changes in Software Development Practices, Software Life Cycle Models.

Software Project Management: Project Planning, Project Size Estimation Matrices, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO- A heuristic Estimation Technique, Halstead's software Science- An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team structures, Staffing, Risk Management, Software Configuration Management.

UNIT- II

Requirements Analysis and Specification: Requirements Analysis, Software Requirements Specification (SRS), Formal System Development Techniques, Algebraic Specifications, Software Design: Good Software Design/Practices, Cohesion and Coupling, Neat Hierarchy, Software Design Approaches.

Function-Oriented Software Design: Overview of the SA/DK Methodology, Structured Analysis, Data Flow Diagrams (DFDs), Extending the DFD Technique to Real Time Systems, Structured Design.

UNIT- III

Object Oriented Software Design: Overview of Object-Oriented Concepts, Object- Oriented vs. Function –Oriented Design, Graphical Representation of Object- Oriented Design, Object-Oriented Design Methodology.

User Interface Design: Characteristics of a Good User Interface Design, Basic Concepts, Command Language –Based Interface, Menu-Based Interface, Director Manipulation Interfaces, Windowing Systems, Types of Widgets, An overview of X Window/MOTIF, Visual C++.

UNIT-IV

Software Reliability and Quality Assurance: Software Reliability, Software Quality, Software, Software Quality Management, ISO 9000, SEI Capability Maturity Model. Computer Aided Software Engineering: CASE and its Scope, CASE Support in Software Architecture of a CASE Environment.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Rajib Mall, " Fundamentals of Software Engineering", PHI
2. RogerS.Pressman ,"Software Engineering A Practitioner's Approach, McGraw-Hill.
3. Ali Behforooz and Frederich J. Hudson, " Software Engineering Fundamentals", Oxford University Press.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
EEN-430N	**Fuzzy Logic & Neural Networks**	**3**	**1**	**25**	**75**	**100**	**3 Hr**

UNIT I

Introduction to Fuzzy sets, Crisp sets, Basic concepts of Fuzzy sets, L-fuzzy sets, level 2-fuzzy sets, type 2-fuzzy sets. Fuzzy sets Vs. Crisp sets. Fuzzy Arithmetic, Algebraic operations, set-theoretic operations, fuzzy relation on sets & fuzzy set compositions of Fuzzy relations, properties of the minimum-maximum composition.

UNIT II

Introduction to Fuzzy control, Fuzzy logic controller components, Construction of Fuzzy sets(Direct methods, Indirect method), Introduction to Expert system, Case study on fuzzy logic controller, Application of Fuzzy control.

UNIT III

Introduction to Neural Networks, Artificial Neuron model, Neural Network controller, Multilayer Network, Back propagation Algorithm (Forward, Backward), learning control Architecture (Indirect learning, General, Forward Inverse), Simplex matrix operation.

UNIT IV

Network Application of Neural: The traveling salesman problem, Time series prediction.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. James A. Anderson “Introduction to Neural Networks”, Prentice Hall India.
2. H.J. Zimmermann “Fuzzy set theory & its Applications “, Allied Publishers Ltd.
3. Nil Junbong “Fuzzy Neural Control Principles & Algorithm”, PHI.
4. N.K. Bose “Neural Network Fundamental with Graphics “, TATA McGraw Hill.
5. Klir George J. “Fuzzy sets and Fuzzy Logic Theory and Applications”, PHI.
6. J.M Zurada , “ Introduction to Artificial Neural Network” , Jaico Publishers

7th Semester BACHELOR OF TECHNOLOGY (TEXTILE TECHNOLOGY) w.e.f. 2018-19										
		Teaching Schedule (hrs)				Examination Schedule (Marks)				
S. No.	Subject Code and Name	L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce	Total Marks	Duration of Exam (hrs)
1	TT- 401N: Technical Textiles I	4	1	---	5	25	75	---	100	3
2	TT- 403N: Fundamentals of Management	4	1	---	5	25	75	---	100	3
3	TT- 405N: Advanced Chemical Processing	4	1	---	5	25	75	---	100	3
4	Elective I	3	1	---	4	25	75	---	100	3
5	Elective II	3	1	---	4	25	75	---	100	3
6	TT- 407N: Advanced Chemical Processing Lab	---	---	3	3	40	---	60	100	3
7	TT- 409N: Project I	---	---	6	6	100	---	100	200	3
8	TT- 411N: Seminar	---	---	3	3	100	---	---	100	3
9	TT- 413N: Summer Training Report	---	---	---	---	100	---	---	100	3
Total		**18**	**5**	**12**	**35**	**465**	**375**	**160**	**1000**	

Elective I										
		Teaching Schedule (hrs)				Examination Schedule (Marks)				
S. No.	Subject Code and Name	L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce	Total Marks	Duration of Exam (hrs)
1	TT-415N: Process Control in Spinning	3	1	---	4	25	75	---	100	3
2	TT- 417N: Process Control in Chemical Processing	3	1	---	4	25	75	---	100	3

Elective II										
		Teaching Schedule (hrs)				Examination Schedule (Marks)				
S. No.	Subject Code and Name	L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce	Total Marks	Duration of Exam (hrs)
1	TT- 419N: Process Control in Garment	3	1	---	4	25	75	---	100	3
2	TT- 421N: Process Control in Weaving	3	1	---	4	25	75	---	100	3

TT-401N
TECHNICAL TEXTILES - I

L	T	P	
4	1	-	Sessional: 25 Marks Exam: 75 Marks Total: 100 Marks Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Introduction, definition and growth of technical textiles, Classification of Technical Textiles.Brief idea about technical fibres.Role of yarn construction, fabric construction and composite materials.

Unit II:

Filtration:
Textile and other filter media for dry and wet filtration. Filtration parameters.Theory of dust collection and solid liquid separation.Filtration requirements.Role of fibre, fabric construction and finishing treatments.Concept of pore size and particle size.Mathematical models. Nano filters.

Unit III:

Geotextiles:
Types of geosynthetic and their uses.Functions and application areas of Geotextiles.Essential properties.Fibre and fabric selection criteria for geotextile applications.Mechanics of reinforcement, filtration and drainage by Geotextiles.
Natural fibre Geotextiles.
Methods of long term prediction of geotextile life and survivability in soil.Geotextile testing.

Unit IV:

Textiles in Transportation:
Introduction to automotive textile.Application of textiles in automobiles.Fibre requirements. Textile in passenger cars – tyres, airbags, seat belts, hoses and filters. Textiles in other road vehicles.Railway application.Application in aircraft and marine.
Textile as structural elements in transport vehicles
Reference.

1. " Handbook of Technical Textiles", Ed. A R Horrcks and S C Anand, Woodhead Publication Ltd, Cambridge, 2000
2. " Handbook of Industrial Textiles", Ed. SabitAdanur, Technomic Publishing Co. INC

TT – 403N
FUNDAMENTALS OF MANAGEMENT

L T P
41 -

Sessional :25 Marks
Exam : 75 Marks
Total : 100 Marks
Time : 3 hours

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT-I Financial Management

Introduction of Financial Management, Objectives of Financial Decisions, Status and duties of Financial Executives. Financial Planning – Tools of financial planning. Management of working capital, Factors affecting requirements of working capital. Capital structure decisions. Features of appropriate capital structure.Sources of finance.

UNIT-II Personnel Management

Personnel Management – Meaning, Nature and Importance; Functions of Personnel Management – (a) Managerial Functions and (b) Operative functions. Job Analysis: Meaning and Importance; Process of Job Analysis; Job Description and Job specification. Human Resource Development- Meaning and concept.

UNIT-III Production Management

Production Management : Definition and Objectives
Plant location: Ideal plant location. Factors affecting plant location.
Plant Layout : Ideal plant layout, factors affecting plant layout.
Work Measurement : Meaning, Objectives and Essentials of work measurement.
Production Control : Meaning and importance of production control and steps involved in production control.

UNIT-IV Marketing Management

Modern Nature, scope and importance of marketing management.Marketing concepts.Role of marketing in economic development.Marketing Mix.Marketing Information System.Meaning, nature and scope of International Marketing.

NOTE : The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidateshall have to attempt five questions in all, selecting at least one question from each unit.

Books Recommended

Text Books

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata McGraw Hill)

Reference Books

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and CyriloDonell (Mc.Graw Hill).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner &R.Edward Freeman, PHI.
6. Marketing Management- Philip Kotler, PHI

TT-405N
ADVANCEDCHEMICAL PROCESSING

L	T	P
4	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Continuous open width processing, use of eco-friendly enzymes in wet processing.
Continuous dyeing, Super critical CO_2 dyeing.New direct, reactive and disperse dyes.
Grading and methods to determine fastness relating to washing, light, perspiration, sublimation and hot pressing treatment.

Unit II:

Novel printing techniques like Ink Jet printing or digital printing.
Zero formaldehyde easy-care finishes, polysiloxanes based softener. Breathable water-proof fabrics. Antimicrobial finishing of textiles. Low wet pick up techniques.

Unit III:

Source of natural light, sources of artificial light, CIE illuminants, absorption and scattering of light.Beer-Lambert law, Additive and subtractive mixing.Standard observer color matching function, Tristimulus values, Chromtaicity coordinates, Kubelka-Munk equation.Metamerism.

Unit IV:

Spectophotometric curves and their relationship to perceived colors.Principle of spectrophotometer.Colorimeter, Munsell system of color specification.Relationship of hue, value and chroma.Whiteness and yellowness indices.
Computer aided color matching and recipe prediction

Reference:

1. “Colourage” Journal
2. “Asian Dyers” Journal
3. “Asian Textile Journal” Journal
4. “Man-made Textiles in India” Journal
5. Shah and Gandhi, “Instrumental Color”, Mahajan Book Distributors.
6. Shore J. “Computer Aided Colour Matching”, SDC U.K 1998 ISBN.
7. AATCC Technical Manual

TT- 407N

ADVANCED CHEMICAL PROCESSING LAB

L	T	P
-	-	3

Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

List of Experiment:

1. Identification of dye on a dyed cotton sample
2. Determination of wash fastness of a dyed sample
3. Determination of Crock fastness of a dyed sample
4. Calibration of a UV-visible transmittance based spectrophotometer
5. Assessment color strength (K/S) of dyed sample
6. Relation between color strength (K/S) and dye uptake
7. Assessment of color difference between samples
8. Determination Lab values and construction of hue and shades based on that.

TT – 415N

PROCESS CONTROL IN SPINNING

L	T	P	Sessional: 25 Marks
3	1	-	Exam: 75 Marks
			Total: 100 Marks
			Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Importance of process control.Control of mixing quality and cost using Linear Programming.Bale management.Bale management: The concept, Instrumental evaluation of cotton, The final goal-bale management, the control, Step by step implementation of bale management.Control of cotton contamination.Control of cleaning efficiency and waste in blow room and card.Control of waste in comber.

Unit II:

Yarn Irregularity: Concept, Measurement, and Interpretation, Types of Irregularity, Causes of yarn irregularity, Index of Irregularity, Application.

Variance length curves: Fundamental considerations of the variance-length curve, Interpretation of V(l) and B(l) curves, Important characteristics of variance-length curve, Short term and Long term unevenness, Stacked variance length curve.

The spectrogram: Comparison of the diagram and spectrogram, Spectrogram Harmonics, causes of periodic defects, effect of doubling on periodic variation, Control of periodic mass variations.

Drafting wave: Definition, Causes of formation, Quasi-periodic irregularity, causes of drafting waves, Amplitude of drafting wave, Yarn irregularity due to drafting waves.

Yarn hairiness: Importance of Hairiness, Generation of yarn hairiness, Factors effecting hairiness, Effect of Preparatory and Spinning process on hairiness, Measure to reduce Hairiness, Periodic variation in hairiness, Hairiness Testing.

Unit III:

Imperfections: Concept, Measurement, and Interpretation; Importance of thin places, thick places and neps in the textile industry.

Yarn Faults: Importance of Yarn Faults, Determination of Yarn Faults, Various reasons for different types of Yarn Faults. Contribution of Raw material, Blow room and carding, Combing, Draw frame, Speed frame and Ring frame to yarn faults.

Control of yarn count and count CV%, between bobbin lea count variations, Minimizing lea count variation, Effect of count CV on strength CV.

Control of strength, and strength CV%, Mechanism of Strength Generation, Yarn failure mechanism, Influencing Factors, Variables which can affect yarn tensile properties, Influence of humidity of the room on the breaking force, instrument set up affect tensile properties. Control of end breaks: Mechanism of end breakage in ring spinning, Causes of end breaks in spinning.

Unit IV:

Yarn realisation and Process waste control:Control of measure, Method of consolidating waste, Waste losses at various stages like Blow room, Cards, Combers, Yarn waste, Sweepings, Invisible loss. Judging yarn realization of a mill

Measures for improving performance of blow room and card

Evaluation of auto leveler in draw frame

Measuring for improving performance of comber, draw frame and speed frame

Towards better performance of ring frame in terms of quality and productivity
Measurement of productivity of a spinning mill and means to improve it,
Machinery Audit: Differences with routine Maintenance, Implementation of the system of machinery audit,Tools for machine audit,Machinery Audit in Spinning : Check List, Test Instruments for Machinery Audit
Analysis and interpretation of statistical data.Total quality control.

Reference.

1. Grade, A. R., and Subramanium T. A., "Process control in cotton spinning" ATIRA, Ahmedabad, 2nd Ed. (1978).
2. Salhotra, K. R., and Ishtiaque, S. M., "Process control in spinning", IIT Delhi, CD cell (2001).
3. Ratlam, T. V., "Quality control in spinning" SITRA, Coimbatore(1994).
4. Chattopadhyay, R., "Advances in Technology of Yarn Production, 1st Ed., NCUTE, IIT Delhi (2002).
5. GAR Foster, "Manual of Cotton Spinning Vol IV"

TT-417N
PROCESS CONTROL IN CHEMICAL PROCESSING

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Importance of process and quality control in chemical processing. Quality of grey fabrics, selvedge quality, stains in grey fabric, overall assessment of quality of grey fabrics.
Stitching of grey pieces, common stitching defects and method for assessing stitching quality.Process control in shearing and cropping.

Unit II:

Singeing - Process control in singeing, parameters to control the singeing process
Desizing- Enzyme desizing, parameters to control the enzyme desizing process
Scouring - Parameters to control the pressure boil scouring
Mercerizing – Parameters to control the mercerization process,
Bleaching - Sodium hypochlorite & Hydrogen peroxide, treatment on J-box, pad roll bleaching, washing and drying.
Process control in Heat Setting process.

Unit III:

Process control in Dyeing - Fiber and yarn package dyeing,
Fabric dyeing - Satisfying basic needs, selection of dyes, process control in jigger dyeing, high temperature beam or jet dyeing, continuous dyeing.
Process control in Printing: Selection of thickening agent and preparation of printing paste, printing recipe, printing, fixation, after treatments.
Process control in Finishing: Stenter or felt calendar for temporary finishes, durable finishes: resin finishing, calendaring, decatising, weight reduction, carbonisation

Unit IV:

Evaluation of dyes - Dyestuff performance test, critical temperature test, migration test and build-up tests.
TextileChemicals &auxiliaries - Wetting agents, Levelling Agents, Cross linking Agents, Thickeners & Binders for printing, OBA, Softners etc.
Evaluation of processed fabric at different stages: desizing, scouring, bleaching mercerization, heat setting, dyed printed and finished fabric.

References

1. ATIRA / BTRA Books of journals.
2. “Process control in processing” by ATIRA.

TT – 419N

PROCESS CONTROL IN GARMENT

L	T	P	Sessional: 25 Marks
3	1	-	Exam: 75 Marks
			Total: 100 Marks
			Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT-I

Automation in Garment Industry-Information Technology in Garment Industry, Microprocessor based machinery in design, pattern making, market making, cutting, sewing, embroidery, programmable machines. Production planning in garment manufacturing; Cost structure in garment manufacturing; Production technology – manual and mechanical systems. Quantitative Production analysis, co-ordination of activities, Check list sheet, Time and motion study: need, Improving production efficiency,

UNIT-II

Stitch application for woven and knitted garment: Stitch identification, Application, Advantages and disadvantages, Proper stitch formation.

Common seam quality defect: Seam rupture on stretch knits, Skipped stitches, Stitch Cracking, Seam slippage and Needle cutting, Causes and remedies

Seam puckering: types, major causes and solution to puckering.

UNIT-III

Sewing Thread selection: Right thread to optimize seam quality, fibre type, thread construction, thread size. Advantages of core-spun sewing thread, Quality aspect of industrial sewing thread. Needle size, needle numbering system

Sewability: Quality parameters for assessing sewability, seam strength, seam pucker, seam slippage, needle cutting.

UNIT-IV

Quality control aspects of garment exports

Quality systems for garment (manufacture), the nature of quality costs, the functions of quality assurance and quality control;evaluating care and appearance, evaluating material contribution, Inspection standard for apparel,

Inspection systems – raw material inspection, in process inspection, final inspection, how much to inspect? Comparability checks; Audit inspection

References:

1. An Introduction to Quality Control for Apparel Industry by PV Mehta
2. Managing Quality for Apparel Industry by PV Mehta & SK Bhardwaj
3. Garment Technology, NCUTE Publication
4. Testing and Quality Management (Vol-1) by V.K. Kothari

TT – 421N

PROCESS CONTROL IN WEAVING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT: I

Importance and consideration for evolving a system for process control in winding, warping, sizing and weaving. Key parameters at winding, Quality and productivity in winding, Control of package faults, measuring principle. Process control in pirn winding: minimizing end breaks, improving the build of the pirn, control of productivity, causes of low productivity.

UNIT: II

Process control in warping: minimizing end break in warping, performance assessment of warping, quality of warp beam, control of productivity, causes of low productivity.Common defects & remediesat warping.
Process control in sizing: control of yarn stretch, performance assessment in sizing, quality of sized yarn, control of productivity, control of size losses.Common defects at sizing & remedies.Common defects in drawing-in & remedies, Costing calculations in drawing-in. Standard norms for setting speeds and production rates at different stages.

UNIT: III

Control of productivity in loom shed, Analysis of warp breaks, Control of loom efficiency, Control of loom stops, Quality of yarn, Loom performance, Control of loss of efficiency by snap reading, Optimum loom allocation
Types and classification of fabric defects, Measures for fabric defect control. Control and norms of hard waste in various processes, care, selection and consumption norms of accessories.Control of fabric quality at loom state.

UNIT: IV

Operative, Running, Machine Efficiency and Service factor.Importance and types of maintenance, Maintenance schedule in winding, warping, sizing and loomshed.Calculations pertaining production and efficiency. Machine allocation in winding, warping, pirn winding, sizing and loom shed.Machine audit.

References:

1. Control in Weaving" ATIRA Ahmedabad, 2nd Ed(1978).

2. Weaving Machines Mechanisms Management, by Talukdar MK, Sriramulu PK, Ajgaonkar DB.

8th Semester BACHELOR OF TECHNOLOGY (TEXTILE TECHNOLOGY) w.e.f. 2018-19

S. No.	Subject Code and Name	Teaching Schedule (hrs)				Examination Schedule (Marks)			Total Marks	Duration of Exam (hrs)
		L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce		
1	TT-402N: Technical Textile II	4	1	---	5	25	75	---	100	3
2	TT-404N: Textile Costing	4	1	---	5	25	75	---	100	3
3	TT-406N: Management of Textile Production	4	1	---	5	25	75	---	100	3
4	Elective III	3	1	---	4	25	75	---	100	3
5	Elective IV	3	1	---	4	25	75	---	100	3
6	TT-408N: Project II	---	---	9	9	100	---	100	200	3
7	TT-410N: Seminar	---	---	3	3	100	---	---	100	3
8	TT- 412N: Comprehensive Viva-voce	---	---	---	---	100	---	---	100	---
9	TT-414N: General Fitness for the Profession	---	---	---	---	---	---	100	100	3
Total		**18**	**5**	**12**	**35**	**425**	**375**	**200**	**1000**	

Elective III										
S. No.	Subject Code and Name	Teaching Schedule (hrs)				Examination Schedule (Marks)			Total Marks	Duration of Exam (hrs)
		L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce		
1	TT-416N: High Performance Fibres	3	1	---	4	25	75	---	100	3
2	TT-418N: Industrial Engineering	3	1	---	4	25	75	---	100	3

Elective IV										
S. No.	Subject Code and Name	Teaching Schedule (hrs)				Examination Schedule (Marks)			Total Marks	Duration of Exam (hrs)
		L	T	P/D	Total	Sessional	Theory	Practical/ Viva-voce		
1	TT-420N: Nonwoven Technology	3	1	---	4	25	75	---	100	3
2	TT-422N: Processing of Man Made Fibres and Blended Textiles	3	1	---	4	25	75	---	100	3

TT-402N
TECHNICAL TEXTILE - II

L	T	P	Sessional: 25 Marks
4	1	-	Exam: 75 Marks
			Total: 100 Marks
			Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Medical Textiles:
Introduction and classification of Medical Textiles. Fibres used for medical applications. Medical Drapes and Linen.Implantables – sutures, soft tissue implants, hard tissue implants, vascular implants. Nonimplantables – surgical dressing, bandages. Extracorporeal devices, Tissue Engineering.Healthcare and Hygiene products.Super absorbent polymers, hydrogels.

Unit II:

Protective Textiles:
Different types of protective clothing. Functional requirements of defense clothing including ballistic protection, parachute, temperature and flame retardant clothing. Chemical and Biological protective clothing.Water proof breathable fabric.

Unit III:

Technical Textiles in Apparel Sector:
Introduction to Smart Technology for textile and clothing.Areas of application of smart textile. Pathogen barrier fabric, fibres used for pathogen barrier application. Clothing for extreme climatic conditions - wearable technology for snow clothing, high altitude clothing.Electromagnetic radiation protective clothing.

Unit IV:

Other Applications:
Sportech – Sport uniforms, sporting equipments, textiles in sport surfaces
Agrotech – General applications and fibres used in agriculture, horticulture, fishing and animal husbandry
Buildtech – Architectural membranes, hoardings and signages, awnings and canopies.
Packtech.Ropes and cordages. Canvas covers and tarpaulins.

References:

3. "Handbook of Industrial Textiles", Ed. SabitAdanur, Technomic Publishing Co. INC
4. "Handbook of Technical Textiles", Ed. A R Horrcks and S C Anand, Woodhead Publication Ltd, Cambridge, 2000
5. " Textiles for protection, Ed. Richard A. Scott, Woodhead Publication Ltd, Cambridge,
6. " Wearable Electronics and Photonics, Ed. Xiaoming Tao, Woodhead Publication Ltd, Cambridge

TT-404N
TEXTILE COSTING

L	T	P
4	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I: Fundamentals of Costing
Cost concept. Classification of cost, elements of cost.Methods of costing.Unit and operating costing, preparation of cost sheet.Estimation of cost of production and component of total cost.Profit planning, job order, batch process, conversion cost.Inventory costing.

Unit II:
Cost-Profit-Volume analysis, break even point, contribution margin, margin of safety, angle of incidence. Capital budgeting.

Unit III: Cost Structure in Textile Industry
Cost structure, cost of raw material/labour/utilities**.**Cost control, standard costs, determination of cost per kg of yarn, per metre of fabric, cost of dyeing/printing per metre of fabric, yarn realization, measures of cost reduction, selling price decision for yarn/fabric. Concept of depreciation.

Unit IV: Labour Allocation and Rationalization of Labour
Labour allocation in different department of textile mill. Work-load standards for card tenters, speed frame and ring frame tenters, doffers and winders, weavers, etc. Costing of large package spinning and optimum package size.Costing of Open end spun and Air-jet spun yarns.
Waste and its control at spinning and weaving, Costing of shuttle-less looms like Sulzer, air-jet.Economics of shuttle loom,

References:

1. Textile Costing by SITRA.
2. Khan and Jain, “Management Accounting”, Tata McGraw-Hill Publication.
3. Owler, L. W. J., Brown, J. L., “Wheldon’s Cost Accounting and Cost Methods”, ELVS Publication.

TT-406N
MANAGEMENT OF TEXTILE PRODUCTION

L	T	P	Sessional: 25 Marks
4	1	-	Exam: 75 Marks
			Total: 100 Marks
			Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT-I: Indian Textile Industry

Structure of Indian Textile Industry, Organized and Decentralized Sector, Handloom sector, Production and export, Sickness in Textile Industry.
Location and Layout : Plant location and site selection , Factors affecting location , plant lay- out, Different type of layouts, Layout plan for spinning, weaving and process house.

UNIT-II: Production, Planning and Control

Product mix decision, linear programming concept, Supply chain management, Concept of zero defects, Management information system.
Inventory Management: Inventory concepts, techniques to reduce inventory, ABC analysis, EOQ, P and Q systems.
Enterprise Resource Planning: ERP concept, Applications of ERP, Ways to use ERP.

UNIT-III:

Air Conditioning and humidification: Humidification systems used in textile mills, Development in humidification systems.
Power Consumption: Energy consumption in textile machines, Measure to reduce power consumption.
Maintenance Management: Maintenance systems, Maintenance schedules.
Work Management: Basics of work load and work assignment, effect of end breaks on work assignment.

UNIT-IV:

Working Environment: Measures of good working environment, Measures to minimize noise, terms related to lighting, illumination level required for different departments, Material handling equipments, Accidents and safety engineering, Fire prevention and protection.

Suggested Text Books and References:

1. Dudeja V D , "*Management of textile Industry*" Textile Trade Press Ahmedabad (1981)
2. Ormerod A, "*Textile Project Management*" The Textile Institute , ManchesterUK(1992)
3. Talukdar M K ,Srirammulu P K and Ajgaokar D B , "*Weaving – Machine , Mechanism and Management* ," Mahajan Publisher Private Ltd., Ahmedabad , India (1998)
4. Grade A R and Subramanian T A , "Process Control in Spinning," 3rd Edition., ATIRA Ahmedabad, (1987)
5. Higgins, "*Handbook of Maintenance Management,*" Prentice Hall New York (1999).

TT-416N

HIGH PERFORMANCE FIBRES

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

Unit I:

Fully aromatic polyamide or aramid fibers: Nomex and Kevlar - Polymerization, spinning properties and applications
Ordered Polymeric Fibers: High molecular weight polyester, rigid rod and ladder polymers such as PBL, PBZT, PBO, PBI.

Unit II:

Carbon Fibers: Manufacturing of carbon fibres from PAN precursors, viscose and pitch fibres. Pre-oxidation, carbonization and graphitization.Chemical and structural changes in structure during these fibers.Structure and Properties of these fibers.
Liquid crystal fibres, Gel spinning

Unit III:

Flexible Chain based high performance fibers: High and ultramolecular weight polyethylene. Structure and properties of these fibers.
Optical Fibers: Definition, working principle of optical fibers, different materials used for manufacturing of optical fibers, different types of optical fibers. Manufacturing process of optical fibers and their applications. Hollow and profile fibres, design of spinnerette for such fibres.

Unit IV:
Glass fibres.PEEK fibers, Soyabean fibers etc.Memberane technology. Blended and bicomponentfibres. Medical textiles (fibers used in Medical textiles). Superabsorbent fibres.

Plasma modification.Radiation processing.Industrial tapes.Biaxially oriented films and film fibres.Barrier films and coatings.

Suggested Text Books and References:

1. P.Bajaj& A.K. Sengupta, “High performance fibers”
2. M. Lewin& J. Preston, “High Technology Fibers (Part A, B, C,D)”
3. Lewin& Pearce, “Handbook of Fiber Chemistry”. CRC Press LLC; 2 edition (Feb 26 998)

TT – 418N
Industrial Engineering

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT I

Introduction to work study, Method study, Basic procedure, Recording techniques (charts and diagrams), Elemental breakdown, Micro-motion studies, Therbligs, SIMO-chart, Principles of motion –economy.

Introduction, Objectives, technique, (time) information recording, methods of timings, Time study allowances, Work sampling technique, Performance rating and its determination PMTS, M. T. M., Work factor.

UNIT II

Principles of organization, Importance and characteristics of organization, Organization theories, Classical Organization theory, Neo-Classical organization theory, Modern organization theory, Types of organization, Military or line organization, Functional organization, Line and staff organization, Committees.

Objectives of PPC, Functions of PPC, Preplanning and planning, Routing, Estimating, scheduling-master schedule, and Daily schedule, Gantt chart, Dispatching – centralized vs. decentralized, Control, Follow up and progress reporting.

Introduction, Product development, Product characteristics, Role of product development, 3Ss – Standardization, Simplification and Specialization.

UNIT III

Introduction, Objectives and importance of sales forecasting, Types of forecasting, Methods of sales forecasting-Collective opinion method, Delphi technique, economic indicator method, Regression analysis, Moving average method, Time series analysis.

Introduction, Functions of inventory, Types of inventory, Control importance and functions, Inventory costs, Factors affecting inventory control, Various inventory control models. A. B. C. analysis, Lead-time calculations.

UNIT IV

Introduction, Objectives, Concept and life cycle of a product and V.E., Steps in VE.Methodology and techniques, Fast diagram, Matrix method.

Various concepts in industrial engineering

a) WAGES AND INCENTIVES, -Concept, Types, Plans, Desirable characteristics.
b) ERGONOMICS, - its importance, Man-machine work place system, Human factors considerations in system design.
c) SUPPLY CHAIN MANAGEMENT, - its definition, Concept, Objectives, Applications, benefits, Some successful cases in Indian Industries.
d) JIT, - Its definition, Concept, Importance, Misconception, Relevance, Applications, Elements of JIT (brief description).
e) MRP,-Introduction, Objectives, factors, Guide lines, Techniques Elements of MRP system, Mechanics of MRP, MRP-II
f) TIME MANAGEMENT,-Introduction, Steps of time management, Ways for saving time, Key for time saves.

Reference and Textbooks:

- Production planning and control by S.Elion
- Modren production Management by S.S Buffa
- Industrial engg. and management manufacturing system by Surenderkumar, Satyaprakashan
- Essence of Supply Chain Management by R.P mohanty and S.G Deshmukh
- Industrial engg. and management by S Sharma and Savitasharama

TT- 420N
NONWOVEN TECHNOLOGY

L	T	P	
3	1	-	Sessional: 25 Marks Exam: 75 Marks Total: 100 Marks Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT-1: Web Formation Technique

Definition of nonwoven, manufacturing steps of nonwoven fabrics, major fibres which are used for manufacturing of nonwovens, classification of nonwoven.

Parallellaying and Cross laying techniques, Aerodynamic laying, wet laying technique, spun-bond technique and melt-blown technique.

UNIT-2: Mechanical Bonding

Needle punching machine, needle board parameters, needle design, needle parameter, needle modification.Factors affecting fabric structure and fabric mechanical properties.Stitch bonding technique-Maliwat&Malivlies Stitch Bonding Technique, Calculation of machine production.

UNIT-3: Chemical and Thermal Bonding

Bonding agents, forms and classes of adhesives or binders, characteristics required, factors affecting adhesion, various bonding technique: spraying bonding, print bonding, saturation bonding.

Advantages of thermal bonding over chemical bonding, different types of binders. Bonding methods: hot calendaring, belt calendaring. Factors that affect the properties of calendar bonded products. Fusion bonding, bonding types: through perforated drums and perforated belts.

UNIT-4

Dry finishing of nonwoven- Shrinkage, Wrenching, Creeping, and Glazing. Wet finishing of nonwoven: Washing, Dyeing, Printing. Chemical finishing: Antistatic, Antimicrobial, Water repellent, Flame retardant, Water absorbency.

Defects of nonwoven fabrics. Test methods for nonwovens. Application of nonwoven materials.

Suggested Text Books and References:

1. Madhavamoorthy, P., Shetty, G.S., NONWOVEN, Mahajan Publishers Pvt. Ltd., 2005
2. Lunenschloss J and Albrecht W," Non-woven Bonded Fabric", Ellis and Horwood Ltd., UK(1985)
3. KremaRadco,"Manual of nonwovens",Textile trade Press, UK(1971)
4. Albrecht W, Fuchs H and Kittelmann,"Nonwoven Fabrics", Wiley-VCH Weinheim(2003)

TT-422N
PROCESSING OF MAN MADE FIBRES AND BLENDED TEXTILES

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.

UNIT -I

Pretreatment of man mades and blends : Pretreatment of polyester , nylon , acrylic, and their blends , viz. singeing ,desizing , scouring , bleaching ,mercerizing and heat setting. Pretreatments machineries.

UNIT –II

Dyeing of man mades : Role of fibre structure in dyeing of man mades .Dyeing of polyester & its blend. HTHP, Thermofixationand carrier dyeing. Dyeing of nylon and its blend. Dyeing of acrylic with disperse, acid and cationic dyes. Dyeing of differentially dyeable man mades.

UNIT – III

Printing of man mades and and blends: Direct, resist and discharge styles of printing of polyester, nylon, acrylic and their blends. pigment printing and carbonised prints of polyester. Transfer printing of polyester , nylon, acrylic and their blends.

UNIT –IV

Finishing of Manmade and Blends: Mechanical finishing: calendaring, raising, emerising, decatising. Optical whitening , anti-pilling and durable press finishes . Soil release, water repellent and flame retardant finishes on manmades and blends. Anti static finish.

Suggested Text Books and References:

1. Nunn D M, "*The dyeing of syntetic polymer and acetate fibres,*" Dyers company publication trust London (1979)
2. Shore J, "*Colorants and auxiliaries* ," Vol-I and II , Society of dyers and colorists , Bradford , England (1990)
3. Gulrajani M L , "*Polyester Textiles* ," Book of paper : 37th National Textile Conference ,The Textile Association (India) Mumbai (1980).
4. Gulrajani M L , "*Blended Textiles* ," Book of paper : 38th National Textile Conference ,The Textile Association (India) Mumbai (1981).
5. Datye K V and Vaidye – A A, " *Chemical Processing of Synthetic Fibres and blends,*" John Wiley and Sons,New York (1984).

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME & SYLLABUS

FOR

BACHELOR OF TECHNOLOGY (CHEMICAL ENGINEERING)

FINAL YEAR (SEMESTER-VII & VIII)

(w.e.f. session 2018-2019)

10(2624)

BACHELOR OF TECHNOLOGY (CHEMICAL ENGINEERING)

SCHEME OF STUDIES/EXAMINATION

SEMESTER-VII (w.e.f. session 2018-2019)

S. No	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Dur of Exam (Hrs.)
			L	T	P	Hrs/ Wk	Theory	Sessional	Practical	Total	
1	CHE-401N	Process Equipment Design	4	1	0	5	75	25	0	100	3
2	CHE-403N	Transport Phenomenon	4	1	0	5	75	25	0	100	3
3	CHE-405N	Petroleum Processing Engineering	4	0	0	4	75	25	0	100	3
4	CHE-407N	Environmental Engineering	4	0	0	4	75	25	0	100	3
5	CHE-	Elective-I	4	0	0	4	75	25	0	100	3
6	CHE-409N	Process Plant Utilities	4	1	0	5	75	25	0	100	3
7	CHE-411N	Environmental Engineering (Lab)	0	0	3	3	0	40	60	100	3
8	CHE-413N	Project (Minor)	0	0	3	3	0	50	50	100	3
9	CHE-415N	Seminar	0	0	2	2	0	50		50	3
10	CHE-417N	Industrial Training Viva	0	0	0	0	0	0	100	100	3
		Total	**24**	**3**	**8**	**35**	**450**	**290**	**210**	**950**	

Elective-I

S. No.	Course No.	Course Title	L	T	P	Hrs/ Wk	Theory	Sessional	Practical	Total	Dur of Exam (Hrs.)
1	CHE-419N	Fluidization Engineering	4	0	0	4	75	25	0	100	3
2	CHE-421N	Non Conventional Energy Systems	4	0	0	4	75	25	0	100	3
3	CHE-423N	Fertilizer Technology	4	0	0	4	75	25	0	100	3
4	CHE-425N	Food Technology	4	0	0	4	75	25	0	100	3

Note:

1. Industrial Training which was undergone by the students after VI sem is to be evaluated during VII sem as **(CHE-417N)** through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation
2. Students will be allowed to use scientific calculator, however, sharing of calculator will not be permitted.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

BACHELOR OF TECHNOLOGY (CHEMICAL ENGINEERING)

SCHEME OF STUDIES/EXAMINATIONS

SEMESTER-VIII (w.e.f. session 2018-2019)

S. No	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Dur of Exam (Hrs.)
			L	T	P	Hrs/ Wk	Theory	Sessional	Practical	Total	
1	CHE-402N	Process Engineering Economics	4	2	0	6	75	25	0	100	3
2	CHE-404N	Energy Technology	4	1	0	5	75	25	0	100	3
3	CHE-406N	Industrial Hazards and Safety	4	1	0	5	75	25	0	100	3
4	CHE-	Elective-II	4	1	0	5	75	25	0	100	3
5	CHE-	Elective-III	4	1	0	5	75	25	0	100	3
6	CHE-408N	Energy Technology (Lab)	0	0	3	3	0	40	60	100	3
7	CHE-410N	Project (Major)			6	6		100	100	200	3
8	CHE-412N	Comprehensive Viva	0	0	0	0	0	0	75	75	3
9	CHE-414N	General Fitness and Aptitude Test	0	0	0	0	0	0	75	75	3
		Total	**20**	**6**	**9**	**35**	**375**	**265**	**310**	**950**	

Elective-II											
S. No.	**Course No.**	**Course Title**	**L**	**T**	**P**	**Hrs/Wk**	**Theory**	**Sessional**	**Practical**	**Total**	**Dur of Exam (Hrs.)**
1	CHE-416N	Pulp and Paper Technology	4	1	0	5	75	25	0	100	3
2	CHE-418N	Catalytic Processes	4	1	0	5	75	25	0	100	3
3	CHE-420N	Novel Separation Techniques	4	1	0	5	75	25	0	100	3
Elective-III											
1	CHE-422N	Mixing Theory and Practice	4	1	0	5	75	25	0	100	3
2	CHE-424N	Optimization Techniques in Chemical Engineering	4	1	0	5	75	25	0	100	3
3	CHE-426N	Fermentation Technology	4	1	0	5	75	25	0	100	3

Note: Students will be allowed to use scientific calculator, however, sharing of calculator will not be permitted.

PROCESS EQUIPMENT DESIGN

CHE-401N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Basic considerations in equipment design, general design procedures, material ofconstruction, corrosion, protective coating, corrosion prevention, choice of materials,stress strain, biaxial stress and triaxial stress. Stress strain relationship for elastic bodies.Theories of failure.Process flow diagrams.

UNIT-II

Design of piping and piping networks. Selection, specification requirement of processpumps, fans and blowers.

UNIT-III

Introduction to codes for pressure vessel design, classification of pressure vessels, Designof cylindrical and spherical shells under internal and external pressure.Selection anddesign of closures selection and design of flanges.Design of leg support and saddlesupport including bearing plates and anchor bolt.

UNIT-IV

Process design and specifications of shell and tube heat exchangers and condensers.

BOOKS RECOMMENDED:

1. Chemical Engineering Vol-6: J.M.Coulson and J.F.Richardson- Pergamon Press.
2. Process Equipment Design: M.V.Joshi and V.V.Mahajani- MacMillan India Ltd.
3. Introduction to Chemical Equipment Design, Bhattacharya B.C.

REFERENCE BOOKS:

1. Process Heat Transfer: D.Q.Kem- McGraw Hill.
2. Plant Design and Economics for Chemical Engineers.
3. Process Equipment Design, M.V.Joshi.

TRANSPORT PHENOMENON

CHE-403N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Transport of momentum, Heat and Mass transfer by molecular motion- Newton's law of viscosity, Fourier's law of heat conduction, Fick's law of diffusivity.

UNIT-II

Emphasis on the analogy between Momentum, Heat and Mass transfer with respect to transport mechanism and governing equations.

UNIT-III

Development of mathematical models of transfer processes through shell momentum balance, shell energy balance and shell mass balance for solving in laminar specific problem of transport of momentum, heat and mass in laminar flow in solids in one dimension.

UNIT-IV

Development of general differential equations of Fluid flow, Heat Transfer and Mass Transfer and their application in solving one dimensional steady state and unsteady state problem of momentum, heat and mass transfer.

TEXT BOOKS:

1. "Transport Phenomenon", B.S. Bird, W.E. Stewart and E.N. Lightfoot, John Wiley & Sons.
2. "Transport Processes and Unit Operations", C.J. Geankopils- Prentice Hall of India

REFERANCE BOOKS:

1. "Transport Phenomenon-A unified approach", R. S. Brodkey& H.C. Hershey, McGraw Hill.
2. "Unit Operation of Chemical Engineering", W.L. McCabe & J.C. Smith, McGraw Hill.

PETROLEUM PROCESSING ENGINEERING

CHE-405N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Introduction to petroleum industry, world petroleum resources, petroleum industry in India:origin. Exploration, drilling and production of petroleum crudes, transportation of crudes andproducts, crude pretreatment composition and classification of crudes.

UNIT-II

Methods of evaluation: ASTM, TBP and EFV distillation. Petroleum products such as LPGgasoline, naphtha, kerosene diesel oils, lubricating oils, waxes and rube still

UNIT-III

Separation Process: Operation of topping and vacuum distillation units, tube still furnaces,solvent extraction process, solvent dewaxing.

UNIT-IV

Conversion Process: Thermal cracking visbreaking and cooking process catalytic cracking

TEXT BOOKS

1. Petroleum Refinery Engineering, W. L. Nelson McGraw Hill.

2. Modern Petroleum Technology by G.D. Pohl Hoston, halsled press, Division of Wiley

Eastem.

REFERENCE BOOKS

l.Petroleum products by V.B. Guthrie. Handbook McGraw Hill.

2.“Advances in petroleum chemistry" and Refining by K.A. Kobeand J.J. MC KettaInterscience.

ENVIRONMENTAL ENGINEERING

CHE-407N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Industrial pollution and its importance in environment, industrial waste regulatorylegislations, Preventions of environmental pollution through conservation, recycle andreuse of wastes, recovery of by-products from industrial effluents. Economicsconsiderations of waste disposal, raw material substitution, process and equipmentmodifications.

UNIT - II

Air Pollution: Principle air pollutants, and their sources, effect of air pollutants onhuman health, animals and vegetation, atmospheric dispersion of air pollutants,temperature inversion, air pollution control techniques - process and equipments usedfor control of gaseous pollutants.

UNTT - III

Water Pollution: Types of water pollutants, their sources and ill effects, BOD andCOD characteristics of water (physical, chemical and biological) waste watertreatment techniques, primary treatment involving removal of suspended particlesthrough flocculation, settling, skimming and friction. Secondary treatment: biologicaltreatment, aerobic and anaerobic digestion, activated sludge processes, trickling filtersand oxidation periods.

UNIT.IV

Solid wastes: Hazardous and non-hazardous wastes, methods of treatment and disposal,land filling, incineration of solid wastes, Biodegradation.

REFERENCE BOOKS:

1. Environmental Pollution Control Engineering, by C.S.Rao, WireyEastern,New Delhi.
2. Waste water system Engineering : HW. parker prentice Hail of rndia.
3. Waste water Engineering, by Metcarf and Eddy rnc., Tata McGraw Hiil, Derhi.
4. Air pollution : M.N. RaoandH.y.N. Rao- Tata McGraw Hill
5. Environmental Engineering: G.N. panday and G.c. Gamey - Tata McGrawHiil.
6. Environmental Engineering: Peavy H.s. And Rowe D.R. - McGraw Hill

PROCESS PLANT UTILITIES

CHE-409N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Water: Water resources, storage and characterization of water, conditioning for processindustries e.g. boiler feed cooling etc. Recycling aspects of water.

UNIT-II

Steam: Steam generation: Boilers, boiler accessories, Steam distribution. Steam Traps,insulation, condensate utilization.

UNIT-III

Compressed Air and Vacuum: Reciprocating air compressors, vacuum pumps. Air receivers, piping systems, different type of ejectors and barometric condensers.

UNIT-IV

Air Conditioning, Refrigeration and Power Generation: Review of refrigeration cycles.Cooling load calculations, refrigeration piping and layout, dehumidification. Internalcombustion engine, gas turbines steam power plants, dual power system and cogeneration.

BOOKS RECOMMENDED:

1. Wenghen, D.A. Theory and Practice of Heat Engines, ELBS Camridge University Press.
2. Arora, C.P. Refrigeration and Air conditioning, Tata McGraw Hill, Delhi.
3. Checketekem, High Temperature Heat Carriers, 1963, A.V. Pergamon Press.

REFERENCE BOOKS:

1. Ballaney, P.L.Refrigeration and Air Conditioning.
2. Kurl, W.F.J.M. Reuse of Water in Industry, Butterworth.
3. Goodall, P.M. Efficient use of steam (1980).

ENVIRONMENTAL ENGINEERING (LAB)

CHE-411N

L	T	P		
-	-	3	**Sessional:**	**40 Marks**
			Practical:	**60 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

LIST OF EXPERIMENTS

1. Determination of COD in water sample.
2. To find total dissolved solids (TDS), volatile and non-volatile components.
3. To find total suspended solids (TSS), volatile and non- volatile components
4. Determination of BOD in water sample
5. Determination of dissolved oxygen (DO) in water sample
6. Determine the acid value of water sample.
7. Determine pH of acid base sample after calibration of pH meter

Note: At least six experiments are to be performed

FLUIDIZATION ENGINEERING

CHE-419N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Importance of fluidization in process industry, comparison of fluidized bed with other models of contacting, advantages and disadvantages.

Fixed bed of particles of one and mixed size, fluidization with and without carryover of particles, minimum fluidization velocity of particles, pneumatic transport of solids, mapping of regimes.

UNIT-II

Bubble behavior and bed properties: Single rising bubble models, wake region and solids within bubbles, interaction and coalescence of bubbles, bubble formation, slug flow.

Bubbling fluidized beds: Emulsion phase, gas flow, bubble properties, Physical and flow models.

UNIT-III

Entrainment and Elutriation from fluidized beds: Free board behavior, gas outlet location, entrainment from tall and short vessels.

High velocity fluidization: Turbulent fluidization beds, fast fluidization, pressure drop in Turbulent and fast fluidization.

UNIT-IV

Spouted Bed: Hydrodynamics and processing in spouted beds.
Calculation Systems: Circuits for the circulation on solids, pressure balance, flow of gar solid mixtures in down comers, flow in pneumatic transport lines.

BOOKS RECOMMENDED:

Fluidization Engineering by D. Kunii and O.Levenspiel, IInd ed. Butterworth-Heinemann, (1991)

NON CONVENTIONAL ENERGY SYSTEMS

CHE-421N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

SOLAR ENERGY: Solar radiation and its measurement, Limitations in the application of solar energy, solar collectors-types and constructional details. Solar water heating, applications of solar energy for air heating, crop drying, space cooling, water desalination, solar concentrator, photovoltaic power generation using silicon cells.

UNIT-II

BIOFUELS: Importance, combustion, pyrolysis and other thermo chemical processes for biomass utilization. Alcoholic fermentation, anaerobic digestion for biogas production.

UNIT-III

WIND POWER: Principle of energy from wind, windmill construction and operation details, electricity generation and mechanical power generation.

UNIT-IV

TIDAL POWER: Its meaning, causes of tidal and their energy potential, enhancement of tides, power generation from tides, principles of ocean thermal energy conversion (OTEC).

GEOTHERMAL ENERGY: Geotechnical wells and other resources, dry rock and hot aquifer analysis, harnessing geothermal energy resources.

BOOKS ROCOMMENDED:

1. Renewable Energy Resources byJ.Twiddel and T. Weir, E & F N Spon (1986).
2. Principles of Solar Energy by F. Kreith and J.F. Kreith, McGraw Hill (1978).
3. Energy Technology- Non conventional, Renewable and conventional by S. Rao, B.B Parulekar, Khanna Publisher.

FERTILIZER TECHNOLOGY

CHE-423N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Micro and macro nutrients fertilizer grades, different types of fertilizer, fertilizer storage andhandling.Nitrogenous fertilizers.Synthesis gas: various feed stocks, merits/demerits. Synthesis gas production by stem reformingand partial oxidation, purification methods, shift convertors, carbon dioxide removal systems,final gas purification.

UNIT-II

Ammonia synthesis: Different types of reactors, their design considerations and operations.
Urea: Physiochemical consideration. Various processes.Calcium ammonium nitrateammonium sulphate, methods of production.

UNIT-III

Phosphatic fertilizer: Raw materials, triple super phosphate, phosphoric acid, processes ofmanufacture and their limitations.

UNIT-IV

Potash fertilizer: Methods of production of potassium chloride and potassium sulphate.Complex NPK fertilizer: mono and di ammonium phosphates, urea ammonium phosphate,mixed fertilizer, granulation techniques.

TEXT BOOKS:

1. Chemistry and Technology of fertilizer by A.V. Slack, Interscience Publishers (1966)

2. Shreve's Chemical Process industries by G.T. Austin, McGraw Hill.

3. Outlines of Chemical Technology by M.G. Rao and M. Dryden, 1985 Affiliated Eastwest Process, New Delhi

FOOD TECHNOLOGY

CHE-425N

L	T	P		
4	-	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Classification of foods, nutritional aspects of foods, causes of food spoilage, Food poison: bacterial toxins, food borne illnesses. Principles of food preservations.

High and low temperature preservation of food: Thermal death of bacteria, Thermal process evaluation, Batch and continuous sterilization. Pasteurization, blanching, canning metabolism as a function of temperature, refrigeration, storage of foods, freezing methods and equipment

UNIT-II

Drying and dehydration of foods: Principles of drying and dehydration of foods: drying methods and equipment, sun drying, freeze drying. Diffusion-pervapouration.

Food preservation by chemical: Food additives, auto oxidants, surface-active agents, stabilizers, bleaching and maturing agents, Pickling and fermentation of foods.

UNIT-III

Radiation preservation of foods: Various types of radiations and their classifications, physical and chemical reactions induced by radiation, interaction of radiation with living micro-organisms, food irradiation and microwave heating.

UNIT-IV

Preservation and processing of food: Preservation and processing of food material such as fruits, vegetables, bread, dairy products, fish, meat, alcoholic and soft drinks.

Techniques for packaging and storage of food materials.

BOOKS RECOMMENDED:

1. Fundamentals of Food Engineering by S. C. Charm, AVI Publishing Co. (1971).
2. Principles of Dairy Processing by J.N. Warner, Wiley Eastern (1976).

PROCESS ENGINEERING ECONOMICS

CHE-402N

L	T	P		
4	2	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Cost Estimation:

Factors affecting investment and production costs, capital investment-fixed investments andworking capital. Cost indices. Estimating equipment costs by scaling 6/10 factor rule.Methods for estimating capital investment. Estimations of total product cost. Different costinvolved in the total product for a typical chemical process plant.

UNIT-II

lnterest and lnstrument costs:

Simple and compound interest.Nominal and effective rates of interest.continuous interest.ordinary annuity. Perpetuities and capitalized costs.

UNIT-III

Taxes and lnsurance:

Type of taxes and tax returns, type of insurance and returns, types of insurance of legalresponsibility.

Depreciation :

Types of depreciation, service life, salvage value, present value and methods of determiningdepreciation single unit and group depreciation, single unit and group depreciation.

UNIT-IV

Profitability Alternative lnvestment and Replacements:

Methods for profitability evaluation, cash flow diagram. Determination of acceptableinvestment. Alternatives when an investment must be made and analysis with a smallincrement investment, replacement, break even analysis..Balance sheet and incomestatement.

Optimum design:

Procedure with one variable optimum reflex ratio in distillation and other examples.

BOOKS RECOMMENDED:

1. Peters, M.S. Timmerhaus, K.D. Plant Design and Economics of Chemical Engineers.
2. Ulrich G.D. A Guide to chemical Engineering process Design and Economics, Than Wiley (1984).
3. Guthrie, K.M. Craftsman Solano Beach Calif (1974)

ENERGY TECHNOLOGY

CHE-404N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Introduction: Classification of energy source and resources, present and future energydemands. Solid Fuels: Principal solid fuels, Classification of Indian coals, coal preparation, storage ofcoal, low and high temperature carbonization, briquetting.

UNIT–II

Liquid fuels: crude petroleum, Physical processing of crude petroleum- distillation,purification of petroleum products, properties of petroleum products , liquid fuels from coalby hydrogenation or liquification, storage and handling of liquid fuels.

UNIT-III

Gaseous Fuels: Natural gas, LPG, Producer gas Water gas and carburetted water gas,storage and distribution of gaseous fuels.

UNIT-IV

Principles of combustion: Combustion of fuels (solid, liquid and gaseous), Combustionequipment, Incomplete combustion, efficiency and heat recovery, calorific value, gasanalysis, Fluidized bed combustion.

BOOKS RECOMMENDED:

1. Elements of Fuel, Furnaces and Refractories by O.P. Gupta, Khanna Publisher, Delhi.
2. Energy Technology, Non conventional, Renewable and conventional by S.Rao& B.B. Parulekar, Khanna Publisher, Delhi

REFERENCES BOOKS:

1. Fuels - solid, liquid and gaseous by J.S. Brame and J.C. King, MGH.

INDUSTRIAL HAZARDS AND SAFETY

CHE-406N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Definition, ldentification, classification and assessment of various types of industrialhazards.General principles of industrial safety, importance of safety in chemical industrial.Protective and preventive measures in hazard control.

UNIT-II

Standard safety procedures for disaster control, lndian legislation on safety and prevention ofhazards and safety code. Environmental Protection Act (1986).

UNIT-III

Toxic chemicals, Maximum allowable concentration and other standards biological thresholdlimit values, toxicity and radioactivity. Regulations for storage and handling of hazardoussubstances and labelling.

UNIT-IV

Hazards, hazards classification, hazard due to the explosion' Dow's fire and explosion index,HMOP, guide words and their meaning, application of guide words to hazardousoperation-deviation,possible causes, Consequences and actions required, event trees and fault trees.

BOOKS RECOMMENDED:

1. Chemical process safety fundamentals with applications by crowl, D'A' and Louvar, J.F. Prentice Hall, Delhi.
2. Safety in process plant design by Wells, G'L'
3. Industrial hazards and safety handbook'

ENERGY TECHNOLOGY (LAB)

CHE-408N

L	T	P		
-	-	3	**Sessional:**	**40 Marks**
			Practical:	**60 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

LIST OF EXPERIMENTS:

1. To find out flash point and fire point.
2. To find the pour point and cloud point.
3. To find the aniline point of fuel.
4. To find the viscosity of liquid fuel using Redwood viscometer.
5. To study the ASTM distillation unit.
6. Proximate analysis and ultimate analysis of coal.
7. Bomb Calorimeter.
8. Junckers Gas Colorimeter.

PULP AND PAPER TECHNOLOGY

CHE-416N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Present status of pulp and paper manufacture.

Raw Material Preparation: Fibrous raw materials. Debarking, chipping, chip screening, storage.

Pulping: Chemical and mechanical pulping processes.

UNIT-II

Bleaching: Objective of bleaching, bleachability requirement, bleaching chemicals and their production, single and multi-stage bleaching process.

Pulp Processing: Deknotting, defibering, brown stock washing, Screening, Cleaning, thickening, blending.

UNIT-III

Paper manufacture: Approach flow system, wire part, sheet forming process. Sheet transfer mechanism, press part, theory of pressing, dryer part, paper drying process, calendaring, cylinder mould machine, finishing, fiber recovery systems, recent developments in paper making, coating and lamination.

UNIT-IV

Paper properties: Physical (optical, strength and resistance), chemical and electrical properties. Paper defects.

Paper grades: Types, composition, manufacturing techniques, properties and uses, environmental pollution control in papermaking.

BOOK RECOMMENDED:

1. Pulp and Paper Chemistry and Chemical Technology by J.P. Casey. Vol. 1,3rd ed., Wiley Interscience Publication.
2. Pulping Processes by S. A. Rydholm, Wiley Interscience Publication.
3. Pulp and Paper Science and Technology by C. E. Libby, Vol-1, MeGraw Hill.

CATALYTIC PROCESSES
CHE-418N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Classification of catalytic reactors.Physical properties of catalyst.Classification and preparation of catalyst.

UNIT-II

Dynamics of selective and polyfunctional catalysis, rate of fluid solid catalytic reactions, analysis of external transport processes in heterogeneous reactions in fixed bed, fluidized bed and slurry reactors.

UNIT-III

Intrapettet mass transfer, heat transfer, mass transfer with reactions and simultaneous heat and mass transfer with reactions, catalyst selectivity and poisoning.

UNIT-IV

Design calculations for ideal catalytic reactors operating at isothermal adiabatic and non-adiabatic conditions. Deviations from ideal reactor performance. Design of industrial fixed bed, fluidized bed and slurry reactors.

BOOK RECOMMENDED:

1. Chemical Engineering Kinetics by J.M Smith, McGraw Hill, 3rd ed. (1981).
2. Mass Transfer in Heterogeneous Catalysis by C. N. Satterfield, MIT Press, Cambridge.

NOVEL SEPARATION TECHNIQUES

CHE-420N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Separation processes in chemical and biochemical industries, categorization of separation processes, equilibrium and rate governed processes.

Nature of bubbles and foams, stability of foams fraction techniques, batch, continuous, single stage and multistage columns.

UNIT-II

Physical factors in membranes, osmotic pressure, partition coefficient and permeability, concentration polarization, electrolyte diffusion facilitated transport.

UNIT-III

Ultra filtration, reverse osmosis and electro dialysis, membrane structure and production.

UNIT-IV

Theory and application of pervapouration, permeation, critical extraction and freez-drying.

BOOKS RECOMMENDED:

1. Separation Processes by C. J. King, Tata McGraw Hill.
2. New Separation Techniques by J.D. Henry & N.N. Li, AICHE Today Series, AICHE (1975).
3. Hand Book of Separation Techniques for Chemical Engineers by Philip A. Schweitzer, McGraw Hill Book Company.

MIXING THEORY AND PRACTICE
CHE-422N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Impeller types, tank geometry and impeller placement.Power comsumption and head, effect of tank baffles, effect of impeller location, motor and impeller loading.

UNIT-II

Settling velocity, process design consideration, selection of mixers, and power consumption in slurries.Liquid-liquid emulsion and their correlation parameters. Uniform dispersion criteria, gas-liquid dispersion criteria.

UNIT-III

Chemical Reaction: Macro nixing, influence of flow pattern on chemical reaction. Micro mixing, influence of diffusion on chemical reaction.

UNIT-IV

Liquid-solid mass transfer: Principle method of correlation, Gas-liquid-solid processes.
Liquid-liquid mass transfer: Batch mass transfer relationship, counter-current, multistage operation, mixer settlers.
Gas-liquid mass transfer: Effect of gas rate and power on gas-liquid mas transfer.

BOOKS RECOMMENDED:

1. Mixing principles and Application by S. Nagata, John Wiley, 1975.
2. Fluid mixing Technology by J. Y. Oldshue, McGraw Hill, !983.

OPTIMIZATION TECHNIQUES IN CHEMICAL ENGINEERING

CHE-424N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Introduction to system analysis and modeling with reference to chemical engineering problems.Different methods for solving one and two variable problems, with and without constrints- case studies, application of langrangian multiplier method.

UNIT-II

Liner programming-modeling, graphical method, single phase simplex method, two phase complex method, duality, sensitivity analysis.

UNIT-III

Geometric Programming-Problems with degree of difficulty equal to zero and one, with and without constraints.

UNIT-IV

Search Methods-sequential search method, golden section method, and dichotomous search method.

Introduction to dynamic programming as applied to discrete multistage problems.

Computer programming techniques applied to optimization.

BOOKS RECOMMENDED:

1. Optimization Theory and Practice by Baveridege and Schecheter.
2. Linear programming by Hadley
3. Non-linear programming by Hadley

FERMENTATION TECHNOLOGY

CHE-426N

L	T	P		
4	1	-	**Theory:**	**75 Marks**
			Sessional:	**25 Marks**
			Total:	**100 Marks**
			Duration of Exam:	**3 Hour**

UNIT-I

Introduction to fermentation processes, microbial culture, microbial growth kinetics, multistage systems, feedback systems, feed batch cultures. Application of batch, continuous, and feed batch cultures.

UNIT-II

Isolation, preservation and improvement of industrial micro-organisms, isolation methods, selection and characterization of microorganisms, various methods of preservation of microorganism mutagens.

UNIT-III

Air and media sterilization techniques, sterilization of equipment and fermenters, instrumentation and classification of fermenters, their design, sampling and monitoring of various parameters, foam control.

UNIT-IV

Development of inocula for bacterial and fungal processes, effect of inocula on morphology of fungi in submerged culture.Asceptic inoculation to plant fermenters.Recovery and purification of fermentation products, separation of biomass, various methods of product separation and purification, filtration, precipitation, centrifugation and ion exchange.

BOOKS RECOMMENDED:

1. Principle of Fermentation Technology by P.F. Stanbury and Whitaker, Pergemon Press, (1984)

Bachelor of Technology (Information Technology)

SCHEME OF STUDIES/EXAMINATIONS

7th and 8th Semester (w.e.f. the session 2018-19)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Bachelor of Technology (Information Technology)

SCHEME OF STUDIES / EXAMINATIONS

Semester – VII (w.e.f Session 2018-19)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1.	IT-401N	Compiler Design	4	1	--	5	75	25	--	100	3
2.	IT-403N	Artificial Intelligence	4	1	--	5	75	25	--	100	3
3.	IT-405 N	Fundamentals of Entrepreneurship	4	1	--	5	75	25	--	100	3
4.	DEC-1	Elective-1**	4	1	--	5	75	25	--	100	3
5.	DEC-2	Elective-2**	4	1	--	5	75	25	--	100	3
6.	IT-407N	Server Side Programming Lab	--	--	3	3	---	40	60	100	3
7.	IT-409 N	Mobile Application Development Lab	--	--	3	3	---	40	60	100	3
8.	IT-411 N	Project I #	---	--	3	3	--	40	60	100	3
9.	IT-413 N	Industrial Training (Viva-Voce)##	--	--	--	--		50		50	
		Total	**20**	**5**	**09**	**34**	**375**	**295**	**180**	**850**	

Note: Industrial Training which was undergone by the students after VI sem is to be evaluated during VII sem as **(IT-413N)** through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar / presentation / demo etc.

#*The project should be initiated by the students in the beginning of VII*h *semester and will be evaluated at the end of the semester on the basis of a presentation , viva , demo , report etc.*

** **Student should select two Departmental Elective Course (DEC) from the following list:-**

Departmental Elective Courses			
Course No.	**DEC-1**	**Course No.**	**DEC-2**
IT-415 N	Advanced Computer Network	IT-421 N	Software Testing
IT-417 N	Introduction to computer animation	IT-423 N	Software Project management
IT-419 N	Simulation and Modeling	IT-425 N	Distributed Operating System

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Bachelor of Technology (Information Technology)

SCHEME OF STUDIES / EXAMINATIONS

Semester – VIII (w.e.f Session 2018-19)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1.	IT-402N	Mobile Communication	4	1	-	5	75	25	--	100	3
2.	IT-404N	Advanced Database System	4	1	-	5	75	25	--	100	3
3.	IT-406N	Information Security	4	1	--	5	75	25	--	100	3
4.	DEC-3	Elective-3 *	4	1	--	5	75	25	--	100	3
5.	DEC-4	Elective-4 *	4	1	--	5	75	25	--	100	3
6.	IT-408 N	Mobile Communication Lab	---	-- -	3	3	---	40	60	100	3
7.	IT-410N	Python Programming Lab	---	--	3	3	---	40	60	100	3
8.	IT-412 N	Project II	--	--	3	3	---	40	60	100	3
9.	IT-414 N	Comprehensive Viva ##	--	--	--	--	---	25	--	25	--
10.	IT-416 N	General Fitness & Professional Aptitude **	--	--	--	--	---	--	25	25	--
		Total	**20**	**5**	**09**	**34**	**375**	**270**	**205**	**850**	

IT-414 N (Comprehensive Viva) Marks will be based on student's Technical knowledge , professional aptitude, GK , current affairs, logical / analytic reasoning etc. Each student will be evaluated by a team comprising of at least 03 senior faculty members of the department.

**** IT-416 N (General Fitness & Professional Aptitude) : To be examined by an external and internal examiner at the rank of the Director / Principal / Senior faculty member of department. Marks on the basis of student's Technical knowledge , professional aptitude, GK , current affairs, logical / analytic reasoning etc.**

*** The student should select two Departmental Elective Courses (DEC) from the following list:-**

Departmental Elective Courses			
Course No.	**DEC-3**	**Course No.**	**DEC-4**
IT- 418 N	Cloud Computing	IT- 424 N	Expert system
IT- 420 N	Introduction to Internet of Things	IT- 426 N	Big Data and Analytic
IT- 422N	Image Processing	IT- 428 N	Object Oriented Software Engineering

Semester VII

IT-401 N	Compiler Design					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To familiarize the students to design and implement a compiler.**					
Course						
CO 1	To understand, design and implement a lexical analyzer.					
CO 2	To understand, design and implement a parser.					
CO 3	To understand, design code generation schemes.					
CO 4	To understand optimization of codes and runtime environment					

UNIT I

Introduction to Compiling

Analysis of the source program, Phases of a compiler, Grouping of Phases, Compiler construction tools.
Lexical Analysis –Regular Expression, Introduction to Finite Automata and Regular Expression, Conversion of Regular Expression to NFA, Role of Lexical Analyzer, Input Buffering, Specification of Tokens.

UNIT II

Syntax Analysis

Role of the Parser, Writing Grammars, Symbol Table, Context-Free Grammars, Shift-reduce Parser, Operator Precedence Parsing, Top Down Parsing ,Predictive Parsers, LR Parsers: SLR Parser, Canonical LR Parser, LALR Parser, Implementation of LR Parsing Tables.

UNIT III

Intermediate Code Generation and Code

Intermediate languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, DAG representation of Basic Blocks, A simple Code generator from DAG, Issues in the design of code generator , The target machine , Runtime Storage management, Error Handling- Type checking,

UNIT 1V

Code Optimization and Run Time Environments

Principal Sources of Optimization, Optimization of Basic Blocks, Peephole Optimization, Introduction to Global Data Flow Analysis, Source Language issues, Storage Organization, Static Storage Management, Heap Storage management, Access to non-Local Names, Parameter Passing.

Text books

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, Pearson Education Asia, 2003.
2. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003

Reference books

1. Allen I. Holub “Compiler Design in C”, Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003.
3. J.P. Bennet, “Introduction to Compiler Techniques”, Second Edition, Tata McGraw-Hill, 2003.
4. HenkAlblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-403 N	Artificial Intelligence					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**The purpose of this course is to introduce students the basic research areas in artificial intelligence**					
Course Outcomes						
CO 1	To study various AI problems and techniques.					
CO 2	To study knowledge representation methods.					
CO 3	To study certainty and uncertainty based reasonings.					
CO 4	To study the basic concepts of fuzzy, neural nets & natural language processing.					

Unit-1

Introduction –foundation and history of AI:, Classical, Romantic and Modern period, Applications of AI.
Production System: - Production rules, the working memory, Recognize-act cycle, conflict resolution strategies, refractoriness, Regency, specificity, alternative approach for conflict resolution, Architecture of production system, Types of Production systems, conclusion

Unit –2

Prepositional Logic: - Proposition, tautologies, Theorem proving in prepositional logic, Semantic method of Theorem proving, forward chaining, backward chaining, standard theorems in prepositional logic, method of substitution, theorem proving using Wang's algorithm, conclusion.
Predicate Logic: - Alphabet of First order logic (FOL), predicate, well formed formula, clause form, algorithm for writing sentence into clause form, inflict of predicates, unification algorithm, resolution Robinson's inference rule, conclusion

Unit – 3

Logic Programming and Prolog: - Logic program, Horn clause, program for scene interpretation, unification of goals, definite perform clause, SLD resolution, SLD tree, controlling back tracking, common use of cut, implementation of backtracking using stack, risk of using cuts, fail predicate, application of cut-fail combination, replace cut-fail by not, conclusion.

Default & Non monotonic reasoning: - Axiomatic theory, non-atomic reasoning using NML-I, problems with NML-I, reasoning with NML-II, truth maintenance system with example, conclusion

Unit – 4

Imprecision & Uncertainty: - Definition, Probabilistic technicians, Fuzzy reasoning, certainty factor based reasoning conditional probability, Baye's Theorem and its limitations, Bayesian belief network, propagation of belief, Dampster-Shafer theory of uncertainty management, Types of Learning, Introduction to Genetic algorithm
Intelligent Search Technique: - Heuristic function, AND-OR graph, Heuristic search, A* algorithm and examples.

Text Books

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi.
2. Staurt Russel and other Peter Norvig, "Artificial Intelligence – a Modern Approach", Prentice Hall.

Reference Books.:

1. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley, third Ed.
2. Artificial Intelligence & Expert System By Patterson – PHI.

NOTE:
Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 405 N	Fundamentals of Entrepreneurship					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**The purpose of this course is to introduce students the basics of Entrepreneurship**					
	Course Outcome					
CO 1	Students will be able understand who the entrepreneurs are and what competences needed to become an Entrepreneur.					
CO 2	Students will be able understand insights into the management, opportunity search, identification of a Product; market feasibility studies; project finalization etc. required for small business enterprises.					
CO 3	Students can be able to write a report and do oral presentation on the topics such as product identification, business idea, export marketing etc.					
CO 4	Students be able to know the different financial and other assistance available for the establishing small industrial units.					

Unit -I

Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Entrepreneur; Manager Vs. Entrepreneur.

Unit -II

Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

Unit -III

Small Enterprises and Enterprise Launching Formalities : Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

Unit -IV

Role of Support Institutions and Management of Small Business : Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies-At least one in whole course.

Text Books:

1. Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi -Desai, Vasant, 2003.
2. Entrepreneurship Management -Cynthia, Kaulgud, Aruna, Vikas Publishing House, Delhi, 2003.

Reference Books:

1. Entrepreneurship Ideas in Action- L. Greene, Thomson Asia Pvt. Ltd., Singapore, 2004.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-415 N	Advanced Computer Networks					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To familiarize different protocols & applications of computer networks.**					
Course						
CO 1	To study MAC protocols for High speed networks.					
CO 2	To study IPv6 addressing schemes.					
CO 3	To study wireless application protocol for communication.					
CO 4	To study the concepts to manage networks.					

UNIT – 1

Introduction: Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols, etc. MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)

UNIT-2

Fast access technologies (For example, ADSL, Cable Modem, etc.).
Overview of IPv6, IPv6 & TCP/IP stack,IPv6 protocol architecture, IPv6 address basics, address notation, unicast address, multicast address , IPv6 headers, Routing table problem, static & automatic address configuration, neighbor discovery, stateless address auto configuration, Interoperation concepts of IPv4/IPv6.

UNIT-3

Mobility in networks, Mobile IP. Security related issues in mobile IP. IP Multicasting. Multicast protocols, address assignments, session discovery, etc.
Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key, distribution protocols. Digital signatures, digital certificates.

UNIT-4

The Wireless Applications Protocols, applications environment, wireless application protocol client software, wireless application protocol gateways, implementing enterprise wireless application protocol strategy and Security Issues in Wireless LAN. Wireless network management, GPRS, and VOIP services.
Network Management: Introduction, LAN, SNMP, and CMIP. Issues in the management of large networks. Multicast: IGMP, PIM, DVMRP

Text Books:

1. W.R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2. G.R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.

References Books:

1. W.R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.
2. R. Handel, M.N. Huber, and S. Schroeder. ATM Networks. Concepts, protocols, Applications, Addison Wesley, 1998.
3. William Stalling, Wireless Communications and Networks. Prentice Hall 2002

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 417 N	Introduction to Computer Animation					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To introduce the student to the concepts of Animation**					
	Course outcomes					
CO 1	To study various Production Pipeline Components of animation					
CO 2	To introduce the students to Pre-visualization Techniques , Modeling , Texturing					
CO 3	To study Rigging and Rendering					
CO 4	To learn about the various animation techniques.					

Unit 1

Introduction: Defining 3D animation , Exploring 3D animation industry , history of animation, Understanding Production Pipeline Components : Animation preproduction , Animation production , Animation Postproduction

Unit 2

Exploring Animation, Story, and Pre-visualization : Using Principles of Fine Art and Traditional Animation : Modeling , Texturing / lighting, Character animation ; Building a good story : Story Arc, Character goal & conflict , , Storytelling Principles , ; Pre-visualization Techniques : Basic Shot Framing , camera movements , editing ; **Modeling :** Polygons , NURBS , Subdivision surfaces , modeling workflows
Texturing : UVs , shaders , Texture maps , Texturing workflows

Unit 3

Rigging : Parenting , Pivot Position , Skelton system , Forward & Inverse kinematics , Deformers, Constraints , Scripting , expressions , Basic Rigging workflow
Animation : Keyframe , Graph editor, timeline, Dope sheet , Workspace , animation workflow
Visual effects : Particles , Hair & Fur , Fluids , Rigid bodies , Soft bodies ; **Lighting :** Types , Light attributes , lighting techniques **;Rendering :** Basic method , global illumination **;** Creating Stereoscopic 3D ; Providing Real-Time Capabilities

Unit 4

Animation techniques : Interpolation and Basic Techniques: controlling the motion along a curve, Path following, key frames , Animation languages, deforming objects , Morphing, 3Dshape interpolation ; **Natural Phenomena:** Plants , water, Gaseous Phenomena , **Modeling and Animating Articulated Figures**

Text book :

1. Andy Beane , *"3D Animation essentials"* , John Wiley & sons , 2012.
2. Rick Parent, "*Computer Animation: Algorithms and Techniques"* , Morgan Kaufmann Publishers, 2012,
3. Nicholas Bernhardt Zeman , *"Essential Skills for 3D Modeling, Rendering and Animation",* CRC press , 2015

Reference Book

1. Donald Hearn & M. Pauline Baker ,WarrenCarithers, "*Computer Graphics With OpenGL*", 4thEdition, Pearson Education, 2010, ISBN: 0-13-015390-7
2. John F. Hughes, Andries van Dam , "*Computer Graphics: Principles and Practice" Addison-Wesley Professional*, 3rdEdition, 2013, ISBN: 978-0-321-39952-6

NOTE:
Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-419 N	Simulation and Modeling					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To introduce the principles and paradigms of Computer Modeling and Simulation for solving a wide variety of problems.**					
Course Outcomes						
CO 1	Learn the basic concept of System, system modeling, types of model, simulation and					
CO 2	Learn the simulation of contiguous and discrete system with the help of different					
CO 3	Learn the concept of generation of uniformly and non-uniformly distribution random					
CO 4	Learn the simulation of queuing system.					

UNIT-1

Modeling: System Concepts,system boundaries and environment,continuous and discrete systems,system modeling, Types of Models, Model validation , Principles & Nature of Computer modeling.

Simulation: Introduction, Basic nature of simulation, when to simulate, Advantages,disadvantages and limitations of simulation, Concepts of simulation of continuous and discrete system with the help of example.

UNIT-2

Continuous System Simulation: Analog vs. digital simulation, continuous simulation vs. numerical integration, simulation of a chemical reactor, simulation of a water reservoir system.

Discrete system simulation:Fixed time-step vs. event-to-event model, Monte-Carlo computation vs. stochastic simulation, generation of random numbers, and generation of non-uniformly distributed random numbers

UNIT-3

Simulators for the Live systems: Simulation of queuing Systems: basic concepts of queuing theory, simulation of single server, two server and more general queuing system.

Simulation of PERT network: Network model of a project, analysis of an activity network, critical path computation, uncertainties in activity durations, simulation of an activity network.

UNIT-4

Simulation of inventory control systems: Elements of inventory theory, inventory models, generation of Poisson and Erlang variates, simulator for complex inventory systems. Simulation of hypothetical computers.

Design and Evaluation of Simulation Experiments: Variance reduction techniques. Experiment layout and Validation

Simulation Languages: Continuous and Discrete Simulation Languages.

Text Books:

1.Gordon G.: System simulation, Prentice-Hall of India Pvt. Ltd. New Delhi 1993
2.Narsingh Deo: System Simulation with Digital Computer, PHI New Delhi, 1993

Reference Books:

1. Neelankavil Frances: Computer Simulation and Modelling, John Wiley & Sons, New York, 1987.
2. Payne, James A.: Introduction to simulation: Programming Techniques and Methods of Analysis, McGraw-Hill international Editions, Computer Science services, New York (1998).
3.Reitam Julian: Computer Simulation Experiments, Wiley Interscience 1971.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-421 N	Software Testing					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To provide an understanding of concepts and techniques for testing software and assuring its quality.**					
Course Outcomes						
CO 1	Expose the criteria and parameters for the generation of test cases.					
CO 2	Learn the design of test cases and generating test cases.					
CO 3	Be familiar with test management and software testing activities.					
CO 4	Be exposed to the significance of software testing in web and Object orient techniques.					

UNIT–1

Introduction: Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, What is software testing and why it is so hard? Test Cases, Test Oracles, Testing Process, Limitations of Testing.

UNIT-2

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique. Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

UNIT-3

Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, and Slice based testing, Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

UNIT-4

Object oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing. Testing Web Applications : What is Web testing?, User interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing.

TEXT BOOKS:

1. Naresh Chauhan "Software Testing Principles and Practices" Oxford Publications, 2012.
2. Louise Tamres, "Software Testing", Pearson Education Asia, 2002.
3. Robert V. Binder, "Testing Object-Oriented Systems-Models, Patterns and Tools", Addison Wesley, 1999.
4. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.

REFERENCE BOOKS:

1. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
2. K.K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International Publishers, New Delhi, 2005.
3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Boris Beizer, "Black-Box Testing –Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc.,New York, 1995.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 423 N	Software Project Management					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**The purpose of this course is to introduce students the basics of Entrepreneurship**					
CO 1	To study software economics evolution.					
CO 2	To study software management process & its framework.					
CO 3	To study software management planning, responsibilities.					
CO 4	To familiarize students about Project Management And Control					

Unit-1

Conventional Software Management : Evolution of software economics, Improving software economics: reducing product size, software processes, team effectiveness, automation through, Software environments, Principles of modem software management.

Unit-2

Software Management Process : Framework,: Life cycle phases- inception, elaboration, construction and training phase. Artifacts of the process- the artifact sets, management artifacts, engineering artifacts, and pragmatics artifacts, Model based software architectures, Workflows of the process, Checkpoints of the process.

Unit-3

Software Management Disciplines : Iterative process planning, Project organizations and responsibilities, Process automation, Project control and process instrumentation core metrics, management indicators, life cycle expectations, Process discriminates.

Unit-4

Project Management And Control : framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
2. . Software Project Management, Walker Royee, Addison Wesley, 1998

REFERENCE BOOKS :

1 Project management 2/e, Maylor.
2. Managing the Software Process, Humphrey.
3. Managing Global Software Projects. Ramesh, TMfH, 2001

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-425 N	Distributed Operating System					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**Distributed operating system is an important field for study to drive general research in distributed systems.**					
Course Outcomes						
CO 1	To study the issues of distributed operating system					
CO 2	To study mutual exclusion algorithms of DOS.					
CO 3	To study deadlock detection & handling strategies of DOS.					
CO 4	To study scheduling of distributed operating system (DOS).					

Unit-1

Architecture of distributed O.S:- Introduction, motivation, system architecture type, issues in distributed O.S., Communication primitive.

Unit-2

Distributed mutual Inclusion:- Introduction, classification preliminaries simple solution, non token based algorithm, Lamport algorithm, Ricart algorithm, Mackawa's algorithm, A generalized non token based algorithm,, token based algorithm, Broad cast algorithm, Heuristic algorithm, tree based algorithm, comparative performance analysis.

Unit-3

Distributed dead lock detection:- Introduction, dead lock handling strategies, issues in deadlock detection & resolution, Control organization, centralized, distributed & hierarchical detection algorithm.

Unit-4

Distributed file system:- Introduction, architecture mechanism for building, design issues, log structured file system.

Distributed Scheduling:-Introduction, motivation, issues in load distribution, component of load algorithm, stabilizing load distribution algorithm, performance comparison, selection of a suitable load sharing algorithm, requirement for load distribution, task migration, issues in task migration.

Text Books:

1. Mukesh Singhal & N.G. Shivaratri: Advanced concepts in operating systems, TMH 2001.
2. A S Tanenbamn: Modern operating systems, PHI.

Reference Books.:

1. A. Silberschatz, P.Galvin, G.Gagne: Applied operating system concepts, Wiley.
2**.** Operating System Concepts , P.S.Gill, Firewall Media

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-407 N	Server Side Programming Lab					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	**3**	**60**	**40**	**100**	**3**
Purpose	To gain familiarity with what server-side programming is, what it can do, and how it differs from client-side programming.					
Course Outcomes						
CO 1	To study Fundamentals of server side programming and basic programs					
CO 2	To Implement program in ASP to display day, month, date, digital clock.					
CO 3	To implement string function using ASP.					
CO 4	To implement the use of Forms and its validations using ASP.					

List of Experiments:

1. Create a Subroutine with arguments passing & call the subroutine for specific no. of time.
2. Write a program in ASP which define an object & then display the properties of object with method.
3. Write a program in ASP to display present day, month & date. Also display digital clock.
4. Write a program in ASP which will check that a specific file, folder & drive exist or not. Also return the extension of file. Then use the read & write properties on a file using text-stream object.
5. Send information to the user after he submit the form using GET & POST method & implement from validation.
6. Write a program in ASP that has a form taking the user's name as input. Store this name in a permanent cookie & whenever the page is opened again, then value of the name field should be attached with the cookie's content.
7. Use ad-rotator to change advertisements on client side request.
8. Create a session dictionary using object tag. In session-on start add keys for time, user agent, remote I.P. & add appropriate values. Create a simple page to display the values.
9. Implement session tracking using user authentication.
10. Write a program to delete all cookies of your web site that has created on the client's computer.
11. Write a program is ASP to check the capabilities of the browser using browser capability component.
12. Using data base to store & retrieves values input by a user showing them & make updating & add new records to existing database.
13. Create two ASP pages, a form creation web page (selectprice.asp) and a form processing script (liststockbyprice.asp). In selectprice.asp, the user should be shown a form in which he can enter the item & desired maximum price. When it is submitted liststockbyprice.asp will return all the stocks from database whose cost are less than the price entered by user.

Note: A student has to perform at least 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT-409 N	Mobile Application Development Lab					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	**3**	**60**	**40**	**100**	**3**
Purpose	In this lab, a student is expected to design, implement, document and present a mobile client/server system					
Course Outcomes						
CO 1	Build a native application using GUI components and Mobile application development					
CO 2	Develop an application using basic graphical primitives and databases					
CO 3	Construct an application using multi threading and RSS feed					
CO 4	Make use of location identification using GPS in an application					

LIST OF PRACTICALS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Implement an application that implements Multi threading
6. Develop a native application that uses GPS location information.
7. Implement an application that writes data to the SD card.
8. Implement an application that creates an alert upon receiving a message.
9. Write a mobile application that creates alarm clock.
10. Develop a sign-in page with appropriate validation.
11. Develop a real life application that makes use of database.

Note: A student has to perform at least 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

Semester VIII

IT-402 N	Mobile Communication					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To impart knowledge of mobile and wireless communication systems and techniques.**					
Course Outcomes						
CO 1	To study the concepts of mobile communication and antennas.					
CO 2	Learn the basic concepts of GSM, GPRS.					
CO 3	Study of various analog & digital modulation techniques.					
CO 4	To study satellite system architecture					

Unit-1

Introduction:

Introduction cell mobile system, tuning efficiency, mobile radio environment, frequency reuse, co channel interface reduction, and handoff mechanism cell cite and mobile antennas, non cochannel interface. Frequency spectrum utility and management channel management, type of handoff and dropped call rat, cell splitting.

Analog and digital modulation techniques, performance of various modulations, spectra efficiency, and error rate, GMSK, GFSK, DQPSK modulation technique in wireless system comparison of various modulation techniques.

Unit-2

Point to point model propagation over terrains, Losses, Power requirements, Smart Antennas, antennas at cite, gain and pattern relationship mobile antennas, tilting effect, parasitic elements usage, diversity techniques.

Unit-3

Digital technology, digital speech, digital mobile telephony, GSM, Multiples access techniques, north TDMA, American TDMA (ISI36), Japauer cellular TDMA (DDC), CDMA, ISFS North American CDMA standards, PCS, PHS, Advanced system, GPRS,
UMTS, IMT, WAP.

Unit-4

Satellite system architecture, satellite orbit and constellations, LEO and MEO system, GPS Information, Iridium, MSAT, VSAT, DBS, Orbcomm satellite service, use of mobile communication networks, concepts, advanced mobile communication system
using satellite.

Text Book :

1. Rappapart T.S, “Wireless communication”, Prentice Hall, NJ.
2. GSM, CDMA & 3G System-steel Lee and Gluis, JW.

Reference Books.:

1. K.FEHER-Wireless Digital engineering
2. Mobile Satellite communication Engineering-Richards Addison Wesley.
3. Lee, WCY, “Mobile Communication Engineering”, TMIH, New Delhi.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 404N	Advance Database System					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**The student will get knowledge of query optimization, parallel and distributed database systems.**					
	Course outcomes					
CO 1	To study the fundamental theories and requirements that influence the design of modern database systems					
CO 2	To apply acquired knowledge for developing holistic solutions based on database systems/database techniques					
CO 3	To study and evaluate methods of storing, managing and interrogating complex data					
CO 4	To analyze the background processes involved in queries and transactions, and explain how this impact on database operation and design.					

Unit-1

Parallel & Distributed Databases : Architecture for parallel database, parallel query evolution, parallelizing individual operations, parallel query optimization introduction to distributed databases, distributed DBMS architectures, sorting data in a distributed database DBMS, Distributed catalog management, Distributed query processing, updating distributed data, introduction to distributed transactions, Distributed concurrency control, recovery.

Unit 2

Data Mining : Introduction, counting co-occurrences, mining for rules, tree structured rules, clustering, similarity search over sequences

Unit 3

Object database systems : User defined ADT, structured types, objects and reference types, inheritance, design for an ORDBMS, challenges in implementing an ORDBMS, OODBMS, comparison of RDBMS with OODBMS and ORDBMS

Unit 4

Advanced topics : Advanced transactions processing, integrated access to multiply data source, mobile data bases main memory databases, multimedia data bases, GIS, Temporal and sequenced databases.

TEXT BOOKS:

1. R. Ramakrishna & J. Gehrks "Database Management Systems" MGH, International Ed., 2000.

REFERENCE BOOKS:

1. Korth, Silberschatz, Sudershan: Data Base concepts, MGH, 2001.
2. C. J. Date, Database Systems, 7th Ed., Addison Wesley, Pearson Education, 2000.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 406 N	Information Security					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**The course will be useful for students who plan to do research/product development/analysis in areas related to secure computing in their career.**					
	Course outcome					
CO 1	To learn basics of network security and cryptography.					
CO 2	To study network authentication mechanism, with security algorithms.					
CO 3	To explore the knowledge of key exchange protocols.					
CO 4	To realize the effect on digitized security.					

Unit-1

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Unit-2

Symmetric key Ciphers: Block Cipher principles, Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.

Asymmetric key Ciphers: Principles of public key crypto systems, Algorithms (RSA, Diffie-Hellman, and ECC), Key Distribution.

Unit-3

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, HMAC, CMAC, Digital signatures, knapsack algorithm

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

Unit-4

E-Mail Security: Pretty Good Privacy, S/MIME.

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Firewall design principles, types of firewalls.

TEXT BOOKS

1. William Stallings , *"Cryptography and Network Security"* :, Pearson Education,4‴ Edition
2. Atul Kahate , "*Cryptography and Network Security*", Mc Graw Hill Edition

REFERENCE BOOKS

1. Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2‴" Edition
2. Mark Stamp , *"Information Security, Principles and Practice"* Wiley India.
3. WM.Arthur Conklin, Greg White , *"Principles of Computer Security",* TMH

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-418N	Cloud Computing					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To familiar the concepts of cloud services and storage to deploy various resources and arbitrary software.**					
Course Outcomes						
CO 1	Facilitate the basic usage and applicability of computing paradigm.					
CO 2	Explore various cloud service and deployment models to utilize different cloud services.					
CO 3	To get enabled for various data, scalability & cloud services in order to get efficient database for cloud storage.					
CO 4	To deal with various security threats and their controlling mechanism for accessing safe cloud services.					

Unit-1

Overview of Computing Paradigm: Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, evolution of cloud computing, Business driver for adopting cloud computing.
Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards.

Unit-2

Cloud Computing Architecture: Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels,How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS) -Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models-Public cloud, Private cloud, Hybrid cloud, Community cloud.

Unit-3

Service Management in Cloud Computing: Service Level Agreements (SLAs), Billing & Accounting, comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data-Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing. Case study: Eucalyptus, Microsoft Azure, Amazon EC2.

Unit-4

Cloud Security: Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Text Books

1.Barrie Sosinsky, Cloud Computing Bible, Wiley - India,2010.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.

Reference Books

1. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.
2. Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley- India, 2010.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 420 N	Introduction to Internet of Things					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To introduce the student to the fundamentals of Internet of Things**					
	Course outcomes					
CO 1	To introduce a student to IoT and M2M					
CO 2	To study design methodology of IoT					
CO 3	To study the IoT reference Architecture					
CO 4	To apprise students about the various applications of IoT.					

Unit 1

Introduction : Introduction to IOT, definition and characteristics of IOT, Physical and logical design of IOT, IOT functional blocks, IOT communication model , IOT enabling technologies, IOT advantages & disadvantages ; Difference between IoT and M2M , SDN & NFV for IOT ; Everything as a Service (XaaS)

Unit 2

IoT platform design methodology ; IoT and M2M fundamentals : Devices and gateways; Data management ; Business processes in IoT ; M2M and IoT Analytics, Knowledge Management.
Architecture Reference Model : Domain model , Information model , Functional model , Communication model , Safety , Privacy , Trust , Security, Device level energy issues ;

Unit 3

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Real world Design constraint
IoT Standards and Protocols: IoT Related Standardization ; An introduction to **: -** Zigbee , Z-Wave , Thread , MQTT , CoAP, AMQP , Bluetooth Low Energy.

Unit 4

Examples and applications of IOT : Home automation , Environment , Energy, Retail , Logistics , Agriculture , Industry, Smart cities , Participatory sensing , Health and Lifestyle

Text Books

1. Arshdeep Bahga, Vijay Madisetti, *"Internet of Things, A Hands -on Approach"*, 1st Ed 2015, University Press
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, , ***"****From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence****",*** 1st Edition, Academic Press, 2014.
3. Ovidiu Vermesan , Peter Friess , *"Internet of Things – From Research and Innovation to Market Deployment"* , River publishers , 2014
4. https://www.tutorialspoint.com ,*"Internet of things tutorial"*

Reference Books

1. Francis daCosta , *"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything"*,1st Edition, Apress Publications, 2013.
2. Oliver Hersent, David Boswarthick, *"The Internet of Things: Key applications and protocol"*, Wiley ; 2011
3. Michael Miller, *"The Internet of Things, How Smart TVs, Smart Cars, Smart Homes, and Smart Cities are changing the World"*, First edition , 2015 , Pearson Education

NOTE:
Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 422 N	Image Processing					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**The objective of this course is to prepare students to conduct research in image processing.**					
	Course outcomes					
CO 1	To Understand key algorithms for point, neighborhood, and geometric operations					
CO 2	To study image transformation methods.					
CO 3	To study different techniques of image compression.					
CO 4	To study different attributes of images.					

Unit-1

Digital image fundamentals, application of digital image processing, elements of digital image processing systems, vidicon camera, Line scan CCD senso, area sensor, flash A/D converter display – elements of visual perception, structure of the human eye, Luminance, brightness, contrast, mach band effect, image fidelity criteria, color models, - RGB, CMY, HIS mathematical preliminaries of 2D systems, convolution, Fourier transform – ZS transform – toeplitz and circulant matrices, orthogonal and unitary matrices.

Unit- 2

Image transforms, Unitary transform, 2D, DFT, DCT, DST, Discrete wavelet transform, Discrete Hadamard, Walsh, Hostelling transform, SVD transform, Slant Haar transforms. Image Enhancement and Restoration: Constrast stretching, intensity level slicing, Histogram equalization, spatial averaging, directional smoothing, Median filtering, nonlinear filters, maximum, minimum, geometric mean contra harmonic mean, LP mean filters, edge detection, Roberts, Sobel, Isofropic, Kinesh, Campass gradient, Laplacian operators.

Unit- 3

Degradation model - unconstrained and constrained restoration, inverse filtering, removal of blur caused by uniform linear motion, Wiener filtering, geometric transformations for image restoration.

Unit –4

Image compression- Huffman coding, truncated Huffman coding, Br, Binary codes, arithmetic coding, bit plane coding contrast area coding, Run length encoding, transform coding JPEG and MPEG coding schemes. Image Segmentation, pixel based approach, feature threshold, choice of feature, optimum threshold, threshold selection methods, region based approach, region growing, region splitting, region merging, spilt and merge.

Text books :

1. Gonzalez, R.C. and Woods, R.E., "Digital image processing", Addison Wesley.
2. A.K.Jain, "Fundamentals of Digital Processing", PHI.

Reference Books

1. Umbaugh, S.E. "Computer vision and image processing", Prentice Hall Int. NJ
2. W. Pratt, "Digital Image Processing", Wiley Inter-science

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-424 N	Expert System					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**75**	**25**	**100**	**3**
Purpose	**To familiarize the student about the methodologies used to transfer the knowledge of a human expert into an intelligent program to solve real-time problems**					
Course Outcomes						
CO 1	Examining the fundamentals and terminologies of expert system.					
CO 2	To introduce students to expert system tools.					
CO 3	Signifying AI techniques to solve social, industrial and environmental problems.					
CO 4	Application of professional aspects in multi-disciplinary approach to meet global Standards towards design, realizing and manufacturing.					

Unit-1

Introduction to AI programming languages, Blind search strategies, Breadth first – Depth first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game tress, Min-max algorithms, game playing – Alpha beta pruning.

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules based deduction systems.

Unit-2

Introduction to Expert Systems, Architecture of expert system, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, System-building aids, support facilities, stages in the development of expert systems.

Unit-3

Building an Expert System: - Expert system development, Selection of tool, Acquiring Knowledge, Building process.

Unit-4

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain expert, difficulties during development.

TEXT BOOKS

1. Elain Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, New Delhi, 2008.
2. Waterman D.A., “A Guide to Expert Systems”, Addison Wesley Longman, 1985.

REFERENCE BOOKS

1. Staurt Russel , Peter Norvig, “Artificial Intelligence – A Modern Approach”, Prentice Hall, 1995.
2. Patrick Henry Winston, “Artificial Intelligence”, Addison Wesley, 1979.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat and Waterman: Building Expert Systems, Addison Wesley, 1983.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 426 N	Big Data and Analytics					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To provide knowledge of Big Data Analytics and Distributed File Systems.**					
	Course outcomes					
CO 1	To learn in details the concepts of big data.					
CO 2	Expose the criteria of big data analytics and big data storage.					
CO 3	To explore knowledge of big data compression techniques.					
CO 4	To explore learning of big data tools .					

Unit-1

Big Data Background:-Big data definition and features of big data, big data value, development of big data, challenges of big data, NoSQL databases, technologies related to big data including cloud computing, Internet of Things, data center, Hadoop, relationship between IoT and big data, relationship between hadoop and big data, big data generation and acquisition includes data collection, data transmission, data pre-processing, big data applications.

Unit-2

Big Data Analytics and Storage:-Big data analysis, big data analytic methods and tools, Pig, Hive, Flume, Mahout, Big data storage, distributed storage system for massive data, storage mechanism for big data GFS, HDFS, HBase, MongoDB, Cassandra, big data storage deduplication techniques, fixed-size and variable-size blocks based deduplication, content defined chunking, frequency based chunking, byte and mult-byte indexing techniques, Cloud storage.

Unit-3

Big Data Compression:-Big data delta compression, Xdelta implementation, Message Digest (MD5), Secure Hash Algorithm (SHA-1/SHA-256), Gear Hash, Tiger Hash, Rabin and Incremental Secure Fingerprint based deduplication, lossless duplicate and similar data elimination approaches,Parallel deduplication and compression using PCOMPRESS, Scalable Decentralized Deduplication Store (SDDS) using Cassandra.

Unit-4

Big Data Processing:- Installation procedure with system requirements for Apache Hadoop, Cassandra, Spark, Pig, Hive, HBase, MongoDB large scale distributed storage systems, Map Reduce programming model working, YARN architecture, Apache Pig and Hive architecture, Single node and Multi-nodes Hadoop Cluster Set up and running a Big Data example, NoSQL implementation.

Text Books:-

1. "Big Data" by Viktor Mayer-Schönberger, Kenneth Cukier, ISBN:978-0544002692, Eamon Dolan/Houghton Mifflin arcourt 2013.
2. “Big Data Now”, by O’Reilly Media Inc., ASIN: B0097E4EBQ, O’Reilly 2012.
3. “Hadoop Operation”, by Eric Sammer, ISBN: 978-1449327057, O’Reilly 2012.

Reference Books:-

1. “Programming Hive”, by Edward Capriolo, ISBN: 978-1449319335,O’Reilly 2012.
2. “HBase: the Definitive Guide”, by Lars George, ISBN: 978-1449396107, O’Reilly 2011.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 428N	Object Oriented Software Engineering					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**--**	**75**	**25**	**100**	**3**
Purpose	**To impart knowledge about the use of Object Oriented Software Engineering approaches and platforms to solve real time problems.**					
CO 1	To learn the basic concepts of object oriented systems and software engineering.					
CO 2	To get exposure of various object modeling methodologies					
CO 3	To explore problems using Use Cases, analyzing relations, responsibilities and collaborations among classes and their behavior in problem domain.					
CO 4	To evaluate object oriented design processes using models, design patterns, interfaces designs and communication mechanisms for performing required tasks.					

Unit-1

Introduction : An Overview of Object-Oriented system Development, Objects Basis, Class Hierarchy, Inheritance, Polymorphism, Object Relationships and Associations, Aggregations and Object Containment, Object Persistence, Meta-Classes, Object Oriented Systems Development Life Cycle: Software Development Process, Object Oriented Systems Development: A Use-Case Driven Approach.

Unit -2

Object Oriented Methodologies: Rumbaugh Methodology, Jacobson Methodology, Booch Methodology, Patterns, Frameworks, The Unified approach, Unified Modeling Language (UML)

Unit -3

Object Oriented Analysis Process,Use Case Driven Object Oriented Analysis, Use Case Model, Object Analysis: Classification, Classification Theory, Approaches for identifying classes, Responsibilities and Collaborators, Identifying Object Relationships, Attributes and Methods: Associations, Super-Sub Class relationships, A-Part-of-Relationships-Aggregation, Class Responsibilities, Object Responsibilities.

Unit -4

Object Oriented Design process and Design Axioms, Corollaries, Design Patterns, Designing Classes: Object Oriented Design Philosophy, UML Object Constraint Language, Designing Classes: The Process, Class Visibility, Refining Attributes, Designing Methods and Protocols, Packages and Managing classes, View Layer: Designing Interface objects, Designing View layer Classes, Macro and Micro Level Interface Design Process.

Text books:

1. Ali Bahrami, "Object Oriented Systems Development", McGraw Hill , 2013.
2. Rumbaugh et al., "Object Oriented Modeling and Design", PHI, 2006.
3. Robert Laganière and Timothy C. Lethbridge, "Object-Oriented Software Engineering: Practical Software Development", McGraw-Hill , Sixth Print 2008.

Reference books:

1. Ivar Jacobson, Magnos Christerson, Patrick Jonsson, Gunnar Overgaard, Object-oriented Software Engineering: A Use Case Driven Approach, Pearson Education, New Delhi, 7th Edition Reprint, 2009.
2. David C. Kung, "Object-Oriented Software Engineering: An Agile Unified Methodology", McGraw-Hill, 2013.
3. Bernd Bruegge, Allen H. Dutoit, "Object-Oriented Software Engineering: Using UML, Patterns, and Java", Pearson New International, Third Edition, 2013.

NOTE:

Eight questions are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-408 N	Mobile Communication Lab					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**-**	**3**	**60**	**40**	**100**	**3**
Purpose	**To understand and demonstrate the communication techniques and satellite system.**					
Course Outcomes						
CO 1	To study of home networking					
CO 2	To study RF environment and GSM networks.					
CO 3	To establish the link of establish link between GPS satellite and GPS trainer					
CO 4	To establish PC to PC communication using satellite communication link					

LIST OF PRACTICALS:

1. Observe the Modulation and demodulation using internal generation of 2047 bit PN sequence as modulator input and Bit error rate measurement with PRBS-11data (2047 bits).
2. Study of home networking using combination of CDMA, BLUETOOTH, infrared Ethernet & various sensors like fire, gas air conditioning. Use at least five sensors
3. Understanding RF environment & study of GSM network by actually connecting to the GSM environment by any services provide SIM like airtel, idea, RPG etc.
4. Real time study of various GSM commands like Network registration, call control, call setting, call information, phone book commands & commands related to network information about number of cells and their strength etc.
5. To understanding the concept of GPS and establishing link between GPS Satellite & GPS Trainer.
6. To establish audio & video combined link & data communication between transmitters, receiver satellite transponder simulated in a lab.
7. To study and observe the difference in uplink & downlink frequency.
8. To establish PC-to-PC communication using satellite communication link.
9. To calculate antenna gain and antenna beam width.
10. Study and observe the Wave Modulation and Demodulation
11. To plot the radiation pattern of micro strip antennas.
12. Study and observe the antenna matching and antenna radiation with distance.

Note: A student has to perform at least 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT – 410 N	Python Programming Lab					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
--	**--**	**3**	**60**	**40**	**100**	**3**
Purpose	The course is designed to provide Basic knowledge of Python					
CO 1	To study fundamentals of python programming and implement basic programs.					
CO 2	To implement the searching technique using python.					
CO 3	To implement sorting techniques using python.					
CO 4	To implement matrix multiplication using python.					

LIST OF PRACTICALS:

1. WAP to compute the GCD of two numbers.
2. WAP to find the square root of a number
3. WAP to find the Exponentiation (power of a number)
4. WAP to find the maximum of a list of numbers
5. WAP for Linear search and Binary search
6. WAP for Selection sort, Insertion sort
7. WAP for Merge sort
8. WAP to find first n prime numbers
9. WAP to multiply matrices
10. WAP that take command line arguments (word count)
11. WAP to find the most frequent words in a text read from a file
12. WAP to Simulate elliptical orbits in Pygame
13. WAP to Simulate bouncing ball using Pygame

Note: A student has to perform at least 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

B. Tech. Mechatronics Engineering(3rd Semester) only for Batch: 2017-2021

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment Marks				Exam Duration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-201N	Digital Electronics	3	1	-	4	25	75	-	100	3
2	MT-203N	Essential Mechanics & Fluids	3	1	-	4	25	75	-	100	3
3	MT-205N	Thermal Engineering	3	1	-	4	25	75	-	100	3
4	MT-207N	Mathematical Foundation for Engineers	3	1	-	4	25	75	-	100	3
5	AS-201N/ HS-201N	Mathematics–III / Fundamentals of Management	3	1	-	4	25	75	-	100	3
6	MT-209N	Theory ofMachines-I	3	1	-	4	25	75	-	100	3
7	MT-211N	Digital Electronics Lab	-	-	2	2	40	-	60	100	3
8	MT-213N	Essential Mechanics & Fluids Lab	-	-	2	2	40	-	60	100	3
9	MT-215N	Theory of Machines-I Lab	-	-	3	3	40	-	60	100	3
		Total	**18**	**6**	**7**	**31**	**270**	**450**	**180**	**900**	
10	MPC-201N	Environmental Studies	3	0	0	3	-	100	0	100	3

Note:

1. *MPC-201N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*
2. *Students are allowed to use programmable scientific calculator during examination.*

B. Tech. Mechatronics Engineering (4th Semester) only for Batch: 2017-2021

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment Marks				ExamDuration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-202N	Computer Aided Design and Manufacturing	3	1	-	4	25	75	-	100	3
2	MT-204N	Analog Circuits	3	1	-	4	25	75	-	100	3
3	MT-206N	Design Basics	3	1	-	4	25	75	-	100	3
4	MT-208N	Energy Management	3	1	-	4	25	75	-	100	3
5	AS-201N/ HS-201N	Mathematics–III/ Fundamentals of Management	3	1	-	4	25	75	-	100	3
6	MT-210N	Theory of Machines-II	3	1	-	4	25	75	-	100	3
7	MT-212N	Analog Circuits Lab	-	-	2	2	40	-	60	100	3
8	MT-214N	Computer Aided Design and Manufacturing Lab	-	-	2	2	40	-	60	100	3
9	MT-216N	Theory of Machines-II Lab	-	-	3	3	40	-	60	100	3
		Total	**18**	**6**	**7**	**31**	**270**	**450**	**180**	**900**	
10	MPC-202N	Energy Studies	3	0	0	3	-	100	0	100	3

Note:

1. *All the students have to undergo 5 to 6 week industrial training after 4th semester and it will be evaluated in 5th semester.*
2. *Students are allowed to use programmable scientific calculator during examination.*
3. *MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*

B. Tech. Mechatronics Engineering (5th Semester) only for Batch: 2017-2021

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment Marks				Exam Duration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-301N	Signal Conditioning	3	1	-	4	25	75	-	100	3
2	MT-303N	Pneumatic and Hydraulic Instrumentation	3	1	-	4	25	75	-	100	3
3	MT-305N	Embedded Systems-I	3	1	-	4	25	75	-	100	3
4	MT-307N	Heat Transfer	3	1	-	4	25	75	-	100	3
5	MT-309N	Production Technology-I	3	1	-	4	25	75	-	100	3
6	MT-311N	Measurements and Control	3	1	-	4	25	75	-	100	3
7	MT-313N	Signal Conditioning Lab	-	-	2	2	40	-	60	100	3
8	MT-315N	Pneumatic and Hydraulic Instrumentation Lab	-	-	3	3	40	-	60	100	3
9	MT-317N	Embedded Systems-I Lab	-	-	2	2	40	-	60	100	3
10	MT-319N	Industrial Training	2	-	-	2	100	-	-	100	
		Total	**20**	**6**	**7**	**33**	**370**	**450**	**180**	**1000**	

Note:

1. *Students are allowed to use programmable scientific calculator during examination.*
2. *The industrial training undertaken after 4th semester will be evaluated on the basis of student presentation and training reportsubmitted by the student related to industrial training.*

B. Tech. Mechatronics Engineering (6th Semester) only for Batch: 2017-2021

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment Marks				Exam Duration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-302N	Automatic Control Systems	3	1	-	4	25	75	-	100	3
2	MT-304N	Embedded Systems-II	3	1	-	4	25	75	-	100	3
3	MT-306N	Refrigeration and Air Conditioning	3	1	-	4	25	75	-	100	3
4	MT-308N	Internal Combustion Engines	3	1	-	4	25	75	-	100	3
5	MT-310N	Production Technology-II	3	1	-	4	25	75	-	100	3
6	MT-312N	Automatic Control SystemsLab	-	-	2	2	40	-	60	100	3
7	MT-314N	Embedded Systems-IILab	-	-	2	2	40	-	60	100	3
8	MT-316N	Production Technology-II Lab	-	-	4	4	40	-	60	100	3
		Total	**15**	**5**	**8**	**28**	**245**	**375**	**180**	**800**	

Note:

1. *Students are allowed to use programmable scientific calculator during examination.*
2. *All the students have to undergo 5 to 6 week industrial training after 6th semester and it will be evaluated in 7th semester.*

B. Tech. Mechatronics Engineering (7thSemester) only for Batch: 2017-2021

Sr. No.	Course No	Course Title	Teaching Schedule				Allotment Marks				Exam Duration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-401N	Automobile Engineering	3	1	-	4	25	75	-	100	3
2	MT-403N	Operations Research	3	1	-	4	25	75	-	100	3
3		Elective-I	3	1	-	4	25	75	-	100	3
4		Elective-II	3	1	-	4	25	75	-	100	3
5	MT-405N	Smart Materials	3	1	-	4	25	75	-	100	3
6	MT-407N	The Professional Engineer (Project-I)	2	-	3	5	100	-	100	200	3
7	MT-409N	Seminar	2	-	-	2	100	-	-	100	
8	MT-411N	Industrial Training	2	-	-	2	100	-	-	100	
		Total	**21**	**5**	**3**	**29**	**425**	**375**	**100**	**900**	

Note:

1. *Students are allowed to use programmable scientific calculator during examination.*
2. *The industrial training undertaken after 6th semester will be evaluated on the basis of student presentation and training reportsubmitted by the student related to Industrial training.*

ELECTIVE – I

1. MT-413N Advanced ManufacturingTechnology
2. MT-415N Finite ElementMethods
3. MT-417N Applied Numerical Techniques and ComputerProgramming
4. MT-419N Communication Systems

ELECTIVE – II

1. MT-421N Renewable Energy Resources
2. MT-423N Computational Fluid Dynamics
3. MT-425N Mechatronics Engineering
4. MT-427N Antenna & Wave Propagation

B. Tech. Mechatronics Engineering (8th Semester) only for Batch: 2017-2021

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment Marks				Exam Duration (Hours)
			L	T	P	Total	Sessional	Theory	Practical	Total	
1	MT-402N	Data Communication Systems	3	1	-	4	75	25	0	100	3
2	MT-404N	Non-ConventionalMachining	3	1	-	4	75	25	0	100	3
3	MT-406N	Sound and Noise Control	3	1	-	4	75	25	0	100	3
4		Elective-III	3	1	-	4	75	25	0	100	3
5		Elective-IV	3	1	-	4	75	25	0	100	3
6	MT-408N	Data Communication Systems Lab	-	-	2	2	40	-	60	100	3
7	MT-410N	The Professional Engineer (Project-II)	-	-	9	9	100	-	100	200	3
8	MT-412N	Comprehensive Viva	-	-	-	-	100	-	-	100	3
9	MT-414N	General Fitness and Professional Aptitude (Viva-Voce)	-	-	-	-	-	-	100	100	3
		Total	**15**	**5**	**11**	**31**	**615**	**125**	**260**	**1000**	

Note:

1. Students are allowed to use programmable scientific calculator during examination.

ELECTIVE – III

1. MT-416N Autotronics
2. MT-418N IndustrialRobotics
3. MT-420N ManufacturingManagement
4. MT-422N Fuzzy Logic and NeuralNetworks

ELECTIVE- IV

1. MT-424N Quality Assurance and Reliability
2. MT-426N Work Design and Ergonomics
3. MT-428N Digital Image Processing
4. MT-430N Non Destructive Testing

Semester 3

Digital Electronics

MT-201N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Fundamentals of digital techniques: Digital signal, logic gates: AND. OR, NOT, NAND, NOR- EX-OR, EX-NOR, Boolean algebra, Review of Number systems. Binary codes: BCD, Excess-3. Gray codes

Combinational design using gates: Design using gates. Karnaugh map and QuineMcluskey methods of simplification

UNIT II

Combinational design using mst devices: Multiplexers and Demultiplexers and their use as logic elements. Decoders, Adders / Subtracters, BCD arithmetic Circuits, Encoders, Decoders / Drivers for display devices

Sequential circuits: Flip Flops: S-R- J-K. T. D, master-slave, Conversion of one flip-flop to another flip flop, excitation table, edge triggered- shift registers, its types: SISO, PISO,PIPO,SIPO, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

UNIT III

Digital logic families: Switching mode operation of p-n junction, bipolar and MOS-devices. Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families, Tristate logic, Interfacing of CMOS and TTL families

UNIT IV

A/d and d/a converters: Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters: Quantization, parallel -comparator, successive approximation, counting type, Dual-slope ADC, specifications of ADCs

Programmable logic devices: ROM, PLA, PAL, Introduction to FPGA and CPLDs

TEXT BOOK:

1. Modem Digital Electronics (Edition III): R. P. Jain; TMH

REFERENCE BOOKS:

1. Digital Integrated Electronics: Taub& Schilling: MGH
2. Digital Principles and Applications: Malvino& Leach: McGraw Hill.
3. Digital Design: Morris Mano: PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Essential Mechanics & Fluids

MT-203N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

Unit 1

Simple stresses & strains: Concept & types of Stresses and strains, Polson's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, elastic constants & their relationships, temperature stress & strain in simple & compound barsunder axial loading, Numerical.

Compound stresses & strains: Concept of surface and volumetric strains, two dimensional stress system, conjugate shear stress at a point on a plane, principle stresses & strains and principal planes, Mohr's circle of stresses, Numerical.

Unit II

Shear Force & Bending Moments: Definitions, SF & BM diagrams for cantilevers, simplysupported beams with or without over-hang and calculation of maximum BM & SF and the point of contra flexture under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii)combination of concentrated loads and uniformly distributed loads, (iv) uniformly varying loads and (v) application of moments, relation between the rate of loading, the shear force and the bending moments, Problems.

Torsion of circular Members: Torsion of thin circular tube, Solid and hollow circular shafts,tapered shaft, stepped shaft & composite circular shafts, combined bending and torsion,equivalent torque, effect of end thrust. Numerical.

Unit III

Fluid Properties and Fluid Statics: Concept of fluid and flow, ideal and real fluids, continuumconcept, properties of fluids, Newtonian and non-Newtonian fluids. Pascal's law, hydrostaticequation, hydrostatic forces on plane and curved surfaces, stability of floating and submergedbodies, relative equilibrium. Problems.

Fluid Kinematics: Eulerian and Lagrangian description offluid flow; stream, streak and path lines; types of flows, flow rate and continuity equation,differential equation of continuity in cylindrical and polar coordinates, rotation, vorticity andcirculation, stream and potential functions, flow net. Problems.

Unit IV

Fluid Dynamics: Concept of system and control volume, Euler's equation, Bernoulli's equation,venturimeter, orifices, orificemeter, mouthpieces, kinetic and momentum correction factors,Impulse momentum relationship and its applications. Problems.Potential Flow: Uniform andvortex flow, flow past a Rankin half body, source, sink, source-sink pair and doublet, flow past acylinder with and without circulation. Problems.

TEXT BOOKS

1. Ramamurtham.S and Narayanan.R, *"Strength of material"*, DhanpatRai Pvt. Ltd., New Delhi, 2001.
2. Bansal.R.K, *"Strength of Material"*, Lakshmi publications Pvt. Ltd., New Delhi, 1996.
3. Kumar.K.L, *"Engineering Fluid Mechanics"*, Eurasla publishers Home Ltd., New Delhi, 1995.
4. Bansal.R.K, *"Fluid Mechanics and Hydraulic Machines"* ,Laxmi publications (P) Ltd., New Delhi, 1995.
5. Popov.E.P, *"Mechanics of Materials"*, Prentice Hall, 1982.
6. Timoshenko.S.P and Gere .M.J, *"Mechanics of Materials"*, C.B.S. publishers, 1986.

REFERENCES

1. Ferdinand P. Beer and Russell Johnston.E, *"Mechanics of Materials"*, SI metric Edition McGraw Hill, 1992
2. Srinath.L.N, *"Advanced Mechanics of Solids"*,Tata McGraw Hill Ltd., New Delhi.
3. Ramamurthan.S, *"Fluid Mechanics and Hydraulics"*, DhanpatRai and Sons, Delhi, 1988.
4. Fox R.W and Mc. Donald .A.T, *"Introduction to fluid Mechanics"*, 5th Ed. John Wiley and Sons, 1999.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Thermal Engineering

MT-205N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNITI

Basic Concepts: Thermodynamics: Macroscopic and Microscopic Approach, Thermodynamic Systems, Surrounding and Boundary, Thermodynamic Property – Intensive and Extensive, Thermodynamic Equilibrium, State, Path, Process and Cycle, Quasi-static, Reversible and Irreversible Processes, Working Substance. Concept of Thermodynamic Work and Heat, Equality of Temperature, Zeroth Law of Thermodynamic and its utility.

UNIT II

Ideal and Real Gases: Concept of an Ideal Gas, Basic Gas Laws, Characteristic Gas Equation, Avagadro's law and Universal Gas Constant, P-V-T surface of an Ideal Gas. Vander Waal's Equation of state, Mixture of Gases, Mass, Mole and Volume Fraction, Gibson Dalton's law, Gas Constant and specific Heats, Entropy for a mixture of Gases.

UNIT III

First Law of Thermodynamics: Energy and its Forms, Energy and 1st law of Thermodynamics, Internal Energy and Enthalpy, 1st Law Applied to Non-Flow Process, Steady Flow Process and Transient Flow Process, Throttling Process and Free Expansion Process. Numerical

Second Law of Thermodynamics: Limitations of First Law, Thermal Reservoir Heat Source and Heat Sink, Heat Engine, Refrigerator and Heat Pump, Kelvin- Planck and Clausius Statements and Their Equivalence, Perpetual Motion Machine of Second Kind. Carnot Cycle, Carnot Heat Engine and Carnot Heat PumpNumericals

UNIT IV

Entropy: Clausius Inequality and Entropy, Principle of Entropy Increase, TemperatureEntropy Plot, Entropy Change in Different Processes, Introduction to Third Law of thermodynamics. Availability, Irreversibility and Equilibrium: High and Low Grade Energy, Availability and Unavailable Energy, Loss of Available Energy Due to Heat Transfer Through a Finite Temperature Difference, Effectiveness and Irreversibility. Numericals.

TEXT BOOKS:

1. Engineering Thermodynamics – C P Arora, Tata McGraw Hill
2. Engineering Thermodynamics – P K Nag, Tata McGraw Hill

REFERENCE BOOKS:

1. Thermal Science and Engineering – D S Kumar, S K Kataria and Sons
2. Engineering Thermodynamics -Work and Heat transfer – G F C Rogers and Maghew Y. R. Longman

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Mathematical Foundation for Engineers
MT-207N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Principle of Mathematical Induction: Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

Sets: Sets and their representations. Empty set.Finite and Infinite sets.Equal sets.Subsets.Subsets of a set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets.Difference of sets. Complement of a set. Properties of ComplementSets.

UNITII

Binomial Theorem: Statement and proof of the binomial theorem for positive integral indices. General and middle term in binomial expansion, simple applications.

Sequence and Series: Sequence and Series. Arithmetic Progression (A. P.). Arithmetic Mean (A.M.) Geometric Progression (G.P.), general term of a G.P., sum of first n terms of a G.P., infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M.

UNIT III

Mathematical Reasoning: Mathematically acceptable statements. Connecting words/phrases-consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics.

Validating the statements involving the connecting words, Difference between contradiction, converse and contrapositive.

UNIT IV

Statistics: Measures of position - mean, median, mode,Measure of dispersion - range, inter-quartile range, variance, standard deviation, Measure of skewness

TEXT BOOK:

1. Foundation Mathematics, A. Croft and R. Davidson, Addison-Wesley 1997, ISBN: 0201178044
2. Discrete Mathematics for Computer Scientists, J. Truss, Addison-Wesley 1999, ISBN: 0201360616

REFERENCE BOOK:

1. Advanced Engg. Mathematics : E. Kreyzig
2. Higher Engg. Mathematics : B.S. Grewal

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Mathematics- III
AS-201N

L	T	P
3	1	-

Sessional: 25Marks
Theory: 75Marks
Total: 100 Marks
Exam Duration: 3 Hours

UNIT-I

Fourier series: Euler's formulae, Orthogonality conditions for the Sine and Cosine function, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

Fourier Transforms: Fourier integrals, Fourier transforms, Fourier Cosine and Sine transforms, Properties of Fourier transforms, Convolution theorem, Parseval's identity, Fourier transforms of the derivative of a function, Application of transforms to boundary value problems (Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP: Formation and Solutions of PDE, Lagrange's Linear PDE, First order non-linear PDE, Charpit's method, Homogeneous linear equations with constant coefficients, Method of separation of variables.

Solution of linear programming problems: using Graphical and Simplex methods.

UNIT-III

Theory of Complex Variables: A review of concept of functions of a complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Line integral in complex plane: definition of the complex line integral, basic properties,

Cauchy's integral theorem, and Cauchy's integral formula, brief of Taylor's, Laurent's and Residue theorems (without proofs).

UNIT-IV

Probability theory: A review of concepts of probability and random variables, definitions of probability, addition rule, conditional probability, multiplication rule, Conditional Probability, Mean, median, mode and standard deviation, Bayes' Theorem, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function.

Standard Distributions: Binomial, Poisson and Normal distribution.

TEXT BOOKS:

1. Advanced Engg. Mathematics : E. Kreyzig
2. Higher Engg. Mathematics : B.S. Grewal

REFERENCES BOOKS:

1. E. Kreyszig : Advanced Engineering Mathematics, Wiley India.
2. B. V. Ramana: Engineering Mathematics, Tata McGraw Hill.
3. R.K. Jain, S.R.K. Iyengar: Advanced Engineering Mathematics, Taylor & Francis.
4. Murray R. Spiegel:Schaum's Outline of Complex Variables, McGraw Hill Professional.
5. Michael D. Greenberg: Advanced Engineering Mathematics, Pearson Education, Prentice Hall.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Fundamentals of Management
HS-201N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-1

Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration

Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development

Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, McGregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership.

UNIT-IV

Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM.

Recent Trends in Management: Management of Crisis, Total Quality Management, Stress Management, Concept of Corporate Social Responsibility (CSR) and business ethics.

Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources

TEXT BOOKS:

1. Management Concepts - Robbins, S.P; Pearson Education India
2. Principles of Management - Koontz &O'Donnel; (McGraw Hill)

RECOMMENDED BOOKS:

1. *Business Organization and Management* – Basu; Tata McGraw Hill
2. Management and OB-- Mullins; Pearson Education
3. Essentials of Management – Koontz, Tata McGraw-Hill
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
5. Prasad, Lallan and S.S. Gulshan. *Management Principles and Practices.* S. Chand& Co. Ltd., New Delhi.
6. Chhabra, T.N. *Principles and Practice of Management.* DhanpatRai& Co., Delhi.
7. Organizational behaviour – Robins Stephen P; PHI.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to*

attempt five questions selecting at least one question from each unit.

Theory of Machines-I
MT-209N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Kinematics: Introduction to analysis, Kinematics' pairs, Degree of freedom, Dynamitic chain mechanism, Machine, Four-bar chain, inversions, Single and double slider crank chain, Quick return mechanisms, Introduction to function generation, Path generation and rigid bodied guidance.

Velocity determination: Relative velocity methods, Instantaneous center method Acceleration determination, Kennedy's Space cent rode and body cent rode

UNIT II

Centripetal and tangential acceleration: Acceleration determination by graphical method using velocity polygons, Cariole's component of acceleration, Klein's and other constructions.

SHM: Introduction, Velocity and Acceleration of a Particle Moving with Simple Harmonic Motion, Differential Equation of Simple Harmonic Motion, Terms Used in Simple Harmonic Motion, Simple Pendulum, Laws of Simple Pendulum, Closely-coiled Helical Spring. Compound Pendulum, Centre of Percussion, Bifilar Suspension, Trifilar Suspension (Torsional Pendulum).

UNIT III

Straight line motion: Pantograph, straight-line motion mechanisms (Peculiar, Hart, Scott Russell, Grasshopper, Watt, Kemp's Tchybishev, Parallel linkages) Indicator mechanisms (Simplex Crosby, Thomson, etc) Automobile steering gears (Davis and Ackerman), Hooks joint (universal coupling), Double hooks joints.

Friction: Types of friction, Laws of dry friction, Motion along inclined plane Screw threads, Wedge, Pivots and collars, Plate and cone clutches, Antifriction bearings, friction circle and friction axis, bearings and lubrication. Motion along inclined plane and screws, Pivots and Collars Thrust Bearings lubrication

UNIT IV

Cams: Types of cams and followers, various motions of the follower, Construction of cam profiles, Analysis for velocities and accelerations of tangent and circular arc cams with roller and flat–faced followers.

Power transmission: Open and crossed belt drives, velocity ratio, slip , material for belts, crowning of pulleys, law of belting, types of pulleys, length of belts ratio of tensions, centrifugal tension, power transmitted by belts and ropes, initial tension, creep, chain drive, chain length, classification of chains

TEXT BOOKS:

1. Theory of machines: S. S. Rattan, Tata McGraw HillPublications
2. Theory of machines : R S Khurmi, S Chand Publications

REFERENCE BOOKS:

1. Theory of Mechanism and Machines: JagdishLal, Metropolitan BookCo.
2. Mechanism synthesis and analysis: A.H. Soni, McGraw HillPublications.
3. Mechanism: J.S.Beggs.
4. Mechanics of Machines: P.Black, PergamonPress.
5. Theory of Machines: P.L.Ballaney, KhannaPublisher.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Digital Electronics Lab
MT-211N

L	T	P
-	-	2

Sessional: 40Marks
Practical: 60Marks
Total: 100 Marks
Exam Duration:3 Hours

Note: Student will be required to perform total of 10experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENT

1. Familiarization with Digital Trainer Kit and associatedequipment.
2. Verify Truth Table of TTL gates AND, OR, NOT, NAND, NOR, EX-OR,EX-NOR.
3. Design and realize a given function using K-Maps and verify itsperformance.
4. To verify the operation of Multiplexer andDemultiplexer.
5. To verify the operation ofComparator.
6. To verify the truth table of S-R, J-K, T, DFlip-flops.
7. To verify the operation of Bi-directional shiftregister.
8. To design and verify the operation of 3-bit asynchronouscounter.
9. To design and verify the operation of synchronous Up/down counter using J-K flipflops& drive a seven-segment display using thesame
10. To design and verify the operation of asynchronous Decadecounter.
11. Study of TTL logic familycharacteristics.
12. Study of Encoder andDecoder.
13. Study of BCD to 7 segmentDecoder.

Essential Mechanics &Fluids Lab

MT-213N

L	T	P	
-	-	2	**Sessional: 40Marks** **Practical: 60Marks** **Total: 100 Marks** **Exam Duration:3Hours**

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS

1. To perform Torsion test on mild steelspecimen
2. To perform tensile test in ductile and brittle materials and to draw stress-strain curve and to determine various mechanicalproperties.
3. To perform any one hardness test (Rockwell, Brinell&Vicker's test) and determine hardness ofmaterials.
4. To perform compression test on C.I. and to determine ultimate compressivestrength.
5. A simply supported beam is carrying point loads, Uniformly distributed load and uniformly varying loads. Draw the SFD and BMD for thebeam.
6. To find the moment of inertia of flywheel.
7. To compare the actual value of pressure with calculated value with centre of pressure apparatus.
8. To determine the hydrostatic force on a curved surface under partial submerge and full submergecondition.
9. To perform Charpy and Izod impact test on steelspecimen
10. To perform Double shear test on steelspecimen
11. To perform Compression test onbrick
12. Determination of coefficient of discharge of orificemeter
13. Determination of coefficient of discharge of venturimeter
14. Major losses in pipeflow
15. Verification of Bernoulli'stheorem
16. Minor losses - expansion and contraction losses inpipes

Theory of Machines-I Lab
MT-215N

L	T	P	
-	-	3	**Sessional: 40Marks**
			Practical: 60Marks
			Total: 100 Marks
			Exam Duration:3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS

1. To determine the modulus of rigidity of the material of a closed coil helical springand the stiffness of aspring
2. To determine the value of coefficient of friction for a given pair of surfaces using frictionapparatus
3. To determine the modulus of rigidity of horizontalshaft
4. To determine experimentally the ratio of the cutting time to idle time (cutting stroke to idle stroke) of the crank and slotted lever (QRM)/ Whitworth and compare the result to theoretical values plot thefollowing
    - θ v/s X (displacement ofslider).
    - θ v/svelocity.
    - θ v/s Acceleration and to compare the values of velocities
      (Take angles θ =45˚, 90˚, 135˚, 225˚, 270˚ &335˚, ω = 1rad/s)
5. To determine the value of coefficient of friction between the screw and nut of the jack,while:
    - Raising theload
    - Lowering theload
6. To draw experimentally a curve of the follower-displacement v/s cam-angle. Differentiate the above curve to get velocity and acceleration plot and compare the values with those obtainedanalytically.
7. Todeterminethecoefficientoffrictionbetweenbeltandpulleyandplotagraphbetween $\log_{10} T_1/T_2$ v/s, θ.
8. To determine the displacement, velocities, & accelerations of the driven shaft of a Hooke's joint for a constant speed of the drivershaft.
9. Study of bifilar and trifilar suspensionsystem
10. Study of the inversions of the single slider crankmechanism.
11. To verify the law of moment using Bell- cranklever.

Environmental Studies
MPC-201N

L	T	P	
3	0	-	**Sessional: -----**
			Theory: 100 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT 1

The multidisciplinary nature of environmental studies: Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.

(b) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food Resources- World Food Problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

(f) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem: Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.EcologicalSuccession.Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem-

(a) Forest Ecosystem

(b) Grassland Ecosystem

(c) Desert Ecosystem

(d) Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, estuaries

Field Work: Visit to a local area to document Environments etsriver/forest/grassland/hill/mountain.Visit to a local polluted site- Urban/Rural Industrial / Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation: Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India.Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution: Definition. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management: Cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.Pollution case studies. Disaster management:floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment: .From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies.Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents

and holocaust. Case studies.WastelandReclamationConsumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and Control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness.Human population and the Environment.Populationgrowth, variation among nations. Population explosion-Family Welfare Programme. Environment and human health.Humanrights.ValueEducation.HIV/AIDS, Women and Child Welfare.Role of Information Technology in Environment and Human Health.Case Studies.

TEXT BOOKS:

1. Environmental Studies- Deswal and Deswal. DhanpatRai& Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India

REFERENCE BOOKS:

1. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
2. Environmental Science-Botkin and Keller. 2012. Wiley, India

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Semester 4

Computer Aided Design and Manufacturing

MT-202N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction to CAD/CAM: Historical Development, Industrial look at CAD/CAM Application of CA/CAM, Display devices, Input/ Output Devices, CPU.

Introduction to CIM, Definition, Nature of Elements of CIM, CIM Wheel, Introduction to computer aided quality control, Contact and Non Conduct Inspection Method.

UNIT-II

Modeling: Wireframe modeling, Representation of curves, Parametric and non-parametric curves, straight lines, Hermite cubic splines, B splines curves.

Plane surface, ruled surface, surface of revolution, bi-cubic surface, Bezier surface, B spline surface, Solid modeling, boundary representation, sweeping, parametric solid modeling.

.

UNIT-III

Basic commands: Introduction, Transformation of points & line, 2-D translation, rotation, Reflection, Scaling, shearing and combined transformation, Homogeneous coordinates, Orthographic and perspective Projections.

Group technology: Part families, Part classification and coding, Optiz method, product flow analysis, Machine cell Design, Advantages of GT

UNIT-IV

Numerical control: Types of NC systems, MCU & other components, Co-ordinate system, NC manual part programming, G & M codes, part program for simple parts, Computer assisted part programming.**FMS:**Introduction, FMS component, Types of FMS, FMS layout, planning for FMS, advantage and applications.Introduction, conventional process planning, Steps in variant process planning, types ofCAPP, planning for CAPP

TEXT BOOKS:

1. Chris McMahon and Jimmie Browne, CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, Second Edition, 2000.
2. Rogers, D.F. and Adams, A., Mathematical Elements for Computer Graphics, McGraw Hill Inc, NY, 1989
3. Ibrahim Zeid, CAD/CAM theory and Practice, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1992.
4. M.P. Groover, Automation, Productions systems and Computer-Integrated Manufacturing by Prentice – Hall

REFERENCE BOOKS:

1. Ibrahim Zeid, Mastering CAD/CAM, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. P. Radhakrishnan, S. Subramanayan and V.Raju, CAD/CAM/CIM, New Age International (P) Ltd., New Delhi.
3. Groover M.P. and Zimmers E. W., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall International, New Delhi, 1992.
4. Dr. Sadhu Singh, Computer Aided Design and Manufacturing, Khanna Publishers, New Delhi, Second Edition, 2000.
5. Chang, Wang &Wysk Computer Aided Manufacturing. Prentice Hall
6. Kundra&Rao, Numerical Control and Computer Aided Manufacturing by, Rao and Tiwari, Tata Mc-Graw Hill.
7. Mattson, CNC programming Principles and applications, Cengage Learning India Pvt.

Ltd. Delhi

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt*

five questions selecting at least one question from each unit.

Analog Circuits

MT-204N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

P-N junction diode: P-N junction and its characteristics, the load line concept, Applications: half-wave and full-wave rectifiers, capacitor-filter circuit, clipping and clamping circuits. Special Diodes: Zener diode, Schottky barrier diode, Varactor diode, Photodiode, Light emitting diode.

Regulated power supplies: Concept of DC Power supply, line and load regulations, three terminal IC regulators, SMPS.

UNIT-II

Transistors: Review of BJT and its characteristics, variation of operating point and stability. Transistor as amplifier, small signal equivalent circuit and Hybrid pi model, Emitter follower, Miller's theorem, R-C coupled amplifier, Multistage amplifier. Transistor Biasing: fixed bias, emitter bias with and without emitter resistance, limitations on BJT'S (at high frequency), Large signal model: Ebers-Moll Model. Large Signal Amplifier: Class A and ClassB.

UNIT-III

Feedback oscillators and power amplifiers:basic principles and types of feedback in amplifiers. Effect of feedback, Sinusoidal Oscillators: Use of positive feedback, Barkhausen's criterion, Different oscillator circuits-tuned collector, Hartley Colpitts, phase shift,Wien's bridge, and crystal oscillator.

Multivibrators: Concept of multi-vibrator: astable, monostable, and bistable and their applications, IC555.

UNIT-IV

Field effect transistors: JFET, pinch-off voltage, Volt-ampere characteristics, small signal model, MOSFET-Enhancement & Depletion mode, V-MOSFET, MOSFET amplifiers: C-S Amplifiers, C-D Amplifiers, C-D Amplifier. Biasing of JFETS and MOSFETS.

TEXT BOOKS:

1.Integrated Electronics: Millman&Halkias; McGraw Hill. 2. Electronic circuit analysis and design (Second Edition): D.A. Neamen; TMH

REFERENCE BOOKS:

1. Electronics Principles: Malvino; McGraw Hill. 2. Electronics circuits: Donald L. Schilling & Charles Belove: McGraw Hill. 3. Electronics Devices & Circuits: Boylestad&Nashelsky; Pearson.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Design Basics

MT-206N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Kinematics of simple vibrating motion: Simple harmonic motions, Vectorial representation of harmonic motion. Degree of freedom, Equations of motions, general solution of free vibration, Phase planemethod

Vibrations: Damped free vibration, undamped and damped forced vibrations, Vibrating isolation, Vibrating instruments.

UNIT II

Undamped free vibration: Principle modes , Influence coefficients, Coordinate coupling, Orthogonality, Vibration absorbers.Geometric method, Stability of equilibrium points, Method of harmonic balance.Influence coefficients, Dunkerleys equation, Matrix iteration, Holzer method, Rayleigh method, and Rayleigh-Ritz method.

Unit III

Bending & shear Stresses in Beams: Bending stresses in beams with derivation & application to beams of circular, rectangular, I,T and channel sections, composite beams, shear stresses in beams with derivation combined bending torsion & axial loading of beams. Numericals.

Columns & Struts: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Eulers formulae for the elastic buckling load, Eulers, Rankine, Gordom's formulae Johnson's empirical formula for axial loading columns and their applications, eccentric compression of a short strut of rectangular & circular sections, Numerical.

Unit IV

Slope & Deflection: Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numerical.

Fixed Beams: Deflections, reactions and fixing moments with SF & BM calculations & diagrams for fixed beams under (i) concentrated loads, (ii) uniformly distributed load and (iii) a combination of concentrated loads & uniformly distributedload.

TEXT BOOKS:

1. Mechanical vibration - By G.K. Grover; Nemchand Chand andSons
2. Mechanical Vibration – By Thomson; PrenticeHall
3. Strength of Materials – G.H.Ryder, Third Edition in SI Units 1969 Macmillan, India.
4. Mechanics of Materials – (Metric Edition) : Ferdinand P. Beer and E. Russel Johnston, Jr. Second Edition, McGraw Hill.

REFERENCE BOOKS:

1. Mechanical Vibration - By Den Hartog; McGrawHill
2. Introductory course to mechanical vibrations – By Rao and Gupta; WileyEastern
3. Book of Solid Mechanics – Kazmi, Tata McGrawHill
4. Strength of Materials – D.S. Bedi - S. Chand & Co.Ltd.
5. Advanced Mechanics of Solids and Structures – N. KrishanRaju and D.R.Gururaje-Narosa PublishingHouse.
6. Strength of Materials – Andrew Pytel and FredinandL. Singer Fourth Edition, Int. Student Ed. Addison – WesleyLongman.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Energy Management
MT-208N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Global scenario: Introduction to global energy scenario, global energy requirements, depletion of conventional energy resources, availability of non conventional energy resources, fallouts of energy resources, application of carbon credit

Technology and consideration for electrical and fuel energy: Electrical energy, the evolution of electric power, power plant location, electric power network, designed capacities, electric power storage, fuel energy, fossil fuels, coal, coal analysis, properties of coal, heating value of coal, fuel oil, natural and petroleum gas, combustion reactions

UNIT II

Principles of energy management: Introduction, energy planning, energy staffing, energy organization, energy requirement, energy costing, energy budgeting, energy monitoring, energy consciousness, energy conversions, energy efficient equipments, energy management professions, environment pollution due to energy use, evaluation of alternative energy resources.

Design of energy management programme: Saving energy and implementation of energy conservation, principles of energy management, need for energy management programe, agenda for organization structure, role of energy manager, implement energy conservation actions, continuing energy conservation efforts

UNIT III

Energy analysis and thermodynamics: fundamentals of thermodynamics, the first law, the second law, Carnot cycle, Rankine cycle, energy balance, heat balance for steam process, energy balance of steam generator. Energy nalaysis of real insdustrial systems-transportation systems, energy conservation in transportation, pattern of energy consumption, emission targets for transportation, new technologies, progress in clean diesel technology, areas of improvement, fuel, engine, exhaust systems, cleaning of tailpipe

UNIT IV

Energy analysis of real industrial systems-buildings: energy consumption in buildings, construction cost vs life cycle cost, building design-walls and roof, heating and ventilation (HVAC) systems, water supply systems, lighting systems, building data logger and advanced controls, the energy conservation act, natural building code of India. Procedures for Energy analysis and audit, categories of energy audit, types of energy audit, ventilation audit, measuring and detection instruments for energy survey, scope of energy audit

TEXT BOOKS:

1. Energy Management Principles by Criag B. Smith, Published by Pergamon Press.
2. Energy systems and developments – Jyoti Parikh, Oxford University Press.
3. Energy Engineering and Management by AmlanChakrabarti PHI learning pvt Ltd.

REFERENCE BOOKS :

1. Energy – resources, demand and conservation with reference to India – ChamanKashkari, Tata McGraw Hill Co. Ltd.
2. Integrated renewable energy for rural development – Proceedings of Natural solar energy convention, Calcutta.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Fundamentals of Management
HS-201N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-1

Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration

Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development

Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, McGregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership.

UNIT-IV

Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM.

Recent Trends in Management: Management of Crisis, Total Quality Management, Stress Management, Concept of Corporate Social Responsibility (CSR) and business ethics.

Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources

TEXT BOOKS:

3. Management Concepts - Robbins, S.P; Pearson Education India
4. Principles of Management - Koontz &O'Donnel; (McGraw Hill)

RECOMMENDED BOOKS:

8. *Business Organization and Management* – Basu; Tata McGraw Hill
9. Management and OB-- Mullins; Pearson Education
10. Essentials of Management – Koontz, Tata McGraw-Hill
11. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
12. Prasad, Lallan and S.S. Gulshan. *Management Principles and Practices.* S. Chand& Co. Ltd., New Delhi.
13. Chhabra, T.N. *Principles and Practice of Management.* DhanpatRai& Co., Delhi.
14. Organizational behaviour – Robins Stephen P; PHI.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Mathematics- III
AS-201N

L	T	P
3	1	-

Sessional: 25Marks
Theory: 75Marks
Total: 100 Marks
Exam Duration: 3 Hours

UNIT-I

Fourier series: Euler's formulae, Orthogonality conditions for the Sine and Cosine function, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

Fourier Transforms: Fourier integrals, Fourier transforms, Fourier Cosine and Sine transforms, Properties of Fourier transforms, Convolution theorem, Parseval's identity, Fourier transforms of the derivative of a function, Application of transforms to boundary value problems (Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP: Formation and Solutions of PDE, Lagrange's Linear PDE, First order non-linear PDE, Charpit's method, Homogeneous linear equations with constant coefficients, Method of separation of variables.

Solution of linear programming problems: using Graphical and Simplex methods.

UNIT-III

Theory of Complex Variables: A review of concept of functions of a complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Line integral in complex plane: definition of the complex line integral, basic properties,

Cauchy's integral theorem, and Cauchy's integral formula, brief of Taylor's, Laurent's and Residue theorems (without proofs).

UNIT-IV

Probability theory: A review of concepts of probability and random variables, definitions of probability, addition rule, conditional probability, multiplication rule, Conditional Probability, Mean, median, mode and standard deviation, Bayes' Theorem, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function.

Standard Distributions: Binomial, Poisson and Normal distribution.

TEXT BOOKS:

3. Advanced Engg. Mathematics : E. Kreyzig
4. Higher Engg. Mathematics : B.S. Grewal

REFERENCES BOOKS:

6. E. Kreyszig : Advanced Engineering Mathematics, Wiley India.
7. B. V. Ramana: Engineering Mathematics, Tata McGraw Hill.
8. R.K. Jain, S.R.K. Iyengar: Advanced Engineering Mathematics, Taylor & Francis.
9. Murray R. Spiegel:Schaum's Outline of Complex Variables, McGraw Hill Professional.
10. Michael D. Greenberg: Advanced Engineering Mathematics, Pearson Education, Prentice Hall.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Theory of Machines-II
MT-210N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Gears: Types of gears, terminology, condition for correct gearing, cyclical and involutes profiles of gear teeth, pressure angle, path of contact, arc of contact, Interference, undercutting, minimum number of teeth, number of pairs of teeth in contact, helical, spiral, worm and worm gear, bevel gear. Gear trains; simple, compound, reverted, and epicyclical, Solution of gear trains, sun and planet gear, bevel epicyclical gear, compound epicyclical gear, pre- selective gear box, differential of automobile, torque in geartaints.

UNIT II

Brakes: Types of brakes, friction brakes, external shoe brakes, band brakes, band and block brakes, internal expanding shoe brake, dynamometers; absorption, and tensional. Static and dynamic balancing of rotating parts, balancing of I. C. Engines, balancing of multi-cylinder engine; V-engines and radial engines, balancing of machines.

UNIT III

Gyroscope: Gyroscopic couple and its effect on craft, naval ships during steering, pinching and rolling, Stability of an automobile (2-wheeers), Introduction, open and closed lop control, terms related to automatic control, error detector, actuator, amplification, transducers, lag in responses, damping, block diagrams, system with viscous damped output, transfer functions, relationship between open –loop and closed loop transferfunction.

UNIT IV

Vibrations: Introduction, Terms Used in Vibratory Motion, Types of Vibratory Motion, Types of free Vibrations, Natural frequency of free Longitudinal Vibrations, Natural frequency of free Transverse Vibrations, Effect of Inertia of the Constraint in Longitudinal and Transverse Vibrations, Natural frequency of free Transverse Vibrations Due to a Point Load Acting Over a Simply Supported Shaft, Natural frequency of free Transverse Vibrations Due to Uniformly Distributed Load Over a Simply Supported Shaft, Natural frequency of free Transverse Vibrations of a Shaft fixed at Both Ends and Carrying a Uniformly Distributed Load, Natural frequency of free Transverse Vibrations for a Shaft Subjected to a Number of Point Loads.

TEXT BOOKS:

1. Theory of machines: S. S. Rattan, Tata McGraw HillPublications
2. Theory of machines : R S Khurmi, S Chand Publications

REFERENCE BOOKS:

1. Theory of Mechanism and Machines: JagdishLal, Metropolitan BookCo.
2. Mechanism synthesis and analysis: A.H. Soni, McGraw HillPublications.
3. Mechanism: J.S.Beggs.
4. Mechanics of Machines: P.Black, PergamonPress.
5. Theory of Machines: P.L.Ballaney, KhannaPublisher.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Analog Circuits Lab

MT-212N

L	T	P
-	-	2

Sessional: 40Marks
Practical: 60Marks
Total: 100 Marks
Exam Duration:3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS

1. Measurement & study of P-N junction diode-I-V and C-V characteristics.
2. Study of Half-wave and Full-wave rectifier.
3. Study of Active filters.
4. Study of diode as Clipper and Clamper.
5. Study of Zener diode as Voltage Regulator.
6. Measurement and study of Input and Output characteristics of a BJT.
7. Study of CE amplifier-Current & Power gains and Input, Output Impedances.
8. To study the frequency response of RC coupled amplifier.
9. Measurement and study of Output characteristics of JFET.
10. Measurement and study of Output characteristics of MOSFET.
11. Study of SCR/Thyristor characteristics.
12. Study of UJT characteristics.
13. Study of Push-Pull amplifier.
14. Simulation of few analog electronics circuits using PSPICE tools.

Computer Aided Design and Manufacturing Lab

MT-214N

L	T	P
-	-	2

Sessional: 40Marks
Practical: 60Marks
Total: 100 Marks
Exam Duration:3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS

1 To study the 2 dimensional drawing, orthographic views, front view, top view and side view.
2 To study the wireframe, surface and solid modelling.
3 Draw the part drawing of product 1 using any 3D software.
4 Draw the part drawing of product 2 using any 3D software.
5 Make assembly by using any 3D software.
6 To study the G codes and M codes.
7 Write a NC program for milling operation.
8 Write a NC program for drilling operation.
9 Write a NC program for turning operation.
10 To study the optiz method.

Theory of Machines-II Lab

MT-216N

L	T	P	
-	-	3	**Sessional: 40Marks** **Practical: 60Marks** **Total: 100 Marks** **Exam Duration:3 Hours**

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS

1. To determine experimentally, the moment of inertia of a flywheel and axle compare with theoreticalvalues.
2. To find out critical speed experimentally and to compare the whirling speed of a shaft with theoreticalvalues.
3. To find experimentally the Gyroscopic couple on motorized gyroscope and compare with appliedcouple.
4. To calculate the torque on a planet carrier and torque on internal gear using epicyclic gear train and holding torqueapparatus.
5. To study the different types of centrifugal and inertia governors and demonstrate anyone.
6. To study the automatic transmissionunit.
7. To study the differential types ofbrakes.
8. To find experimentally frequency of simple pendulum.

Energy Studies
MPC-202N

L	T	P	Sessional: ----
3	0	-	Theory: 100 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.
Energy Management: General Principles of Energy Management, Energy Management Strategy.
Energy Audit: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non-Conventional Energy sources: Basicprinciple, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant, Bio energy plants,Geothermal energy plantsand tidal energy plants.MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energyscenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

TEXT BOOKS:

1. Energy Studies-Wiley Dream tech India.
2. Non-conventional energy resources- Shobhnath Singh, Pearson.
3. Soni, Gupta, Bhatnagar: Electrical Power Systems – DhanpatRai& Sons

REFERENCE BOOKS:

1. NEDCAP: Non Conventional Energy Guide Lines
2. G.D. Roy :Non conventional energy sources
3. B H Khan :Non Conventional energy resources - McGraw Hill
4. Meinel A B and Meinal M P,Addison: Applied Solar Energy- Wesley Publications.
5. George Sutton: Direct Energy Conversion –McGraw

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Semester 5

Signal Conditioning
MT-301N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction to signal and its types: Introduction to Signals Processing, Classification of signals & their representation, continuous-discrete, Periodic –Non Periodic, even-odd, random-deterministic, energy-power signals & their problems. Commonly used signals (unit step, unit ramp, unit impulse, signum, gated factions etc.) in continuous & discrete form. Operations on signals (time shifting, time scaling, amplitude sacling etc.) properties of impulse.

UNIT – II

Fourier series & Transformation: Definition, conditions of existence of FS, properties, magnitude and phase spectra, some important FS theorems. Definition of FT, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT(ii) Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT

UNIT – III

Laplace-Transform (LT) and Z-transform (ZT): One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC), Convolution Theorem One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping, convolution theorem.

UNIT – IV

Sampling Theorem: Representation of continuous time signals by its sample –Types of sampling, sampling theorem. Reconstruction of a Signal from its samples, aliasing –sampling of band passsignals.Sample and Hold, Quantization and Coding, Analysis of quantization error

TEXT BOOKS:

1. Oppenheim and Nawab, Signals and Systems
2. John G. Proakis, Digital Signal Processing, PHI
3. S. K. Mitra, Digital Signal Processing , TMH

REFERENCES BOOKS:

1. Rabiner and Gold, Digital Signal Processing, PHI
2. Salivahan, Digital Signal Processing , TMH 5. Digital Signal Processing: Alon V. Oppenhelm;PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Pneumatic and Hydraulic Instrumentation
MT-303N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT – I

Fundamental principles: Industrial Prime movers, a brief system comparison, an electrical system, hydraulic system, pneumatic system, definitions of terms: mass and force, pressure, work, energy and power, torque, Pascal's law, pressure measurement, fluid flow, temperature scales and temperature measurement, gas laws.

Basic components of a pneumatic system: receiver tank, compressors, piston compressors, single acting and double acting compressors, multistage compressors, combined two stage compressors, diaphragm compressors, screw compressors, rotary compressors, dynamic compressors, air treatment: stages of air treatment, filters, air dryers, lubricators, pressure regulation: relief valves, non-relieving pressure regulators, relieving pressure regulators, service units.

UNIT – II

Actuators: Linear actuators, construction, mounting arrangements, cylinder dynamics, seals, rotary actuators, constructional details, application notes, speed control, actuator synchronization, regeneration, counterbalance and dynamic braking, pilot operated check valves, pre-fill and compression relief.

UNIT – III

Hydraulic pumps and pressure regulation: pressure regulation, pump types, gear pumps, vane pumps, piston pumps, combination valves, loading valves, filters, Control valves: Graphic symbols, types of control valve, poppet valves, spool valves, rotary valves, pilot operated valves, check valves, pilot operated check valves, restriction check valves, shuttle and fast exhaust valves, sequence valves, time delay valves, servo valves and modular cartridge valves.

UNIT – IV

Hydraulic and pneumatic accessories: hydraulic reservoirs, hydraulic accumulators, hydraulic coolers, hydraulic fluids, pneumatic piping, hoses and connections, hydraulic piping, hoses and connections, Process Control Pneumatics, signals and standards, the flapper nozzle, volume boosters, the air relay and force balance principle, pneumatic controllers, process control valves and actuators, flow control valves, actuators, valve positioners, converters: I-P converters and P-I converters, sequencing applications

TEXT BOOKS:

1. Pneumatic & Hydraulic, Andrew Parr PHI,1999
2. Pneumatic & Hydraulic, R Srinivasan, vijaynicole
3. Process Control Instrumentation Technology, C. D. Johnson ,PHI,2002
4. Computer based Industrial Control, KrishankantPHI,2004

REFERENCE BOOKS:

1. Process Industrial Instruments & Control Handbook D.Considine , McGraw Hill,1993.
2. Instrument Engineers Handbook ,B.Gliptak ,BH Publication,1999.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Embedded Systems-I

MT-305N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction to Microcontroller: -Evaluation of Microcontrollers. Classification of Microcontroller – On the basis of architecture andinstruction set.Embedded processor.Comparison between Microprocessor and Microcontrollers.A brief history of 8051.Overview of 8051 microcontroller family.Block Diagram and Architecture of 8051. Pin Description of 8051 microcontroller.

UNIT-II

Assembly and C programming of Microcontroller :- 8051 Instruction Format,Addressing modes, Data transfer instructions. Logical operations, Arithmetic operations, looping, jumpand call instructions, Time Delay programming. SFR (Special Function Registers).Development of different programs.Data types and Time Delays in 8051 C. Logic and Arithmetic operation in C.

UNIT-III

8051 Internal Architecture: - I/O port programming. Serial communication using 8051.Counter andTimers programming.Different modes of timer.Serial data input / output,Setting Baud Rate.Interrupt Programming –timer interrupts, external hardware interrupts, serial communication interrupt, priority interrupt. External memory interfacing.

UNIT-IV

Interfacing of microcontroller: Microcontroller based seven segment numeric displays.Microcontroller interfacing with keypad, Microcontroller based D/A& A/D converters andMicrocontroller based LCD display.Motor interfacing with microcontroller 8051.

TEXT BOOKS

1. The 8051 Microcontroller And Embedded Systems Using Assembly And C: Muhammad AliMazidi.
2. The 8051 Microcontroller: Kenneth J.Ayala

REFERENCE BOOKS

1. The 8051 Microcontroller:Mackenzie
2. 8051 Microcontroller: Internals, Instructions, Programming&Interfacing:GhoshalSubrata

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Heat Transfer
MT-307N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Introduction: definition of heat, modes of heat transfer; basic laws of heat transfer, application of heat transfer, simple problems.

Conduction: Fourier equation, electrical analogy of heat conduction; thermal conductivity, steady one dimensional heat conduction without internal heat generation: conduction through plane and composite wall, the cylindrical shell; the spherical shell; critical thickness of insulation; variable thermal conductivity, steady one dimensional heat conduction with uniform internal heat generation: the plane slab.

UNIT II

Convection: Introduction: Newton's law of cooling, convective heat transfer coefficient, Nusselt number, convection boundary layers: Introduction of velocity and thermal boundary layers and its significance with respect to convection (without derivations of boundary layer equations), local and average convection coefficient, functional form of the solution of boundary layer equations, Physical significance of the dimensionless parameters, Reynolds analogy, ***External Forced Convection:*** Introduction to empirical method of solution, flow over a flat plate with both conditions of constant heat flux and constant temperature, cylinder in cross flow, flow over a sphere, ***Internal Forced Convection:*** Introduction to velocity profile, pressure gradient and friction factor in fully developed flow, mean temperature, energy balance considering constant surface heat flux and for constant surface temperature, convection correlations for laminar flow in circular tubes both in entry region and in the fully developed region, ***Natural convection:*** Physical considerations, governing equations (without derivations), functional form of the solution of governing equations, empirical correlations for external free convection flow over the vertical plate, horizontal and inclined plates, horizontal cylinder and sphere.

UNIT III

Extended Surfaces: governing equation for fins of uniform cross section, temperature distribution and heat dissipation rate in infinitely long fin, fin insulated at tip, fin losing heat at tip; efficiency and effectiveness of fins.

Heat Exchangers: classification of heat exchangers; overall heat transfer coefficient, logarithmic mean temperature difference, effectiveness of heat exchangers, NTU method of heat exchanger design, applications of heat exchangers.

UNIT IV

Radiation: fundamental concepts, absorption, reflection and transmission, black body concept, monochromatic and total emissive power, Planck's distribution law, Stefan Boltzman law, Wien's displacement law, Kirchoff's law, intensity of radiation,Lambert's cosine law, heat transfer between black surfaces, radiation shape factor.

TEXT BOOKS:

1. Fundamentals of Heat and Mass transfer – Frank P. Incropera, David P. Dewitt, T.L. Bergman and A.S. Lavine, Wiley Publications.
2. Heat Transfer: A Practical Approach - Yunus A Cengel, Tata McGraw Hill.
3. Heat Transfer – J.P. Holman, Tata McGraw Hill.

REFERENCE BOOKS:

1. A Text book of Heat Transfer - S.P Sukhatme, University press
2. Heat and Mass Transfer - D.S Kumar, S.K. Kataria& Sons
3. Heat and Mass Transfer – P.K. Nag, Tata McGraw Hill.
4. Heat Transfer – Y.V.C. Rao, University Press.
5. Heat Transfer – P.S.Ghoshdastidar, Oxford Press.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Production Technology-I
MT-309N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Theory of Metal Cutting and Machinability: Introduction, classification of cutting tools, single point cutting tool nomenclature, positive and negative rake tools, elements of machining, classical metal machining processes, chip formation and types of chips, basic mechanism of chip formation, forces on the chip, velocity relationships, theories on mechanics of metal cutting, power and energy relations, thermal aspects of machining. Evaluation of machinability, tool life, tool life plots, types of tool failure, flank wear, variables influencing the tool failure.

UNIT II

Economics of metal machining &Mechanics of Multi-Point Cutting Tools: Economics of machining: Element of machining cost, analysis for optimum cutting speed, problems on economics of machining, tooling economics, machines economics and optimization. Milling cutters: conventional milling and climb milling, chip cross section in milling, power required in milling, forces and torque in drilling, power requirement in broaching.

UNIT III

Jigs and Fixtures & Turrets: Tool engineering, tool design, types of tools, usefulness of jigs and fixtures, principles of jigs and fixture design, locating and clamping, locating devices, types of clamping devices, elements of jig, milling fixtures, turning fixtures, boring and broaching fixtures, materials for Jigs and fixtures, economics of jigs and fixtures.Introduction, characteristics of turret lathes, difference between turret and capstan, main parts of turrets, universal chucking equipment, universal bar equipment.

UNIT IV

Metrology: Direct reading instruments, micrometers, differential micrometers, bench micrometers, vernier calipers, vernier height guage, slip gauges, measurement of angles, sprit level, auto- collimator, measurement of tapers, external taper, dovetail angle, comparator-mechanical comparator, dial guage, principle of mechanical comparator, electrical comparator, optical comparator, working principle of an optical comparator, optical flat as comparator, checking height of a component, Surface finish and its measurement, micro and macro deviation, factors affecting surface finish and evaluation of surface finish, peak to valley method, centre line average method and root mean square method.

TEXT BOOKS:

1. Production Engineering and Science: Dr. PC Pandey and Dr. CK Sharma, Standard publishers Distributors
2. Manufacturing science: Ghosh and Malik, E.W.Press

REFERENCE BOOKS:

1. Principles of metal cutting: Sen and Bhattacharya, New CentralBook.
2. Metal cutting principles: Shaw, MIT PressCambridge
3. Manufacturing analysis: Cook,Adisson-Wesley
4. Modern machining processes: Pandey and Shan, Tata McGraw HillPublications

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Measurements and Control
MT-311N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction: Definition, application of measurement instrumentation, functional elements of a generalized measuring system, measuring standards, types of measurement, types of input to measuring instruments and instrument system, classification of measuring instruments, merits and demerits of mechanical measuring systems, comparison of mechanical measuring system with electrical measuring systems, calibration. Errors: Introduction to error, types of error, types of uncertainties, propagation of uncertainties in compound quantity, Static performance parameters: accuracy, precision, resolution, static sensitivity, linearity, hysteresis, dead band, backlash, and drift, Sources of error, Selection of measuring instruments, Mechanical and Electrical loading

UNIT-II

Fundamentals of dynamic characteristics: Generalized mathematical model of measuring systems, types of input, dynamic performance parameters: dynamic error, speed of response, etc, dynamic response of a first order mechanical systems with different inputs e.g. step, ramp, sinusoidal and impulse input. Introduction to measuring data: types of measuring data, statistical attributes, various methods of presentation, estimation of presentation and uncertainties, confidence level, precision and statistical treatments of single and multi-sample type experimental data, Chauvent's criteria of rejecting a dubious data, curve fitting, best linear calibration and its precision, significant figures and rounding off. Overall uncertainty in estimation of measuring systems, common-sense approach and engineering applications.

UNIT-III

Transducers: Introduction, primary function, classification, electrostatic transducers: principle theory, types, advantages and limitations, Fixed contact mechano-resistive transducers: classification, and uses, Metallic resistance strain gauge: types, construction theory of operation, Adhesive: property, selection criteria, mounting of strain gauges, Mathematical analysis of ballast and DC-Wheatstone bridge circuits, Characteristic and comparison of ballast and DC-Wheatstone bridge circuits, temperature effects and their compensation.

Measurement of load, force, and thrust using resistant strain gauges, Elastic load cells, proving rings, fluid pressure measurement in pipe and containers, using strain gauges, measuring of torque in transmission shaft under axial and bending loads in varying ambient conditions.

UNIT-IV

Control Systems: Introduction, classification of control systems: control system terminology, servo mechanism, process control and regulators, Manual and automatic control systems, physical systems and mathematical models, linear control systems, Laplace transform, transfer function, block diagram, signal flow graphs, system stability, Time and frequency domain.

TEXT BOOKS:

1. Mechanical Measurements & Control: D.S. Kumar, Metropolitan book

REFERENCE BOOKS:

1. Instrumentation & Mechanical Measurements: A.K. Tayal, Galgotia Publ.
2. Measurements Systems Application & Design: Ernest Doebelin, McGraw-Hill

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Signal Conditioning Lab
MT-313N

L	T	P
-	-	2

Sessional: 40Marks
Practical : 60Marks
Total: 100 Marks
Exam Duration: 3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. Introduction to MATLAB and to generate different type of signals.
2. Write a MATLAB script to find average value, root mean square value, mean square value of a given signal.
3. Write a MATLAB script to find average power of a given signal.
4. Write a MATLAB script to find energy of a given signal.
5. Write a MATLAB script to find commutation of even and odd symmetries in a signal with algebraic operations.
6. Write a MATLAB script to find signal parameters (amplitude-scaling, time-scaling and timeshifting).
7. Write a MATLAB script to find different operations on a given sequence.
8. Write a MATLAB script to obtain sampling and find out sample rate.
9. Write a MATLAB script to find out quantization of a given signal.
10. Write a MATLAB script to obtain linear convolution of two signals.
11. Write a MATLAB script to obtain circular convolution of two signals.
12. Write a MATLAB script to obtain correlation of two signals.
13. Write a MATLAB script to find Z-transform of a given sequence.

Pneumatic and Hydraulic Instrumentation Lab

MT-315N

L	T	P	
-	-	3	**Sessional: 40Marks**
			Practical: 60Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

Study and experiment the following circuits.

1. Basic Hydraulic circuit
2. Meter in & Meter out hydraulic circuit
3. Basic pneumatic circuit
4. Meter in & Meter out pneumatic circuit
5. Regenerative circuit.
6. Electro pneumatic circuit
7. Synchronizing circuit
8. Automatic Reciprocation circuit
9. Sequential circuit
10. Automatic Reciprocation of Double acting cylinder using PLC
11. Fluid power circuits using Automation studio software.

Embedded Systems-ILab

MT-317N

L	T	P		
-	-	2	Practical : 60Marks	Sessional: 40Marks

Total: 100 Marks
Exam Duration: 3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. Introduction to microcontroller and interfacingmodules.
2. To interface the seven segment display with microcontroller8051.
3. To create a series of moving lights using 8051 onLEDs.
4. To interface the stepper motor withmicrocontroller.
5. To display the digital output of ADC on 16*2 LCDModule.
6. To display character ‘A’ on 8*8 LEDMatrix.
7. To display the data and time on LCDModule.
8. To switch on and off relay by usingkeys.
9. To interface the DC motor usingH-Bridge.
10. To interface a keypad withmicrocontroller.

Industrial Training
MT-319N

L	T	P
2	-	-

Sessional : 100 Marks
Practical : 0 Marks
Total : 100 Marks
Exam Duration: 03 hours

Student will submit summer training report of 5 to 6 week industrial trainingfor his/her assessment. The evaluation will be made based upon the report submitted by student and presentation of work done in industry during the specified period.

Semester 6

Automatic Control Systems

MT-302N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT 1

Introduction of control system: Concept of control, Classification of control systems, Transfer Functions ,system representation-Analogies, Mathematical modeling of physical system (Mechanical,thermal and electrical system), Block diagram reduction technique, Signal Flow Graph , Control System components (Servomotors, Techogenerators, Stepper motor).

UNIT-II

Time domain analysis: Typical test signals, Time response of first order systems to various standard inputs (unit step input ,unit ramp input, unit impulse input) time response of 2nd order system (to step input and unit ramp input) , Time domain specifications for under-damped 2nd order system, Steady state error and error constants, Effect of adding poles and zero to a system. Feedback characteristics of control system (Effect of feedback on sensitivity, overall gain and stability).Basic Control actions (P/I,D/PI/PD and PID control)

UNIT-III

Stability anaysis: Concept of stability, pole zero configuration and stability, necessary and sufficient conditions for stability Routh-Hurwitz stability criterion and relative stability analysis. Root locus concept,Nyquist stability Criterion, frequency response analysis -Bode plot –gain margin and phase margin.

UNIT-IV

Compensation techniques: Classifications-Lag, Lead and Lag lead compensator, Necessity of compensation,compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers. Concepts of state, state variables and state model, derivation of state models from block diagrams- State space representations– Solutions of state equations. Concepts of Controllability and Observability

TEXT BOOKS:

1. Linear Control System by R.S. Chauhan, (Umesh Publications)
2. Automatic Control System by S.HasanSaeed (SK Kataria and Sons publications)
3. Linear Control system by B.S.Manke (khanna Publishers)

REFERENCE BOOKS:

1. Control system Engg. By Nagrath and Gopal
2. Control system Engg. By Ogata
3. Automatic Control Systems :B.C.Kuo, PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Embedded Systems-II

MT-304N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Introduction to microcontrollers: Evaluation of Microcontrollers- Microcontrollers and Embedded system, Criteria for choosing a microcontroller, Overview of AVR Family, Block diagram of AVR microcontroller, AVR microcontroller I/O pins, AVR microcontroller peripherals, Special purpose AVRs.

UNIT-II

Internal architecture of avr microcontroller: General purpose registers in AVR, AVR data memory, using instructions with the data memory, IN and OUT instructions, AVR Status Register, AVR data format and directives Introduction to AVR assembly programming, Program counter and program ROM space in AVR, Harvard architecture in AVR, instruction size of the AVR, RISC architecture of AVR.

UNIT-III

Assembly and c programming of microcontroller:AVR instruction format, addressing modes of AVR microcontroller, Branch Instruction and looping, Call instructions and stack, I/O port programming, I/O bit manipulation in AVR, time delay and instruction pipeline, Arithmetic Instructions, Logical and compare instructions, Rotate and shift instructions, data serialization.AVR timer programming,AVR Interrupt programming and AVR serial port programming in assembly and C.

UNIT-IV

AVR microcontroller interfacing:LCD interfacing ,Keyboard interfacing, ADC characteristics, ADC programming in AVR, Sensor interfacing and Signal Conditioning DAC Interfacing, Relays and opto isolators, Stepper motor interfacing,DC motor control using PWM.

TEXT BOOKS:

1. The AVR Microcontroller and Embedded system using Assembly and C by Muhammad Ali Mazidi-Prentice Hall of India.

REFERENCE BOOKS:

1. The Atmel AVR Microcontroller Mega and XMega in Assembly and C by Han-Way Huang-Cengage Learning, 2014.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Refrigeration and Air Condition
MT-306N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Basics of heat pump & refrigerator: Carnot's refrigeration and heat pump; Units of refrigeration; COP of refrigerator and heat pump; Carnot's COP; ICE refrigeration; evaporative refrigeration; refrigeration by expansion of air; refrigeration by throttling of gas; Vapour refrigeration system; steam jet refrigeration; thermoelectric cooling; adiabatic demagnetization.

Basic principles of operation of air refrigeration system: Bell-Coleman air refrigerator; advantages of using air-refrigeration in aircrafts; disadvantages of air refrigeration in comparison to other cold producing methods; simple air refrigeration in air craft; simple evaporative type air refrigeration in aircraft; necessity of cooling the aircraft.

UNIT II

Simple Vapour Compression Refrigeration System: different compression processes(wet compression, dry or dry and saturated compression, superheated compression); Limitations of vapour compression refrigeration system if used on reverse Carnot cycle; representation of theoretical and actual cycle on T-S and P-H charts; effects of operating conditions on the performance of the system; advantages of vapour compression system over air refrigeration system.

Methods of improving COP: flash chamber; flash inter cooler; optimum interstate pressure for two stage refrigeration system; single expansion and multi expansion processes; basic introduction of single load and multi load systems; Cascade systems.

Basic absorption system: COP and Maximum COP of the absorption system; actual NH_3 absorption system; functions of various components; Li-Br absorption system; selection of refrigerant and absorbent pair in vapour absorption system; Electro refrigerator; Comparison of Compression and Absorption refrigeration systems; nomenclature of refrigerants; desirable properties of refrigerants.

UNIT III

Psychometery: Difference in refrigeration and air conditioning; Psychometric properties of moist air (wet bulb, dry bulb, dew point temperature, relative and specific humidity of moist air, temperature of adiabatic saturation); empirical relation to calculate P_v in moist air.

UNIT IV

Air Conditioning: Classification; factors affecting air conditioning systems; comfort air-conditioning system; winter air conditioning system; summer air- conditioning system; year round air conditioning. unitary air-conditioning system; central air conditioning system; room sensible heat factor; Grand sensible heat factor; effective room sensible heat factor.

TEXT BOOKS:

1. Basic Refrigeration and air-conditioning by Annanthana and Rayanan, TMG
2. Refrigeration and air-conditioning by R.C.Arora, PHI

REFERENCES BOOKS:

1. Refrigeration and air-conditioning by C.P arora
2. Refrigeration and air-conditioning by Arora and Domkundwar, Dhanpatrai

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Internal Combustion Engines

MT-308N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT 1

Heat engines; Internal and external combustion engines; Classification of I.C. Engines; Cycle of operations in four strokes and two-stroke IC engines; Wankle Engine.

Air standard cycles: Assumptions made in air standard cycles; Otto cycle; Diesel cycle; Dual combustion cycle; Comparison of Otto, diesel and dual combustion cycles; Sterling and Ericsson cycles; Air standard efficiency, Specific work output. Specific weight; Work ratio; Mean effective pressure; Deviation of actual engine cycle from ideal cycle.

UNIT II

Mixture requirements for various operating conditions in S.I. Engines; Elementary carburetor, Calculation of fuel air ratio; The complete carburetor; Requirements of a diesel injection system; Type of injection system; Petrol injection; Requirements of ignition system; Types of ignition systems, ignition timing; Spark plugs.

S.I. engines; Ignition limits; Stages of combustion in S. I. Engines; Ignition lag; Velocity of flame propagation; Detonation; Effects of engine variables on detonation; Theories of detonation; Octane rating of fuels; Pre-ignition; S.I. engine combustion chambers. Stages of combustion in C.I. Engines; Delay period; Variables affecting delay period; Knock in C.I. Engines; Cetane rating; C.I. Engine combustion chambers.

UNIT III

Functions of a lubricating system, Types of lubrication system; Mist, Wet sump and dry sump systems; Properties of lubricating oil; SAE rating of lubricants; Engine performance and lubrication; Necessity of engine cooling; Disadvantages of overcooling; Cooling systems; Air-cooling, Water-cooling; Radiators.

Performance parameters; BHP, IHP, Mechanical efficiency; Brake mean effective pressure and indicative mean effective pressure, Torque, Volumetric efficiency; Specific fuel consumption (BSFG, ISFC); Thermal efficiency; Heat balance; Basic engine measurements; Fuel and air consumption, Brake power, Indicated power and friction power, Heat lost to coolant and exhaust gases; Performance curves

UNIT IV

Working of a single stage reciprocating air compressor; Calculation of work input; Volumetric efficiency; Isothermal efficiency; Advantages of multi stage compression; Two stage compressor with inter-cooling; Perfect inter cooling; Optimum intercooler pressure.

TEXT BOOKS:

1. Internal combustion engine by Ramalingamsci-tech publication
2. Internal combustion engine by Ganeshan TMG

REFERENCE BOOKS:

1. Internal combustion engine by Mathur& Sharma
2. Heat power engineering by Dr. V.P. Vasandhani& Dr. D.S. Kumar

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Production Technology-II

MT-310N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Kinematics of Machine Tools: Introduction, drives in machine tools, mechanical drive: conversion of rotary motion into rotary motion, conversion of rotary motion into rectilinear reciprocating motion, selecting maximum and minimum cutting speeds and feeds, upper and lower speed limits of a lathe, stepped and step less drives, characteristics of mechanical stepped drive, series in spindle speed A.P., G.P. and Logarithmic progressions, stand value of ratio, designing layout for mechanical stepped drives, Kinematics calculation of speed gear boxes, stepless mechanical drives.

UNIT II

Gear manufacturing and layout for Automatics: Methods of gear manufacturing, classification of methods, milling, broaching, the process of gear generating, hobbing, hobbing machine relationship, estimating hob time, gear shaping hobbing v/s milling, hobbing v/s shaping, bevel gear cutting, worm gears, gear finishing methods, gear burnishing, gear grinding, gear lapping, gear honning.

Automatic lathes: classification of automatic machines, setting up of automatics, tooling layout and operation sheet, cam design, tool layout of automatic screw machine, programmed automatic lathes, bar stock feeding.

UNIT III

Unconventional Machining Processes & Press Tool Design: Need for unconventional processes, classification, Ultrasonic machining, principle of USM, elements of process, process parameters, electrochemical machining,ecm plant, theory of ECM, electrolyte, application of ECM, electrochemical grinding, Laser beam machining.

UNIT-IV

Press: Introduction, classifications of presses, methods of transmitting power, major components of mechanical press, selecting the proper press, components of die assembly, classification of dies, cutting action in die, punch and die clearance, control of hole and die clearance, cutting forces, shear on punch and dies, punch press energy, centre of pressure, method of calculating centre of pressure.

Fits: Concept of interchangeability, basic terminology, types of fits, clearance fits, transition fits, interference fits, selective assembly, system of fits

TEXT BOOKS:

1. Manufacturing science: Ghosh and Malik, E.W. Press
2. Modern machining processes: Pandey and Shan, Tata McGraw HillPublications

REFERENCE BOOKS:

1. Principles of metal cutting: Sen and Bhattacharya, New CentralBook.
2. Metal cutting principles: Shaw, MIT PressCambridge
3. Manufacturing analysis: Cook,Adisson-Wesley

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Automatic Control Systems Lab

MT-312N

L	T	P	
-	-	2	**Sessional: 40 Marks** **Practical: 60 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. To study D.C. Position control system.
2. To study linear system simulator.
3. To study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. To study D.C motor speed control.
5. To study the stepper motor characteristics and its control through microprocessor kit.
6. To study Temperature control system.
7. To study Compensation design
8. To study Digital control system.

Embedded Systems-IILab
MT-314N

L	T	P	
--	2		**Sessional: 40 Marks**
			Practical: 60Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. Study of architecture of Atmega 2560
2. Study of Pin diagram of Atmega 2560

Study and Demonstrate of the following on atmega 2560

1. Beep and Buzzer
2. I-O interfacing
3. Motion control
4. Motion control with PWM
5. LCD interfacing
6. Sensor Switching
7. Servo Motor Control using PWM
8. Timer overflow interrupt
9. ADC sensor display on LCD

Production Technology-II Lab
MT-316N

L	T	P	
--	4		**Sessional: 40Marks**
			Practical: 60Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. Introduction to milling machines its types functions applications etc.
2. Practice of slab milling on milling machine.
3. Practice of slotting on milling machine.
4. To cut gear teeth on milling machine using dividing head.
5. Introduction to gear hobber, demonstration of gear hobbing and practice.
6. Introduction to various grinding wheels and demonstration on the surface grinder.
7. Introduction to tool and cutter grinder and dynamometer.
8. Study the constructional detail and working of CNC lathes Trainer.
9. To carry out welding using TIG/MIG welding set.
10. Introduction, demonstration & practice on profile projector & gauges.
11. To make a component on lathe machine using copy turning attachment.
12. To cut external threads on a lathe.
13. To cut multi slots on a shaper machine.
14. To perform drilling and Boring operation on a Component.

Semester 7

Automobile Engineering

MT-401N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

INTRODUCTION: Brief history of automobiles, Main components of an automobile, Brief description of each component. Brief description of constructional details and working of a four stroke I.C. Engine (S.I. Engines and C.I. Engines) including lately developed overhead cam shaft, Multi-cylinder engines, Introduction to recent developments in I.C. Engines- Direct injection systems, Multi-point fuel injection systems, Introduction, Brief description of different components of Transmission System. CLUTCH: Clutch Introduction to Clutch and its different types, Principle of Friction Clutch, Clutch Lining and friction materials used in Friction Clutches, Torque transmitted, Brief description of Cone Clutch, Single Plate and Multiplate Clutches, Dry and wet clutches, Automatic clutch action, Centrifugal clutches, Electromagnetic clutches, Fluid Flywheel.

UNIT II

GEAR BOX: Gear Box Air resistance, gradient resistance and rolling resistance coming across a moving automobile, Tractive effort, Variation of tractive effort with speed, Performance curves (object and need of a gear box), Sliding mesh gear box, Control mechanism, Sliding type selector mechanism, Ball type selector mechanism, Steering column gear shift control, Constant mesh gear box, Synchromesh device, Automatic transmission in general, AP automatic gear box, Torque converter, Torque converter with direct drive, Lubrication of Gear Box. PROPELLER SHAFT: Functions and requirements of a propeller shaft, Universal joints, Constructional forms of universal joints, Flexible-ring joints, Rubber-bushed flexible joints. Constant-velocity joints.Differential : Principle of operation, Constructional details of a typical Differential unit, Traction control differentials, Multi-plate clutch type traction control device.

UNIT III

BRAKES: Functions and methods of operation, Brake efficiency. Elementary theory of shoe brake, brake shoe adjustments, A modern rear-wheel brake, Disc brakes, Brake linkages, Leverage and adjustment of the brake linkage, Servo- and power operated brakes, Vacuum brake operation,' Hydraulic Brakes-constructional details and working, Direct action vacuum servos, Power-operated brakes, A dual power air brake system, Suspension system Suspension principles, Road irregularities and human susceptibility, Suspension system, Damping, Double tube damper, Single tube damper, Lever arm type damper, Springs-Leaf springs, Coil and torsion springs, variable rate springs, Composite leaf springs, Rubber springs, Air springs, Adjustable and self-adjusting suspensions, Interconnected suspension system, Interconnected air and liquid suspensions, Independent suspension system, Different independent suspension layouts, McPherson strut type, Rear suspension-live axle, McPherson strut rear suspension.

UNIT IV

Steering Geometry: Castor, Camber, Kingpin inclination, Combined angle, Toe-in, Steering system-basic aims, Ackerman linkage, Steering linkages for independent suspension, Center point steering, Costarring or trailing action, Cornering power, Self-righting torque, Steering characteristics-over steer and under steer, Axle beam, Stub-axle construction, Steering column, Reversible and irreversible steering, Rack-and-pinion steering mechanism, Effect of toe-in on steering, Power steering, Vickers System.

TEXT BOOKS:

1. The Motor Vehicle - By Newton, Steeds and Garretle Basic
2. Automobile Engineering - By Kirpal Singh

REFERENCE BOOKS:

1. Automobile Engineering *' -By K.M. Gupta, Umesh Publications

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Operations Research

MT-403N

L	T	P	
3	1	-	**Sessional: 25Marks** **Theory: 75Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

UNIT I

Introduction: Definition and Development of Operations Research, Necessity and scope of OR in Industry, Operations Research in Decision making, Models in OR, Fields of application, Difficulties and Limitation of OR.

General Linear Programming Problems: Introduction, Maximization and minimization of function with or without Constraints, Formulation of a linear programming problem, Graphical method and Simplex method, Big M method, Degeneracy, Application of linear Programming (LPP) in Mechanical Engineering.

UNIT II

The Transportation Problems: Mathematical formulation, Stepping stone method, Modified Distribution Method, Vogels Approximation Method, Solution of balanced and unbalanced transportation problems and case of degeneracy, Assignment problems, Least time transportation problem

Network Analysis: CPM/PERT, Network Representation, Techniques for drawing network, Numbering of events (Fulkersen Rule), PERT calculations - Forward path, back-ward path, Slack, probability, comparison with PERT, Critical path, Float, Project cost, Crashing the net work, updating (PERT and CPM).

UNIT III

Decision Theory: Steps in decision theory approach, Decision Machinery environment, Decision machining under certainty and uncertainty, Decision machining under condition of risk, Decision trees, Minimum enchained criteria, Advantages and limitations of decision tree solutions, Post Optimality.

UNIT IV

Queuing Theory: Introduction, Applications of queuing Theory, Waiting time and idle time costs, Single channel queuing theory and multi-channel queuing theory with Poisson arrivals and exponential services, Numerical on single channel and multi channel queuing theory.

TEXT BOOKS:

1. Operations Research by Prem Kumar Gupta and D. S. Heera, S. Chand Publications
2. Introduction to Operations Research, by F.S. Hillier and G.J. Lieberman, seventh edition, McGraw Hill publications

REFERENCE BOOKS:

1. Introduction to Mathematical Programming by Winston, W.L. (4th ed.), Duxbury Press.
2. Operations Research by P SankaraIyer, McGraw Hill publications.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Smart Materials

MT-405N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Smart materials:

Introduction, Historical Perspective, Overview of Microsystems and Smart Systems, Need for Miniaturization, Role of Microfabrication, Typical applications of Microsystems and Smart Systems.

Intelligent materials:

Structural Materials, Functional Materials, Primitive functions of Intelligent Materials, Intelligence inherent in Materials, Materials Intelligently Harmonizing with Humanity, Intelligent Biological Materials.

UNIT II

Smart Materials and Structural Systems:

The principal ingredients of a premier class of smart materials, Actuator Materials, Sensing Technologies, Micro-sensors, Intelligent Systems, Hybrid Smart Materials, Passive Sensory Smart Structures, Reactive actuator based Smart Structures, Active Sensing and Reactive Smart Structures.Smart Skins, Synthesis of Future smart systems.

UNIT III

Electrorheological Fluids:

Suspension and Electro-rheological fluids, The Electro-Rheological Phenomenon, Charge Migration mechanism for the dispersed phase, Electrorheological Fluid Actuators, Experimental investigations.

UNIT IV

Piezoelectric Materials:

Introduction, Basic Principle, History, Classification of Dielectric materials, Important Dielectric Parameters, Electrostrictive effect, Piezoelectric Effect, Pyroelectric Effect, Ferroelectric Materials, Poling. Examples of Piezoelectric Materials: Quartz, Lead ZirconateTitanate(PZT), Fabrication of PZT, Polymer Piezoelectric Materials, Barium Titanate, Zinc Oxide Thin Films, Polymer Composites.

Engineering Applications of Piezoelectric Materials:

Gas Lighter, Pressure Sensor, Accelerometer, Piezoelectric Gyroscope, Piezoelectric Microphone, Piezoelectric Actuators, Piezoelectric Motor, Piezoelectric Transformer

TEXT BOOKS:

1. Smart Materials and Structures by B.V. Gandhi and B.S. Thompson, Chapman and Hall Pub.
2. Smart Materials Edited by Mel Schwartz , CRC Press.
3. Smart Structures Analysis and Design by A.V. Srinivasan and D. Michael McFarlaid, Cambridge University Press.
4. Piezoelectric Materials and Devices: Applications in Engineering and Medical Sciences by M.S. Vijaya, CRC Press.

REFERENCE BOOKS:

1. Smart Structures and Materials by Brian Culshaw, Artech House.
2. Smart Structures by Gauenzi, P., Wiley Publication.
3. Piezoelectricity by Cady, W. G., Dover Publication.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

The Professional Engineer (Project-I)

MT-407N

L	T	P	
2	**-**	**3**	**Sessional: 100 Marks**
			Practical: 100 Marks
			Total :- 200 Marks
			Exam Duration: 03 Hours

UNIT-I

Ethics-scope and issues in the engineering sector: What are research ethics, Importance of research ethics, Plagiarism Avoidance, Referencing and citation

UNIT-II

Project management and scheduling techniques: Planning Activities, Estimating the time requirements of a project, Project Milestones, Project Quality, Project Management, Gantt Chart, Pert Chart, COCOMO model, Function Point Analysis,

UNIT-III

Research methodologies: Designing a Research Programme, Research Approaches, Quantitative Methods, Qualitative Methods.

Data gathering methods: Questionnaire, Interview, Focus Groups, Observation, Studying Documentation

UNIT-IV

Abstract and literature review: Writing an abstract, Structure of a Literature Review, Guidelines for writing a literature review, Identifying a good literature review and a bad literature review, Literature searching techniques and sources.

TEXT BOOKS:

1. Research Methodology: Methods and Techniques- C RKothari
2. Project Management: Planning and Control Techniques- RoryBurke

REFERENCE BOOKS:

1. Research Methodology- R. Panneerselvam

Note: *Students will have to submit an* ***individual*** *preparatory report for a proposed project, including literature survey, data gathering methods, ethical assessment, project plan and resources and a logbook detailing background work, sources and reflective comment on the work undertaken. Student will have to complete design of project which may include mechanical designs along with electronic circuitry design. Student will have to include simulation results along with circuitry testing. Report must also include project cost, project management and identification of critical activities involved in the project. Block diagram of the project must be discussed in detail. In next semester, student will convert the idea into the form of final hardware.*

SeminarMT-409N

L	T	P	Practical: 0 Marks
2	-	-	Sessional:100 Marks
			Total: 100 Marks

Student will give talk on some technical topics. Evaluation will be done based upon the technical content and presentation skills.

Industrial Training

MT-411N

L	T	P	Practical: 0 Marks
2	-	-	Sessional: 100 Marks
			Total : 100 Marks

Student will submit summer training report of 5 to 6 week industrial training for his/her assessment. The evaluation will be made based upon the report submitted by student and presentation of work done in industry during the specified period.

Advanced Manufacturing Technology

MT-413N

L	T	P	Sessional: 25 Marks
3	1	-	Theory: 75 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Machining: Hot machining, Machining of Plastics, Unit heads, Plastics cooling, electro forming, Surface Cleaning and Surface Treatments, Surface Coatings, Paint Coating and Slushing, Adhesive Bonds, Adhesive Bond Joints, Adhesives, Surface Coating for Tooling, Graphite Mould Coating, VacuumMould Process.

UNIT II

Polymers and plastics: Introduction, Polymers, Polymerization, Addition of Polymers, Plastics, Types of plastics, Properties of Plastics, Processing of Thermoplastic Plastics, Injection Moulding, Extrusion Process, Sheet forming processes, Processing of Thermosetting Plastics, Compression Moulding, Transfer Moulding, Casting of Plastics, Machining of plastics, other processing methods of plastics

Thread Manufacturing: Introduction, casting, thread chasing, Thread Rolling, Die Threading and Tapping, Thread Milling, Thread Measurement and Inspection

UNIT III

Metalformimg: Theoretical basis of metal forming, classification of metal forming processes, cold forming, hot working, Warm working, Effect of variables on metal forming processes, Methods of analysis of manufacturing processes, Open Die forging, Rolling Power Rolling, Drawing, Extrusion.

UNIT IV

Composites and laminates: Introduction, Types of Composites materials, Agglomerated Materials, Reinforced materials, Laminates, Surface Coated Materials, Production of Composite Structures, Fabrication of particulate composite Structures, Fabrication of reinforced Composite, Fabrication of Laminates, Machining, Cutting and Joining of Composites.

TEXT BOOKS:

1. Principles ofManufacturingBy J.S.Campbell, TataMcGraw-Hill
2. Production EngineeringSciencesByPandey and Sinh StandardPub.
3. A text book of ProductionTechnologyBy P.C. Sharma S.Chand&Company.

REFERENCE BOOKS:

1. Manufacturing Materials andProcessesBy Lindberg PrenticeHall
2. A text book of ProductionEngineeringBy P.C. Sharma S.Chand&Company.
3. ManufacturingTechnologyManufacturingScienceBy A.Ghosh, East-WestPublications.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Finite Element Methods

MT-415N

L	T	P
3	1	-

Sessional: 25Marks
Theory: 75 Marks
Total: 100 Marks
Exam Duration: 3 Hours

UNIT I

Basic Concept: Historical background, Engineering applications, general description, Comparison with other methods.

Need for weighted-integral forms: Relevant mathematical concepts and formulae, weak formulation of boundary value problems, variational methods, Rayleigh-Ritz method, and weighted residual approach.

UNIT II

Model boundary value problem: Finite element discretization, element shapes, sizes and node locations, interpolation functions, derivation of element equations, connectivity, boundary conditions, FEM solution, post-processing, compatibility and completeness requirements, convergence criteria, higher order and isoparametric elements, natural coordinates, Langrange and Hermitepolynomials.

UNIT III

External and internal equilibrium equations: one-dimensional stress-strain relations, plane stress and strain problems, axis-symmetric and three dimensional stress-strain problems, strain displacement relations, boundary conditions, compatibility equations, computer programs.

UNIT IV

Weighted residual methods: Galerkin FE formulation – axially loaded bar – heat flow in a bar. Isoparametric formulation: Natural coordinates – linear and quadratic bar element – linear triangle and plane bilinear elements for scalar fields – jacobian matrix – element matrices - Gauss quadrature – requirements for isoparametric elements – accuracy and mesh distortion. Advanced topics: Introduction to non-linear and dynamic finite element procedures, error estimation, coupled problems (only brief details areneeded).

TEXT BOOKS:

1. The Finite ElementMethodBy Zienkiewicz, Tata McGraw

REFERENCE BOOKS:

1. The Finite Element Method forEngineersBy Huebner, John Wiley
2. An Introduction to the Finite ElementMethodBy J.N.Reddy, McGraw Hill

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Applied Numerical Techniques and Computer Programming
MT-417N

L	T	P	Sessional: 25 Marks
3	1	-	Theory: 75 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

Unit I

Interpolation and Curve Fitting: Lagrangian Polynomials, Divided differences, Interpolating with a cubic spline, Bezier Curves and B-Spline Curves, Polynomial approximation of surfaces, Least Square approximations, Flow Chart for Computer Programmes.

Unit II

Solving Non-Linear Equations: Bisection Method, Linear Interpolation Methods, Newton's Methods, Muller's Methods, Fixed-point Iteration Method, Flow Chart for Computer Programmes.

Solving Sets of Equations: The Elimination Method, Gauss and Gauss Jordan Methods, Other Direct Methods, Iterative Methods, The Relaxation Methods, Flow Chart for Computer Programmes.

Unit III

Numerical Differentiation and Integration: Derivatives from difference tables. High Order Derivative, Extra-polation Techniques. The Trapezoidal Rule, Simpson's Rules.Flow Chart for Computer Programmes.

Numerical Solution of Ordinary Differential Equations: The Taylor-Series Method, Euler and modified Euler methods,Range-Kuttamethods,Miline'sMethod.Theadams-Moulton method, Convergence Criteria, Errors and error Propagation. Flow Chart for Computer Programmes.

Unit IV

Numerical Solution of Ordinary and Partial Differential Equations: Taylor series method, Euler and modified Euler method, RungeKutta methods, Milne's method, Finite differences approximations of partial derivatives,Solution of Laplace equation(Elliptic)by standard5– point formula, solution of one dimensional heat equation(Parabolic)by Bender-Schmidt method, crank–Nicolson method, Solution of one dimensional wave equation(Hyperbolic) by iterative method.

TEXT BOOKS:

1. Applied Numerical Analysis by Curtis f. Gerald and Patrick O. Wheatley – Published by AddisonWesley.
2. Introductory Methods of Numerical Methods – S.S. Sastry, PHI, NewDelhi.
3. Numerical Method: E. Balagurusamy,Tata McGraw HillPublication.

REFERENCE BOOKS:

1. MATHEMATICA – A system for doing mathematics by Computer by Wolfram, Stephen – Published by Addition –Wesley.
2. Applied Numerical Methods by Camahan, Brice,Et.al, Published by Wiley, York.
3. Numerical Solution of partial differential equations by Smith, G.D. Published by Oxford University PressLondon.
4. Iterative Methods for the solution of Equations by J.F. Traub – Published by Prentice Hall.
5. Numerical Methods in Engineering and Science by B.S. Grewal- Published by KhannaPublishers.
6. Numerical Methods in Engineering by M.G. Salvadori and M.L. Baron- Published by Prentice HallIndia.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Communication Systems

MT-419N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Noise: ClassificationofNoise,Varioussourcesof Noise,Methodsof Noise Calculationin networksandinter connected networks. Additionof noisedue toseveralsources;noisein amplifiers in cascade,noise in reactive circuits, Noise figure, its calculation and measurement.Noise temperature,Mathematical representationof randomnoise, narrow band noiseanditsrepresentation.Transmissionofnoisethroughlinearsystems,signaltonoise ratio, noisebandwidth.

UNIT II

Analog Modulationtechniques: Informationsource,encoder,transmitter,channel/medium, receiver, decoder andinformation sink. Need for modulation, Baseband and Pass band signals,AmplitudeDoublesidebandwithCarrier (DSB-C),Doublesidebandwithout Carrier,Single SideBandModulation,DSB-SC, DSB-C,SSB ModulatorsandDemodulators, VestigialSideBand(VSB),QuadratureAmplitudeModulator,Frequency Modulation.Radio Transmitter and Receiver.

UNIT III

DigitalDatatransmission: Linecoding review,Pulseshaping,Scrambling, PCM.Methodof generationanddetectionofcoherent&non-coherentbinary ASK,FSK&PSKPulse Modulation**Digital TransmissionofAnalog Signals:**Sampling Theoremanditsapplications, PulseAmplitude Modulation(PAM), Pulse WidthModulation, Pulse PositionModulation. Theirgenerationand Demodulation.PulseCodeModulation(PCM), Frequency Division Multiplexing,TimeDivisionMultiplexing, LineCoding andtheir PowerSpectraldensityand CodeDivision Multiplexing.

UNIT IV:

OpticalFibrecommunications andNoisesinCommunicationsystems: Basic BlockDiagram, Advantages&DisadvantagesofOpticalFiberCommunication,Ray Theory,Electromagnetic Mode Theory,StepIndexFiber, GradedIndexFiber,Attenuation-Bending Loses, Scattering, Absorption,Dispersion.Applicationof opticalfibers, Noise incommunications,performance comparisonsinthepresenceofnoise,NoiseinAmplitudeModulation: Analysis,Signalto NoiseRatio,FigureofMerit,NoiseinFrequencyModulation:Preemphasis, DeEmphasis and SNRImprovement,PhaseLockedLoops .

TEXTBOOKS:

1. HaykinS.,MohrM.,2006,AnIntroductiontoAnalogandDigitalCommunications, 2nd Ed, Wiley,ISBN: 978-0-471-43222-7
2. HaykinS.,2009,CommunicationSystems,InternationalStudentVersion,5thEd, Wiley,ISBN: 978-0-470-16996-4

REFERENCE BOOKS:

1. OtungI.,2001,CommunicationEngineeringPrinciples,PalgraveMacmillan,ISBN: 9780333775226
2. ProakisJ.G.,SalehiM.,BauchG.,2004,ContemporaryCommunicationSystems UsingMATLAB, 2nd Edition, Thomson Boos/Cole,ISBN: 97805344061

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Renewable Energy Resources
MT-421N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT-I

Direct energy conversion: Description, working principle, magneto hydrodynamic systems (MHD), thermoelectric generators, thermionic generator, fuel cells, solar cells, EMF generated, power output, losses and efficiency, applications, hydrogen conversion and storage systems.

UNIT-II

Extraterrestrial solar radiation: Components of radiation, geometry of earth and sun, geometry of collector arid the solar beam, effects of earth's atmosphere, measurements of solar radiation, calculation of heat balance for a solar collector, type of water heaters, selective surfaces, crop heaters, space heating, space cooling, water desalination, solar ponds, solar concentrators, electric power system, problems.

UNIT III

Photo electric energy: Introduction, the silicon p-n junction, photon absorption solar radiation input, photovoltaic circuit properties and loads, limits to cell efficiency, solar cell construction type and adaptations of photovoltaic, other types of photoelectric and thermo electric generation, problems.

UNIT IV

Hydro power: Principles of hydro power, assessing the resource for small installations, an impulse turbine, reaction turbines, hydro electric systems, the hydraulic rain pump, wind turbine types and terms, linear momentum and basic theory, dynamic matching, steam tube theory, characteristics of the wind, power extraction by a turbine, electricity generation, mechanical power, problems.

TEXT BOOKS:

1. Non-Conventional energy sources by Rai G D, Khanna Publishers, NewDelhi

REFERENCE BOOKS:

1. Renewable Energy Rsources by John W. Twidell and Anthony D. Weir, published by E.& F. N. Spon Ltd.London.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Computational Fluid Dynamics
MT-423N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Methods of prediction: Comparison of experimental investigation Vs theoretical calculation; Mathematical description of physical phenomena; significance of governing differential equations; the general form of governing differential equation.

Classification of problems: Physical classification: Equilibrium problems and Marching problems; Mathematical classification: Elliptic, parabolic and hyperbolic partial differential equations; Nature of co-ordinates; one way and two-way co-ordinates; Proper choice of co- ordinates.

UNIT II

The concept of discretisation: Finite differences; Taylor series formulation; Finite difference discretisation of ordinary and partial derivatives; Truncation error, round-off error, discretisation error; Consistency and stability of numerical schemes; Variation formulation; Method of weighted Residuals, control volume formulation.

UNIT III

Steady one- dimensional Conduction: The inter-face conductivity, Non linearity, Source- Term Linearization, Types of Boundary Conditions. Unsteady one-dimensional Conduction: Explicit, Crank-Nicolson and Fully Implicit scheme's Discretisation of two and three- dimensional problems, Stability analysis.

UNIT IV

Introduction to finite volume method: Regular finite volume – approximations in the discretization technique – discretization procedure – semi-explicit method – implementation of boundary conditions (only elementary theory and no direct problems).

TEXT BOOKS:

1. Computational FluidDynamicsBy Anderson, McGraw-Hill

REFERENCE BOOKS:

1. Numerical Heat Transfer and fluidflowBy Patankar, McGraw-Hill

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Mechatronics Engineering
MT-425N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75Marks

Total: 100 Marks

Exam Duration: 3 Hours

UNIT I

Mechatronics: A measurement system with its constituent elements, open and closed loop systems, sequential controllers, micro processor based controllers, the Mechatronics approach.A review of displacement, position velocity, motion, force fluid pressure, liquid flow, liquid level, temperature, light sensors/along with performance terminology, selection of sensors, input data by switches, Signal Conditioning Processes, Inverting Amplifiers, Non Inverting Amplifiers, Summing, Integrating, Differential, Logarithmic Amplifiers, Comparators, Amplifiers Error, Filtering, Wheatstone Bridge, Temperature Compensation, Thermocouple Compensation, Modeling of Mechanical systems and Simulations

UNIT II

Pneumatic and hydraulic systems: directional control valves, valve symbols, pressure control valves, cylinder sequencing, process control valves, rotary actuators, mechanical systems - types of motion, kinematic chains, cams, gear trains, Ratchet & Pawl, belt and chain drives, bearings, mechanical aspects of motor selection, electrical systems, mechanical and solid state switches, solenoids, D.C. & A.C moto4rs, stepper motors,problems.

UNITIII

Electrical Actuation Systems: Switching Devices, Mechanical Switches – SPST, SPDT, DPDT, Debouncing keypads; Relays, Solid State Switches, Diodes, Thyristors, Transistors, Solenoid Type Devices: Solenoid Operated Hydraulic and Pneumatic Valves, Control of DC Motors, Permanent Magnet DC Motors, Bush less Permanent Magnet DC Motors, AC Motors and speed controls, Stepper Motors and Controls, ServoMotors.

UNIT IV

Logic gates:A review of number systems and logic gates, Boolean algebra, Karnaugh maps, sequential logic basic structure of programmable logic controllers, input/output processing, programming mnemonics; timest, internal relays and counters, master and jump controls, data handling, analog input/output, selection of a PLC,PROBLEMS.Control, microcomputer structure, micro-controllers, applications, programming languages,instruction sets, assembly language programs, subroutines, Why C Language?A review of program structure, branches, loops, arrays, pointers, examples of programs, interfacing, input/output, interface requirements. Peripheral interface adapters, serial communication interface, examples of interfacing, problems.

TEXT BOOKS:

1. Mechatronics by W. Bolton, published by AdditionWesley.
2. Nitaigour Premchand Mahalik, Mechatronics principles, concepts and applications, Tata McGrawHill.

REFERENCE BOOKS:

1. Joji P, Pneumatic Controls,Wiley.
2. Dan Necsulescu, Mechatronics,Pearson
3. David g Alciatore, Michael B Histand, “IntroductiontoMechatronicsand measurement systems”, McGraw HillEducation.
4. A Smaili, F Mrad, “Mechatronics – IntegratedTechnologiesfor Intelligent Machines, Oxford HigherEducation.
5. NitaigourPremchandMahalik,“Mechatronics Principles,Concepts& Application”, Tata McGraw Hill Publishing Co.Ltd.,2003.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Antenna & Wave Propagation
MT-427N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Basic Principle: Scalar & vector potential for electric & magnetic components, Retardation, retarded vector potential relation between scalar & vector potential current element.

Basic Antennas: Half wave dipole, quarter wave mono pole, short dipole, calculation of radiation resistance, effective length & pointing vector. Current distribution: Linear current & sinusoidal distribution.

UNITII

Antenna Parameter: Solid angle, radiation intensity, directive gain directivity, power gain, beam width: HPBW, FNBW, band width, Q factor resonance in antenna, antenna as a transmission line, antenna as active component, antenna temp. Radiation pattern, Eplane H plane, efficiency.Effective aperture, scattering aperture, loss aperture, directivity, polarization. Transmission between two Antenna, Reciprocity theorem application of Reciprocity theorem.

Low Freq Antennas: Monopole, folded, loop antenna, biconical antenna, yagiuda antenna: different antenna used for A.M & FM transmission. VHF & LHF antennas, Resonant Antennas & non-resonant antenna, design parameter of different Antenna.

UNIT III

Microwave Antenna: Parabolic Antenna, Lens Antenna, horn Antenna, Antenna used for tracking & antenna used for satellite communication.E-plane horn, H-Plane horn circulars Horn, pyramidal Horn.

Radio Wave Propagation: Different technique for radio wave propagation: Ground wave propagation, space wave, sky wave, duct propagation, troposcatter.

UNIT IV

Ionosphere propagation: Skip distance, LUF, MUF, Critical freq, Variation of refractive index with height, effect of earth magnetize field on ionospheres propagation, calculation of refractive index dielectric constant & Conductivity for ionospheres. Ionospheres abnormalities.

Antenna Array: Multiplication of Pattern, Significance of Antenna Array, Broadside, End fired, Uniform, Parasitic feed in Antenna Array, Calculation of Directivity & B.W for Antenna array. Increased directed directive end fired array. Tapering of Array: Binomial Array, Techepbyshe.

TEXT BOOKS:

1. Jordan Balmian:- Electromagnetic Field Theory(PHI)
2. Kraus Antenna & Wave propagation (McGrawHill)

REFERENCE BOOKS:

1. Antenna & Wave propagation by K.D.Prasad (SatyaPrakashan)
2. Collin R.E :- Antenna & Wave Propagation(TMH)

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Semester 8

Data Communication Systems

MT-402N

L	T	P	
3	1	-	**Sessional: 25 Marks**
			Theory: 75Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

InformationTheoryConcepts: Informationsource,encoder, transmitter, channel/medium, receiver,decoderandinformationsink.Informationsources,DMS, Entropy,Types of channels,Channelcapacity.

Source EncodingTechniques-Conditional and JointEntropy,Sourcecodingtechniques- Shannon-Fanocoding, Huffman minimum redundancycoding.

UNIT II

Flow& Error ControlTechniques: Generationanddetectionofcodedsignals,Typesof Errorcontrolstrategies-Forwarderrorcorrection &ARQ, Transmission errors-randomand bursterror;Errordetectionmethods-Parity checking,Checksumerrordetection&Cyclic redundancycheck. Classification of error control codes-Block code, Convolution code.

UNIT III

DigitalModulationTechniques: ASK,BPSKBFSK,QPSK,MSK,Errorprobabilityin BPSKandBFSK,MSK,ErrorprobabilityinMSK,PCM,ProbabilityoferrorinPCM system, calculation of signal-to-noise ratio. Classification of noise, calculation of Noise temperature, signal to noise ratio&Noise figure

UNIT IV

Cellular systems:mobile radio.mobilecommunications,CellularConcept,Frequency Reuse,MultipleaccesstechnologiesTDM, FDMCDMAandOFDM.TrunkingandGradeofService, Multipath Fading.

TEXT BOOKS:

1. F. M. Reza, InformationTheory, McGraw Hill.
2. D.C.Aggarwal, Satellite Communications,KhannaPublishers.

REFERENCE BOOKS:

1. Theodore S.Rappaport, Wireless Communications Principles and Practice, IEEE Press, Prentice Hall.
2. Simon Haykin, Communication systems,John Wiley&Sons.
3. SanjaySharma, Communication Systems, Kataria Sons.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Non-Conventional Machining
MT-404N

L	T	P	Sessional: 25Marks
3	1	-	Theory: 75 Marks
			Total: 100 Marks
			Exam Duration: 3 Hours

UNIT I

Unconventional machining processes: Classification, considerations in process selection.

Ultrasonic machining: Elements of process, design of cutting tool, metal removal mechanism, effect of parameters, economic considerations, limitations and applications, surface finish.

UNIT II

Electrochemical machining: Elements of process, process chemistry, metal removal mechanism, tool design, accuracy, surface finish and work material characteristics, economics advantages, limitations and applications

Electric discharge machining: Principle and mechanism of metal removal, generators, electrode feed control, electrode material, tool electrode design, EDM wire cutting, surface finish, accuracy and applications.

UNIT III

Electron beam machining: Electron beam machining, laser beam machining, their principles and metal removal mechanism, process parameters, advantages and limitations, applications.

UNIT IV

Laser beam machining: Laser Beam Machining Process, principles, pumping processes, emission types-beam control. Applications Ultrasonic Machining Process-working principles-types of transducersconcentrators- nodal point clamping-feed mechanism-metal removal rate- Process Parameters, Applications

TEXT BOOKS:

1. Modern machining processes By P.C. Pandey and M.S. Shan.
2. Machining Science ByGhosh and Mallik, Affiliated East West
3. Nontraditional Manufacturing processes By G.F. Benedict, Maicel Dekker.

REFERENCE BOOKS:

1. Advanced Methods of Machining -By J.A. McGeongh, Chapman and Hall.
2. Electrochemical Machining of Metals-By Rurnyantsev&Davydov, Mir Pub.
3. Rapid prototyping: Principles and applications in Manufacturing
4. A Text Book: of Production Engineering, P.C.Sharma,

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Sound and Noise Control

MT- 406N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75 Marks
			Total: 100Marks

Exam Duration: 3 Hours

UNIT I

Basic concepts of Sound and Noise: Introduction, sound, loudness and loudness level, noise sources and levels, effect of noise on hearing, noise from equipment, noise control measures. Noise and its effects, audiometry, dangerous properties of noise, effect of noise on worker's mind and output, effects of noise on human body

UNIT II

Planning to noise control: Introduction, commercial buildings, hospitals, flats and apartments, Noise reduction: Introduction, noise reduction at source, selection of machinery, noise from radiating surfaces, reducing transmission of mechanical vibrations, noise control by absorption of reflected sound, barriers and enclosures.

UNIT III

Technology of reducing motor vehicle noise: Introduction, foreseeable trends, sources of noise in motor vehicles, engine speed effects, vehicle speed effects, noise reduction without radical changes in design, control of engine noise-The case of the diesel engine, radical changes in design, noise, safety and air pollution, Traffic noise reduction: Introduction, urban planning and road design, soundproofing and arrangement of living space.

UNIT IV

Personal safety devices: Introduction, acoustic problems, ear protector requirements. Instrumentation for noise analysis: Introduction, microphones, sound level meters, acoustical measurement, dosimeters, frequency anlysers, amplitude distribution analysers. Audiometric testing and dosimeters: audiometeric testing outside the plant, audiometric test booths and dosimeters.

TEXT BOOKS:

1. S C Bhatia, Textbook of Noise Pollution and its control, ATLANTIC PUBLISHERS AND DISTRIBUTORS (P) LTD
2. L Bernak and I Ver (1992) Noise and Vibration Control Engine e ring: Principle s and
3. Applications,John Wily, ISBN 0-471-61751-2

REFERENCE BOOKS:

1. D A Bies (2002), Engine e ring Noise Control, Spoon press, ISBN 0-419-20430-X
2. B S Smith, R J Peters and S Owe n (1996), Acoustics and Noise Control, Addision-Wesley,
3. ISBN058088646

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Data Communication SystemsLab

MT-408N

L	T	P	
-	-	2	**Sessional : 40 Marks** **Practical: 60 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

NOTE: Student will be required to perform total of 10 experiments. 7 experiments will be from the below given list and rest experiments will be designed based upon the curriculum.

LIST OF EXPERIMENTS:

1. Simple Mathematical operations usingMATLAB.
2. WriteaprogramusingMATLABtoimplementSamplingtheoremforallNyquistconditions.
3. WriteaprogramusingMATLABtocomputeselfinformationcontentofmessage with given probabilityofoccurrence&also compute entropyof thegiven source.
4. WriteaprogramusingMATLABtocomputejoint,marginal&conditionalentropies from given joint probabilitymatrix&verifytherelation between them.
5. WriteaprogramusingMATLABtoplotBERcurvesforBPSK,QPSK&QAM
6. digitalmodulation techniques.
7. WriteaprogramusingMATLABtoplotTimedivisionmultiplexed&demultiplexed signal.
8. Write a program using MATLAB to implement BPSK modulation technique in communication systems.
9. To detect&correct singlebiterrorin linear blockcodes usinginbuiltfunctions
10. Totransmitamultiplexedoutputofdifferentfrequencymessagesignalsthrougha
11. Single channel usingTDM system and recover back the original messagesignals on kit.
12. Toconvertananalogsignalintoapulsedigitalsignalusing PCMsystemandto convert thedigital signal into analogsignal using PCM demodulation system on kit.
13. To modulate &demodulate signal using BPSK technique on kit.

The Professional Engineer (Project-II)

MT-410N

L	T	P	
-	-	9	**Practical : 100 Marks** **Sessional : 100 Marks** **Total :100 Marks** **Exam Duration: 3 Hours**

The student is expected to finish the remaining portion of the project.

The project will be **individual** practical and investigative, requiring the student to investigate the existing background, theories and knowledge as applied to a problem in the design and/or operation of an existing or new process or product. By practical measurement, design, implementation and above all, creativity, the student will arrive at a solution based on sound engineering principles worked in previous semester. The project will be integrative, deploying and extending the range of skills and knowledge previously and concurrently developed.

Comprehensive Viva

MT-412N

L	T	P	Total	
				Practical : 0 Marks

-	-	-	-	**Sessional**	**: 100 Marks**
				Total	**: 100 Marks**
				Exam Duration: 3 Hours	

The comprehensive viva voce is scheduled at the end of 8th semesters in order to judge the understanding as well as application of the knowledge gained by the students. This is also to see the articulation of what is being learnt by them. The viva-voce will be conducted by Principal/ Director of the institution.

General Fitness and Professional Aptitude (Viva-Voce)

MT-414N

L	T	P	Total
-	-	-	-

Practical : 100Marks
Sessional : 0 Marks
Total : 100 Marks
Exam Duration: 3 Hours

The general fitness and professional aptitude viva voce is scheduled at the end of 8th semesters in order to judge the general fitness of students as well as to check their professional aptitude. The viva-voce will be conducted by Principal/ Director appointed by university.

Autotronics
MT-416N

L	T	P	
3	1	-	**Sessional: 25Marks** **Theory: 75 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

UNIT I

Fundamentals of Automotive Electronics: Microprocessor and micro Computer applications in automobiles; components for engine management System; electronic management of chassis system; vehicle motion control; electronic panel meters.

Sensors & Actuators: Introduction; Basic sensor arrangement; Types of Sensors such as oxygen sensors, Crank angle position sensors, fuel metering/vehicle speed sensors and detonation sensors, altitude sensors, flow Sensors, throttle position sensors, solenoids, stepper motors,relays.

UNIT II

Electronic Fuel Injection & Ignition System: Introduction; feed back carburetor system; throttle body injection and multi point fuel injection System; injection system controls; advantage of electronic ignition systems; types of solid state system and their principle of operation; electronic spark timing.

UNIT III

Digital Engine Control System: Open loop and closed loop control system; engine cooling and warm-up control; acceleration, deceleration and idle speed control; integrated engine control system; exhaust emission control engineering; on-board diagnostics; future automotive electronic systems.

UNIT IV

Automotive Electrical: Batteries; starter motor & drive mechanism; D.C. generator and alternator; regulation for charging; lighting design; dashboard instruments; horn, warning system and safety devices.

Electromagnetic Interference Suppression: Electromagnetic compatibility Electronic dash board instruments - Onboard diagnosis system. Security and warning system

TEXT BOOKS:

1. Automotive Electronics Handbook, Ronald K. Jurgen, McGraw Hill Publishing Co., ISBN 0- 07-034453-1.
2. Automotive Electricity and Electronics, Al Santini, Delmar Publishers, NY, ISBN 0-8273- 6743-0.

REFERENCE BOOKS:

1. Automobile Electrical & Electronic Equipments, Young, Griffitns, Butterworth Publication, London.
2. Understanding Automotive Electronics, Bechfold, SAE 1998

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Industrial Robotics

MT-418N

L	T	P	
3	1	-	**Sessional: 25Marks** **Theory: 75 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

UNIT I

Automation and robots: Robot classification, Applications, Robot specifications.
Dot and Cross products, Coordinate frames, Homogeneous coordinates, Link Coordinates, The arm equation, Five-axis articulated robot (Rhino XR-3), Four-axis SCARA robot (Adept One), Six-axis articulated robot (Intelledex 660).

UNIT II

The inverse kinematics problem: General properties of solutions, Tool Configuration, Inverse kinematics of Five-axis articulated robot (Rhino XR- 3), Inverse Kinematics of Four- axis SCARA robot (Adept One), inverse kinematics of Six- axis articulated robot (Intelledex 660), and Inverse kinematics of a three-axis planar articulated robot, a robotic workcell.

UNIT III

Workspace analysis: Work envelope of a five-axis articulated robot (Rhino XR-3), Work envelope of a four-axis SCARA robot (Adept One), Workspace fixtures, The pick and place operations, Continuous path motion, Interpolated motion, Straight line motion.The tool configuration and Jacobean matrix, Joint space singularities, Generalized inverses, Resolved motion rate controls, rate control of redundant robots, rate control using (1) inverses, The manipulator Jacobean, Induced joint torque and forces.

UNIT IV

Lagrange's equation: Kinetic and potential energy, Generalized force, Lagrange-Euler dynamic model, Dynamic model of a two-axis planner articulated robot, Dynamic model of a three-axis SCARA robot, Direct and inverse dynamics, Recursive Newton-Euler formulation, Dynamic model of a one-axis robot (invertedpendulum).

TEXT BOOKS:

1. Industrial Robotics By M.P. Groover, McGraw Hill

REFERENCE BOOKS:

1. Industrial Robotics and Automation - By S.R.Deb Tata McGraw Hill

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.* Manufacturing Management

MT-420N

L	T	P	
3	1	-	**Sessional: 25Marks** **Theory: 75 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

Unit I

Manufacturing systems designs: Definition, Systems, Subsystems, Systems Approach Fundamentals, Systems Approach for designing, Manufacturing Systems, Systematic Layout Planning (SLP), Computerized Plant Layout-CRAFT, ALDEP, CORELAP, Assembly Line balancing, Problems and solutions of assembly lines, Group Technology & Cellular Systems, Classification & Grouping, overview of FMS. Strategic consideration for comparison of various systems.

Unit II

New product development (npd): Product Development, Customer Need, Strategies for New Product Development, Product life cycle, Product status. Corporate Design Strategies, Japanese Approach to NPD. PUGH total Design approach, PAHL & BEITZ Approach, Project Approach.

Unit III

Forecasting methods: Forecasting Framework, Forecasting cost and accuracy, Forecasting Uses and Methods – Delphi, Exponential Smoothing, Forecasting Errors – MAD, Regression Methods-Linear Model for single & multiple variables, Brief idea of computerized forecasting systems.

Unit IV

Value engineering: Origin of Value Engineering, Meaning of value, value analysis and value engineering, uses of value engineering, when to apply value analysis, reason of unnecessary cost, difference between value analysis and other cost reduction techniques, steps in value analysis. Phases and constituents elements of each phase. FAST technique, Ten commandments(principles of value analysis) of value engineering

TEXT BOOKS:

1. Operations management – Schoroeder, McGraw HillInternational
2. Industrial Engineering and production management – MartandTelsang, S. Chand & Company, NewDelhi.
3. Production operations management – chary, TMH, NewDelhi.

REFERENCE BOOKS:

1. Production Operations Management – Adam & Ebert, PHI, NewDelhi
2. Operational Management –Monks, Mcgraw Hill,Int.
3. Production & Operations Management – I. Hill, Prentice HallInt.
4. Production Planning & Inventory Control – Narasimhametal, PHI, NewDelhi
5. Production & Operation Management- Panneerselvam, PHI, NewDelhi
6. Managing for Total Quality-Logothetis, PHI, NewDelhi
7. Concept of Reliability Engineering –L.S. Srinath, Affiliated EastWest.
8. Revolutionizing Product Development – Wheelwright & Clark, Freepress.
9. Management In Engineering – Freeman-Ball &Balkwill, PHI, NewDelhi.
10. Production & operations management – Martinich, John Wiely , NewDelhi.
11. The goal by Eliyahu M. Goldratt& Jeff Cox, Productivity Press India Ltd,,Bangalore
12. Toyota Production System by TaichiOhno, Productivity Press India Ltd,Bangalore

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Fuzzy Logic and Neural Networks

MT-422N

L	T	P	
3	1	-	**Sessional: 25Marks** **Theory: 75 Marks** **Total: 100 Marks** **Exam Duration: 3 Hours**

UNIT I

Neural Networks: Fundamental of neural network, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning Methods, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms- perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Radial Basis functions, Hopfield Networks, Associative Memories, Applications of Artificial NeuralNetworks.

UNIT-II

Fuzzy sets: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Extension principle and fuzzy relations Fuzzy Logic: Fuzzification and defuzzification, Membership Function, Linguistic Variables, Linguistic hedges, Fuzzy rules and reasoning, lamda cut-sets. Arithmetic operations on Fuzzy numbers.

UNIT-III

Fuzzy Inference System: Fuzzy Modeling, Mamdani Fuzzy model, TSK Fuzzy model, Fuzzy Controller, Industrial Applications.Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Hybrid learning algorithms, Neuro-fuzzy Control.

UNIT-IV

Introduction to Evolutionary Techniques: Genetic Algorithm, Basic Concepts, Flow Chart of GA, Genetic representations (Encoding), Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Convergence of GA and Applications.

TEXT BOOKS

1. James A. Anderson " Introduction to Neural Networks", Prentice HallIndia.
2. H.J. Zimmermann " Fuzzy set theory & its Applications ", Allied PublishersLtd.

Reference BOOKS:

1. Nil Junbong" Fuzzy Neural Control Principles & Algorithm",PHI.
2. N.K. Bose " Neural Network Fundamental with Graphics ", TATA McGrawHill.
3. Klir George J. " Fuzzy sets and Fuzzy Logic Theory and Applications",PHI.
4. J.M Zurada , " Introduction to Artificial Neural Network" , JaicoPublishers
5. S. Rajasekaran, "Neural Network, Fuzzy Logic and Genetic Algorithms", PHI Learning India2011
6. S. N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", WileyIndia.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Quality Assurance and Reliability

MT-424N

L	T	P	
			Sessional: 25Marks

3	**1**	**-**	**Theory: 75 Marks**
			Total: 100 Marks Exam
			Duration: 3 Hours

UNIT I

Introduction- Definition of Quality, Quality function, Dimensions of Quality, Brief history ofquality methodology, Statistical methods for quality improvement, Quality costs, Introduction to Quality function deployment.

Quality Assurance (QA) - Introduction, Definition, Management principles in QA, Forms ofQA, QA in different stages. Quality planning, QA program, QA aspect, Quality in materialmanagement, Vendor selection & development.

UNIT II

Statistical Process Control - Introduction to statistical process control, Concept of variation,Assignable & Chance causes, Attributes & variables, Frequency distribution curve & its types.Normal Distribution curve, Problems on FD curve & ND curve, Application of SPC.

Control Charts for Variables- Definition, Formulae & its problems. Control chart patterns,Process capability. Problems on x & R chart and Process capability.

UNIT III

Control Charts for Attributes- Definition, Formulae & its problems. Problems on p, c charts.Choice between variables and attributes control charts. Guidelines for implementing controlcharts.

Sampling Inspection - Sampling: Definition, types of sampling, importance, benefits andlimitations of sampling, Operating Characteristic Curve, Average Outgoing Quality Curve,Errors in Making Inferences from Control Charts (Type I and II errors).

UNIT IV

Reliability Concepts - Introduction of Reliability concepts, Failure data analysis and examples,Failure rate, Failure density, Probability of failure, Mortality rate, Mean time to failure,Reliability in terms of Hazard rate and Failure Density, examples, Useful life and wear out phaseof a system,

System Reliability and Improvement: Reliability of series and parallel connected systems andexamples, Logic diagrams, Improvement of system reliability, Element Redundancy, Unit redundancy, Standby redundancy.

TEXT BOOKS:

1.Mahajan, "Quality Control and Reliability", DhanpatRai& Sons
2. Srinath L S, "Reliability Engineering", East west press.
3. Sharma S C, Inspection Quality Control and Reliability, Khanna Publishers

REFERENCE BOOKS:

1. Grant E L, Statistical Quality Control", McGraw-Hill.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Work Design and Ergonomics

MT-426N

L	**T**	**P**	
3	**1**	**-**	**Sessional: 25Marks**
			Theory: 75 Marks
			Total: 100 Marks Exam
			Duration: 3 Hours

Unit I

Introduction to Work Study: Productivity, Scope of methods, motion and time study.

Work Methods Design: Operation Process Chart, Flow Process Chart, Flow Diagram, String Diagram, Man and machine chart, Two handed process chart, Travel Chart, Micro motion and memo motion study.

Unit II

Work Measurement: Tools and Techniques

Work Sampling: Determining time standards from standard data and formulas, Pre-determined motion time standards, Work factor system, Methods time measurement, Analytical Estimation,

Measuring work by physiological methods – heart rate measurement – measuring oxygen consumption– establishing time standards by physiology methods.

Unit III

Human Factors Engineering: Introduction to ergonomics, Man/machine/environment systems concept, Human Anthropometry and its use in work place layout.

Human Performance: Information input and processing, factors affecting human performance, physical work load and energy expenditure, heat stress, manual lifting, Static and dynamic muscular load, human motor activity, metabolism, physical work load, repetitive and inspection work, measurement of physical work load, mental work load and its measurement, musculoskeleton disorder, work duration and work pauses, principles of motion economy.

Unit IV

Design of Work Space & Equipment: Work-space design for standing and seated workers, arrangement of components with in a physical space, Interpersonal aspect of work place design, Ergonomic Factors to be considered, design of displays and controls, design for maintainability

Design of Environment: Illumination and its effect, Climate - Heat Humidity – Body heat

balance, effective temperature scales, zones of discomfort, effect of heat on body and work performance, Vibrations - Response of body to low frequency vibrations, vibrations and discomfort, effect on health of worker, high frequency vibrations, effect of high frequency vibrations, methods of reducing vibrations

TEXT BOOKS:

1. Introduction to Work Study, I.L.O., 3rd Revised Edn.
2. Motion and Time Study – Design and Measurement of Work, Barnes, Raeph.m., JohnWiley & sons, New York.
3. Human Factors in Engineering and Design, Macormick, E.J., Tata McGraw-Hill
4. A Guide to Ergonomics of Manufacturing, Martin Helander, TMH.
5. Human Factor Engineering, Sanders & McCormick, McGrawhill Publications.
6. Sound, Noise and Vibration Control, Lyle, F. Yerges, Van Nostrand.

REFERENCE BOOKS:

1. Improving Productivity and Effectiveness, Mundel, Marvin, E., Prentice Hall.
2. Human Factors Engineering & Design, Sounders, M.S. and McCornic, E.J., McGrawHill.
3. Motion and time study, Benjamin .W. Neibel,, Richard .D .Irwin Inc., Seventh Edition.
4. Work design Stephen Konz., Publishing Horizon Inc., Second Edition.
5. Introduction to Ergonomics, Bridger R.S.,McGraw Hill.
6. Applied Ergonomics, Hand Book: Brien Shakel (Edited) Butterworth Scientific, London.
7. Work Study and Ergonomics, Shan, H.S, DhanpatRai& Sons.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Digital Image Processing MT-428N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75 Marks
			Total: 100 Marks Exam
			Duration: 3 Hours

UNIT I

Digital image fundamentals: Introduction, image model, sampling and Quantization, relationship between pixels, imaging geometry, discrete, Fourier transform, properties of two dimensional Fourier transform, fast Fourier transform.

UNIT II

Image enhancement and compression: Enhancement by point processing, spatial filtering and enhancement in the frequency domain, pseudo color image processing, image compression models, error free compression, image compression standards.

UNIT III

Image restorations: Degradation, models, diagonalizations of matrices, inverse filtering, interactive estorations, geometric transformations.

Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region orienting segmentation.

UNIT IV

Representations and recognition: Boundary representation, Chain Code, Polygonal approximation, signature, boundary segments, Boundary description,Shape number, Fourier Descriptor, moments- Regional Descriptors –Topological feature, Texture – Patterns and Pattern classes

TEXT BOOKS:

1. Rafael c. Gonzalez and Richard E. Woods, digital image processing, Addison
Wesley publishing company, 1987

REFERECE BOOKS:

1. William K. Pratt, digital image processing, John Wiley and sons, 1978
2. Jain, Fundamentals of digital image processing, PHI, 1996
3. Barrie W. Jervis , “digital signal processing (Pearson education India)
4. Prokis, “ digital signal processing” (PHI)

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Non Destructive Testing MT-430N

L	T	P	
3	1	-	**Sessional: 25Marks**
			Theory: 75 Marks
			Total: 100 Marks Exam
			Duration: 3 Hours

UNIT I

Introduction to NDET and surface NDT techniques: Introduction to non-destructive testing and evaluation, visual examination, liquid penetrant testing and magnetic particle testing. Advantages and limitations of each of these techniques.

UNIT II

Radiographic testing: Radiography principle, electromagnetic radiation sources, X-ray films, exposure, penetrometer, radiographic imaging, inspection standards and techniques, neutron radiography. Radiography applications, limitations and safety.

UNIT III

Eddy current testing and ultrasonic testing: Eddy current principle, depth of penetration, eddy current response, eddy current instrumentation, probe configuration, applications and limitations. Properties of sound beam, ultrasonic transducers, inspection methods, flaw characterization technique, immersion testing. Special/Emerging Techniques Leak testing, Acoustic Emission testing, Holography, Thermography, Magnetic Resonance Imaging, Magnetic Barkhausen Effect. In-situ metallography

UNIT IV

Defects in materials / products and Selection of NDET Methods Study of defects in castings, weldments, forgings, rolled products etc. and defects arising during service. Selection of NDET methods to evaluate them. Standards and codes.

TEXT BOOKS:

1. Baldevraj, Jayakumar T., Thavasimuthu M., (2008) "Practical Non-Destructive Testing", 3rd edition, Narosa Publishers.

Reference Books

2. American Society for Metals, "Non-Destructive Evaluation and Quality Control": Metals Hand Book: 1992, Vol. 17, 9th Ed, Metals Park, OH.
3. Paul E Mix, "Introduction to nondestructive testing: a training guide", Wiley, 2nd edition New Jersey, 2005.

REFERENCES BOOKS:

1. Ravi Prakash, "Nondestructive Testing Techniques", New Age International Publishers, 1st rev. edition, 2010.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Bachelor of Technology (Electronics Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2018-19 onwards)***

Semester–III (Common with B.Tech 3rd Sem ECE)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	AS-201N	Mathematics –III	3	1	0	4	75	25	0	100	3
2	ECE-201N	Signal and System	3	1	0	4	75	25	0	100	3
3	ECE-203N	Electronic Devices	3	1	0	4	75	25	0	100	3
4	ECE-205N	Network Analysis and Synthesis	3	1	0	4	75	25	0	100	3
5	ECE-207N	Digital Electronics	3	1	0	4	75	25	0	100	3
6	ECE-209N	Analog Communication	3	1	0	4	75	25	0	100	3
7	ECE-211N	Signal and System Lab	0	0	2	2	0	40	60	100	3
8	ECE-213N	Digital Electronics Lab	0	0	2	2	0	40	60	100	3
9	ECE-215N	Analog Communication Lab	0	0	2	2	0	40	60	100	3
		Total	18	6	6	30	450	270	180	900	27
10	MPC-201N	Environmental Studies*	3	0	0	3	75	25	0	100	3

* MPC-201N *is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*

Bachelor of Technology (Electronics Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2018-19 onwards)***

Semester–IV (Common with B.Tech 4th Sem ECE)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	AS-202N	Numerical Analysis	3	1	0	4	75	25	0	100	3
2	ECE-202N	Data Structure and Algorithms	3	1	0	4	75	25	0	100	3
3	ECE-204N	Electronic Measurement and Instruments	3	1	0	4	75	25	0	100	3
4	ECE-206N	Electromagnetic Theory	3	1	0	4	75	25	0	100	3
5	ECE-208N	Analog Electronics	3	1	0	4	75	25	0	100	3
6	ECE-210N	Computer Architecture and Organization	3	1	0	4	75	25	0	100	3
7	ECE-212N	Data Structure Lab	0	0	2	2	0	40	60	100	3
8	ECE-214N	Electronic Measurement and Instruments Lab	0	0	2	2	0	40	60	100	3
9	ECE-216N	Analog Electronics Lab	0	0	2	2	0	40	60	100	3
		Total	18	6	6	30	450	270	180	900	27
10	MPC-202N	Energy Studies*	3	0	0	3	75	25	0	100	3

**MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*

** Students shall devote 6 weeks to industrial training after Fourth semester exam outside the college campus at approved works.*

Bachelor of Technology (Electronics Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2019-2020 onwards)***

Semester–V

S.No	Subject code	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam
			L	T	P	Total	Theory	Sessional	Practical	Total	
1	EL-301N	Linear Integrated Circuits	4	1	0	5	75	25		100	3
2	EL-303N	VLSI Technology	4	1	0	5	75	25		100	3
3	EL-305N	Control Systems Engineering	4	1	0	5	75	25		100	3
4	EL-307N	Antenna & wave Propagation	3	1	0	4	75	25		100	3
5	EL-309N	Digital System Design	3	1	0	4	75	25		100	3
6	EL-311N	Linear Integrated Circuits Lab	0	0	3	3		40	60	100	3
7	EL-313N	Control Systems Engineering Lab	0	0	3	3		40	60	100	3
8	EL-315N	Digital System Design Lab	0	0	3	3		40	60	100	3
9	EL-317N	Industrial Training Seminar							100	100	3
		Total	18	5	9	32	375	245	280	900	27

Bachelor of Technology (Electronics Engineering)Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2019-2020 onwards)***

Semester – VI

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	EL-302N	Digital Signal Processing	4	1	0	5	75	25	0	100	3
2	EL-304N	Microprocessor & Interfacing	3	1	0	4	75	25	0	100	3
3	EL-306N	Digital CMOS Design	3	1	0	4	75	25	0	100	3
4	EL-308N	Microwave & Radar Engg.	3	1	0	4	75	25	0	100	3
5	EL-310N	Biomedical Instrumentation	3	1	0	4	75	25	0	100	3
6	EL-312N	Digital Signal Processing Lab	0	0	3	3	0	40	60	100	3
7	EL-314N	Microprocessor & Interfacing Lab	0	0	3	3	0	40	60	100	3
8	EL-316N	Microwave Lab	0	0	3	3	0	40	60	100	3
		Total	16	05	09	30	375	245	180	800	24

* ***Note:*** *All the students have to undergo six weeks industrial training after VIth semester and it will be evaluated in VIIth semester.*

Bachelor of Technology (Electronics Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2020-21 onwards)***

Semester–VII

S.No	Subject code	Course Title	Teaching Schedule			Allotment of Marks					Duration of Exam
			L	T	P	Total	Theory	Sessional	Practical	Total	
1	EL-401N	Fuzzy Logics and Neural Network	4	1		5	75	25		100	3
2		*Departmental Elective- I	3	1		4	75	25		100	3
3		**Departmental Elective- II	3	1		4	75	25		100	3
4	EL-403 N	Embedded Systems Design	4	1		5	75	25		100	3
5	EL-407N	Neural Networks Lab			3	3		40	60	100	3
6	EL-411N	Minor Project			10	10		50	50	100	3
7	EL-413N	Summer Training Report						100		100	3
		Total	14	4	13	31	300	290	110	700	21

Sr. No.	Code	*Departmental Elective -I
1	EL-421N	Robotics
2	EL-423N	Microcontrollers
3	EL-425N	Renewable Energy Sources

Sr. No.	CODE	**Departmental Elective - II
1	EL-431N	MEMS
2	EL-433N	Nano-electronics
3	EL-435N	Electronic Waste Management

Bachelor of Technology (Electronics Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2020-2021 onwards)***

Semester–VIII

S.No.	Subject code	Course Title	Teaching Schedule				Allotment Of Marks				Duration of Exam
			L	T	P	Total	Theory	Sessional	Practical	Total	
1	EL-402N	Computer Communication Network	3	1		4	75	25		100	3
2		*Departmental Elective - I	3	1		4	75	25		100	3
3	EL-404N	Optical Communication	3	1		4	75	25		100	3
4		**Departmental Elective-II	3	1		4	75	25		100	3
5	EL-406N	Optical Communication Lab			2	2		25	25	50	3
6	EL-408N	Major Project			12	12		75	75	150	
7	EL-410 N	Comprehensive Viva						75		75	
8	EL-412 N	General Proficiency Viva							75	75	
		Total	12	4	14	30	300	275	175	750	15

Sr. No.	**Code**	*Departmental Elective -I
1	EL-422N	Operation Research
2	EL-424N	Artificial Intelligence and expert system
3	EL-426N	Analog Filter Design

Sr. No.	**Code**	**Departmental Elective -II
1	EL-432N	Electronic systems Design
2	EL-434N	Electronic Switching Theory
3	EL-436N	Quality and Reliability of Electronics system

Semester-III

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
AS-201N	Mathematics-III	3	1	0	75	25	100	3
Purpose	To acquaint the students with the basic use of PDE, Linear Programming problems, Fourier series and transforms, Complex variables and Probability.							
Course Outcomes (CO)								
CO-1	This section is concerned mainly with Fourier series and Fourier transform which are very much useful in solving the initial and boundary value problems.							
CO-2	Students will learn about the formation and solution the partial differential equations and its applications in the field of engineering.							
CO-3	Complex analysis is concerned with generalization of the familiar real functions of calculus and their detailed knowledge is an absolute necessity in practical work to solve engineering problems.							
CO-4	Students will learn about concept of Probability theory and its applications in the field of engineering.							

UNIT-I

Fourier Analysis

Fourier series**:** Euler's formulae, Orthogonality conditions for the Sine and Cosine function, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

Fourier Transforms**:** Fourier integrals, Fourier transforms, Fourier Cosine and Sine transforms, Properties of Fourier transforms, Convolution theorem, Parseval's identity, Fourier transforms of the derivative of a function, Application of transforms to boundary value problems (Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP

Formation and Solutions of PDE, Lagrange's Linear PDE, First order non-linear PDE, Charpit's method, Homogeneous linear equations with constant coefficients, Method of separation of variables.

Solution of linear programming problems**:** using Graphical and Simplex methods.

UNIT-III

Theory of Complex Variables

A review of concept of functions of a complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Line integral in complex plane, definition of the complex line integral, basic properties,

Cauchy's integral theorem, and Cauchy's integral formula, brief of Taylor's, Laurent's and Residue theorems (without proofs).

UNIT-IV

Probability theory:

A review of concepts of probability and random variables: definitions of probability, addition rule, conditional probability, multiplication rule, Conditional Probability, Mean, median, mode and standard deviation, Bayes' Theorem, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function. Standard Distributions**:** Binomial, Poisson and Normal distribution.

Text Books:

1. E. Kreyszig : Advanced Engineering Mathematics, Wiley India.
2. B. V. Ramana: Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. R.K. Jain, S.R.K. Iyengar: Advanced Engineering Mathematics, Taylor & Francis.
2. Michael D. Greenberg: Advanced Engineering Mathematics, Pearson Education, Prentice Hall.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-201N	Signal and System	3	1	0	75	25	100	3
Purpose	To familiarize the students with the basic concepts of signals and systems, Random variables, discretisation of analog signals, Fourier series, Fourier transform and Laplace transform.							

Course Outcomes (CO)	
CO-1	Introduce and classify signals and systems based on their properties.
CO-2	To understand the basic concepts of random variables and Linear time invariant systems.
CO-3	Familiarization with the sampling process and spectral analysis of signals using Fourier series.
CO-4	Apply transform techniques to analyze continuous-time and discrete-time signals and system.

UNIT-I

Introduction to Signals: Continuous and discrete time signals, deterministic and stochastic signals, periodic and a periodic signals, even and odd signals, energy and power signals, exponential and sinusoidal signals and singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation.

Introduction to Systems: Linear and non-linear systems, time invariant and time varying systems, lumped and distributed systems, deterministic and stochastic systems, casual and non-causal systems, analog and discrete/digital memory and memory less systems.

UNIT-II

Random Variables: Introduction to Random Variables, pdf, cdf, moments, distributions, correlation functions

Linear Time Invariant Systems: Introduction to linear time invariant (LTI) systems, properties of LTI systems, convolution integral, convolution sum, causal LTI systems described by differential and difference equations. Concept of impulse response.

UNIT-III

Discretisation of Analog Signals: Introduction to sampling, sampling theorem and its proof.Effect of undersampling, reconstruction of a signalfrom sampled signal.

Fourier Series : Continuous time fourier series (CTFS), Properties of CTFS, convergence of fourier series, Discrete time Fourier Series (DTFS), Properties of DTFS , Fourier series and LTI system,filtering

UNIT-IV

Fourier Transform: Continuous Time Fourier Transform (CTFT), Properties of CTFT, Systems characterized by linear constant- coefficient differential equations. Discrete time Fourier transform (DTFT), Properties of DTFT, Duality, Systems characterized by Linear constant coefficient difference equations.

Laplace Transform: Introduction to Laplace transform, Region of convergence for Laplace transform, Inverse Laplace transform, Properties of Laplace transform, Analysis and characterization of LTI systems using Laplace transform, System function algebra and block diagram representations, Unilateral Laplace transform.

Text Books:

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Signals and Systems, Prentice Hall India, 2nd Edition, 2009

Reference Books:

1. Simon Haykins – "Signal & Systems", Wiley Eastern
2. Tarun Kumar Rawat , Signals and Systems , Oxford University Press.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-203N	Electronic Devices	3	1	0	75	25	100	3
Purpose	To familiarize the students with the various electronic devices such as various types of diodes, BJT's, FET's and regulated power supplies.							
Course Outcomes (CO)								
CO-1	To understand the concept of carrier transport phenomena in semiconductors and various diodes such as p-n junction diode, tunnel diode and schottky diodes.							
CO-2	To understand the detailed concept of BJT's and calculation of parameters of transistors using different models.							
CO-3	Describe the characteristics & parameters of FET's and MOSFET's.							
CO-4	To understand the concept of different types of regulated power supplies.							

UNIT-I

Carrier Transport Phenomena: Carrier Drift, Carrier Diffusion, Hall Effect, Mobility and Resistivity. Generation and Recombination of carriers, Fermi energy level, its position and its variation with doping concentration.

PN Junction: Basic Structure, Built in potential Barrier, Electric Field, Space charge width, Junction capacitances: Depletion & Diffusion Capacitance, Small signal model of PN Junction Diode. Tunnel Diode, Schottky Diode.

Unit-II

Bipolar Junction Transistor: Basic principle of operation, Forward Active mode & other modes. Non Ideal Effects: Base Width Modulation, Current Crowding, High Injection. Ebers-Moll Model, Frequency Limitations of BJT'S, Hybrid Pi Model, Introduction to H-Parameters, Hetrojunction Bipolar Transistors.

UNIT-III

Field Effect Devices: JFET concepts, Basic Operation, Internal pinch off voltage, Pinch off voltage, Ideal DC current voltage relationship, Transconductance, Channel length modulation, velocity saturation effects, Small Signal Model & Frequency Limitations.Two Terminal MOS structure, Energy band diagrams, Depletion layer thickness, Capacitance Voltage Relationship, Basic MOSFET operation, Small Signal Model.

UNIT-IV

Regulated Power Supplies: Voltage Regulation, Zener diode shunt voltage regulator, Transistor series and Transistor shunt voltage regulator, Controlled Transistor Voltage Regulator, Op-Amp Series voltage regulator, Complete power supply and SMPS.

Text Books:

1. Millman & Halkias: Integrated Electronics, TMH.

2. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi,

Reference Books:

1. E S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.

2. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.
3. Boylestad&Nashelsky: Electronic Devices & Circuit Theory, PHI.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-205N	Network Analysis and Synthesis	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of topology, transient analysis, network modeling, filters and methods of network analysis and synthesis for solving simple and complex circuits.							
Course Outcomes (CO)								
CO-1	To understand the concept of network topologies and the network analysis in the time domain for solving simple and complex circuits.							
CO-2	Describe the circuit element models, network analysis using Laplace transform and time domain behavior from the pole-zero plots.							
CO-3	Describe the characteristics & parameters of two port networks.							
CO-4	To understand the concept of filters and synthesis of one port network.							

UNIT-I

Introduction: Principles of network topology, graph matrices, Network Analysis (Time-Domain): Singularity Functions, Source-Free RC, RL, Series RLC, Parallel RLC circuits, Initial & Final Conditions, Impulse & Step Response of RC, RL, Series RLC, Parallel RLC circuits.

UNIT-II

Network Analysis (using Laplace Transform): Circuit Element Models, Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.

Network Functions: Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions.

UNIT-III

Characteristics and Parameters of Two Port Networks: Relationship of two-port variables, short circuit admittance parameters, open circuit impedance parameters, transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT-IV

Types of Filters and their Characteristics: Filter fundamentals, constant-k and m-derived low-pass and high-pass filters.

Network Synthesis: Causality & Stability, Hurwitz Polynomials, Positive real functions, Synthesis of one port networks with two kinds of elements.

Text Books:

1. Fundamentals of Electric Circuits: Charles K. Alexander, Matthew N. O. Sadiku, McGraw Hill Education
2. Network Analysis: M.E. Van Valkenburg, PHI

Reference Books:

1. Circuits & Networks: Sukhija & Nagsarkar, Oxford Higher Education.
2. Network Analysis & Synthesis: F. F. Kuo, John Wiley.
3. Basic Circuit Theory: Dasoer Kuh, McGraw Hill Education.
4. Circuit Analysis: G.K. Mithal; Khanna Publication Electronics principles: Malvino : McGraw Hill.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-207N	Digital Electronics	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of Digital Electronics covering the contents of digital techniques, logic gates & logic families etc.							
Course Outcomes (CO)								
CO-1	Students will be able to design a minimum circuit for any function.							
CO-2	Students will be able to analyze various logic families available to design digital components.							
CO-3	Students will be able to design state machine circuits using sequential and combinational circuits.							
CO-4	Students will be able to understand the basics of various PLD's.							

UNIT-I

Introduction to Digital Techniques: Digital Systems; Logic circuits, Analysis, design and implementation of digital systems, Number Systems and Codes- Positional number system; Binary, octal and hexadecimal number systems; Methods of base conversions; Binary, octal and hexadecimal arithmetic; Representation of signed numbers; Fixed and floating point numbers; Binary codes: BCD codes, Excess-3, Gray codes; Error detection and correction codes - parity check codes and Hamming code.

Combinatonial Design using Gates: Combinatonial Logic Systems: Definition and specification; Truth table; Basic logic operation and logic gates. Basic postulates and fundamental theorems of Boolean algebra;Standard representation of logic functions : SOP and POS forms; Simplification of switching functions using K-map and Quine-McCluskey tabular methods; Synthesis of combinational logic circuits using AOI, NAND,NOR and other combination of other logic functions.

UNIT-II

Logic families: Introduction to different logic families; Operational characteristics of BJT in saturation and cut-off regions; Operational characteristics of MOSFET as switch; TTL inverter - circuit description and operation; CMOS inverter - circuit description and operation; Structure and operations of TTL ,CMOS and ECL gates; Electrical characteristics of logic gates – logic levels and noise margins, fan-out, propagation delay, transition time, power consumption and power-delay product; interfacing of TTL and CMOS families.

Combinational design using MST devices: Encoders, Decoders, multiplexers, demultiplexers and their use as logic elements; Parity circuits and comparators; Arithmetic modules- adders, subtractors , BCD arithmetic circuits

UNIT-III

Sequential circuits: Definition of state machines, state machine as a sequential controller; Basic sequential circuits- latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, T flip-

flop; Timing hazards and races; Analysis of state machines using D flip-flops and JK flip-flops; Design of state machines - state table, state assignment, transition/excitation table, excitation maps and equations, logic realization;

State machine design: Designing state machine using ASM charts, Designing state machine using state diagram, Design of registers, counters-asynchronous and synchronous, up/down counter, Ring and Johnson counters.

UNIT-IV

Memory–Organization, Functional Diagram, Memory operations, Classification of semiconductor memories, Read and Write Memories, ROM, Programmable Logic Devices-PLAs, PALs and their applications, Generic Array logic devices, Sequential PLDs and their applications; Introduction to field programmable gate arrays (FPGAs) and ASICS.

Text Books:

1. R.P.Jain: Modern Digital Electronics, 3rd edition, TMH.2003

2. Anand.Kumar: Fundamentals of digital circuits,2nd edition, Prentice Hall of India

Reference Books:

1. M.M.Mano and M.D.Ciletti: Digital design4th edition, Prentice Hall.2006

2. A.P.Malvino and D.P.Leach: Digital principles and applications,6th edition,TMH,2008

3. Z. Kohavi, Switching and Finite Automata Theory, McGraw Hill, 1970.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-209N	Analog Communication	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of basic communication systems and various noises in that system, different analog modulation techniques and also AM&FM transmission & reception with various pulse techniques.							
Course Outcomes (CO)								
CO-1	To understand the concept of basic comm. System and various types of noise and analog modulation techniques.							
CO-2	To understand the concept of AM transmission & reception.							
CO-3	To understand the concept of FM transmission & reception.							
CO-4	To understand the concept of SSB transmission & reception and analog pulse techniques.							

Unit-I

Communication Systems and Noise: Constituents of communication system, Modulation, Bandwidth requirement, Noise, Classification of noise, Resistor noise, Multiple resistor noise sources, Network with reactive elements, Noise Temperature, Noise bandwidth, Noise figure, its calculation and measurement, Bandpass noise representation, Noise calculation in Communication Systems, Noise in Amplitude Modulated System, Noise in angle modulated systems, SNR calculation for AM and FM.

Analog Modulation Techniques: Theory of amplitude modulation, AM power calculations, AM modulation with a complex wave, Concepts of angle modulation, Theory of frequency modulation, Mathematical analysis of FM, Spectra of FM signals, Narrow band FM, Wide band FM, Phase modulation, Phase modulation obtained from frequency modulation, Comparison of AM, FM & PM.

Unit-II

AM Transmission: Generation of Amplitude Modulation, Low level and high level modulation, Basic principle of AM generation, Square law modulation, Amplitude modulation in amplifier circuits, Vander bijl modulation, Suppressed carrier AM generation (Balanced Modulator) ring Modulator, Product Modulator/balanced Modulator.

AM Reception: Tuned Ratio Frequency (TRF) Receiver, Super heterodyne Receiver, RF Amplifier, Image Frequency Rejection, Cascade RF Amplifier, Frequency Conversion and Mixers, Tracking & and Alignment, IF Amplifier, AM detector, AM detector with AGC, Distortion in diode detectors, Double hetro-dyne receiver, AM receiver using a phase locked loop (PLL), AM receiver characteristics.

Unit-III

FM Transmission: FM allocation standards, Generation of FM by direct method, Varactor diode Modulator, Indirect generation of FM, The Armstrong method RC phase shift method, Frequency stabilized reactance FM transmitter, FM stereo transmitter, Noise triangle.

FM Reception: Direct methods of Frequency demodulation, Travis detector/frequency discrimination (Balanced stop detector), Foster seelay of phase discriminator, Ratio detector, Indirect method of FM demodulation, FM detector using PLL, Pre-emphasis / de-emphasis, Limiters, The FM receiver, RF Amplifier, FM stereo receiver, Square, Triangular, Sinusoidal FM generation Voltage controlled oscillator.

Unit-IV

SSB Transmission: Introduction, Advantages of SSB Transmission, Generation of SSB, The Filter method The Phase Shift Method, The Third Method, AM Compatible SSB Modulation, Pilot Carrier SSB, Independent Side-band Systems (ISB), Vestigial Side-band Modulation (VSB), VSB-SC, Application of AM and FM in TV transmission.

SSB Reception: SSB Product Demodulator, Balanced Modulator as SSB Demodulator, Pilot Carrier SSB Receiver, SSB Double Super-hetrodyne Receiver, Compatible SSB (CSSB) Receiver, ISB/Suppressed Carrier Receiver, Modern Communication Receiver.

Analog Pulse Modulation: Introduction, Pulse amplitude modulation (PAM), Natural PAM Frequency Spectra for PAM, PAM Time Multiplexing Flat-top PAM, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PPM Demodulator,

Text Books:

1. Proakis, J. G. and Salehi, M., Fundamentals of Communication Systems, Dorling Kindersley (2008) 2nd ed.

2. Mithal G K, Radio Engineering, Khanna Pub.

Reference Books:

1. Taub, H., Principles of Communication Systems, McGraw-Hill (2008) 3rd ed.

2. Haykin, S., Communication Systems, John Willey (2009) 4th ed

3. Kennedy, G., Electronic Communication Systems, McGraw-Hill (2008) 4th ed.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-211N	Signal and System Lab	0	0	2	40	60	100	3
Purpose	To Learn about the MATLAB and the representation of signals in MATLAB.							
Course Outcomes (CO)								
CO-1	To understand the basic concepts of MATLAB.							
CO-2	To explore properties of various types of signals and systems.							
CO-3	To visualize the relationship between continuous and discrete Fourier transforms.							
CO-4	To understand the concept of sampling in time and frequency domain.							

LIST OF EXPERIMENTS:

1) To demonstrate some simple signal.
2) To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling and time-shifting).
3) To explore the various properties of the impulse signals.
4) To visualize the complex exponential signal and real sinusoids.
5) To identify a given system as linear or non-linear.
6) To explore the time variance and time invariance property of a given system.
7) To explore causality and non-causality property of a system.
8) To visualize the relationship between the continuous-time Fourier series and Fourier transform of a signal.
9) To visualize the relationship between the discrete-time Fourier series and Fourier transform of a signal.
10) To visualize the relationship between continuous-time and discrete-time Fourier transform of a signals.
11) To demonstrate the time domain sampling of bandlimited signals (Nyquist theorem).
12) To demonstrate the time domain sampling of non-bandlimited signals and antialiasing filter.
13) To demonstrate the signal reconstruction using zero-order hold and first-order hold filters.
14) To demonstrate the sampling in frequency domain (Discrete Fourier Transform).
15) To demonstrate the spectral analysis using Discrete Fourier Transform.
16) To demonstrate the convolution and correlation of two continuous-time signals.
17) To demonstrate the convolution and correlation of two discrete-time signals.
transient response of RC circuit.

Note: Any 12 experiments from the above list are required to be performed by students in the laboratory.

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-213N	Digital Electronics Lab	0	0	2	40	60	100	3
Purpose	To make the students aware of realization of different digital circuits on the board.							
Course Outcomes (CO)								
CO-1	To understand the concept of TTL gates such as AND, OR, NAND etc.							
CO-2	To study and verify various combinational circuits such as multiplexers, Comparators etc.							
CO-3	To understand the concept of sequential circuits such as flip flops, counters etc.							
CO-4	To design the state machine of four states and to study a sequence detector.							

List of Experiments:

1. Study of TTL gates AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design and realize a given function using K-Maps and verify its performance.
3. To verify the operation of Multiplexer and Demultiplexer.
4. To verify the operation of 2 bit Comparator using gates.
5. To verify the truth table of S-R, J-K, T, D Flip-flops.
6. To verify the operation of Bi-directional shift register.
7. To design and verify the operation of 3-bit asynchronous counter.
8. To design and verify the operation of asynchronous Up/down counter using J-K FFs.
9. Design a state machine of 4 states.
10. To design a sequence detector.

Note: Any 8 experiments from the above list and 2 more experiments (as developed by institute) are required to be performed by students in the laboratory.

B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-215N	Analog Communication Lab	0	0	2	40	60	100	3
Purpose	To make the students aware of various types of modulation techniques, Transmitter and receiver and their uses in Electronics applications.							
Course Outcomes (CO)								
CO-1	To study various modulation techniques of Amplitude modulation and also demodulation.							
CO-2	To study the generation techniques of SSB and DSBSC modulation.							
CO-3	To understand the concept of PLL , its capture range and frequency multiplier using PLL.							

List of Experiments:

1. i) To study Double Sideband Amplitude Modulation and determine its modulation factor and power in sidebands.
   ii) To study amplitude demodulation by linear diode detector.
2. i) To study Frequency Modulation and determine its modulation factor.
   ii) To study PLL 565 as frequency demodulator
3. To study Sampling and reconstruction of pulse amplitude modulation system.
4. To study the Sensitivity characteristics of superhetrodyne receiver.
5. To study the Selectivity characteristics of superhetrodyne receiver.
6. To study the Fidelity characteristics of superhetrodyne receiver.
7. i) To study Pulse Amplitude Modulation a) Using switching method b) By sample and hold circuit.
   ii) To demodulate the obtained PAM signal by IInd order Low pass filter.
8. To study Pulse Width Modulation / Demodulation.
9. To study Pulse Position Modulation / Demodulation.
10. To study active filters (Low-pass, High-pass, Band-pass, Notch filter).

Note: At least eight experiments should be performed from above list. Remaining two experiments may either be performed from above list or designed & set by concerned institution as per scope of syllabus.

. B. Tech. 3rd Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
MPC-201	Environmental Studies	3	0	0	75	25	100	3
Purpose	To learn the multidisciplinary nature, scope and importance of Environmental Studies							
Course Outcomes (CO)								
CO-1	Basic concepts of Various kinds of Microscopy and Centrifugation Techniques							
CO-2	To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques							
CO-3	To learn the concepts of different kinds of Spectroscopy and Colourimetry							
CO-4	To understand the concept of radioisotope techniques and their applications in research							

UNIT 1

The multidisciplinary nature of environmental studies. Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.
(b) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food Resources- World Food Problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
(f) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological Succession.Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem-

a. Forest Ecosystem
b. Grassland Ecosystem
c. Desert Ecosystem
d. Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, estuaries

Field Work:Visit to a local area to document Environment
ssetsriver/forest/grassland/hill/mountain.Visit to a local polluted site- Urban/Rural Industrial / Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India.Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Definition. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management:floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment.From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies.Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.Wasteland ReclamationConsumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and Control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness. Human population and the Environment.Population growth, variation among nations. Population explosion-Family Welfare Programme. Environment and human health.Human rights.Value Education.HIV/AIDS, Women and Child Welfare.Role of Information Technology in Environment and Human Health.Case Studies.

Text Books:

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India

Reference Books:

1. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
2. Environmental Science-Botkin and Keller. 2012. Wiley, India

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Semester-IV

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
AS-202N	Numerical Analysis	3	1	0	75	25	100	3
Purpose	To acquaint the students with the complete procedure to numerically approximate the solution for different kinds of problems occur in science, engineering and technology whose exact solution is difficult to find.							
	Course Outcomes (CO)							
CO-1	In this section, student will learn the methods to find the roots of nonlinear (algebraic or transcendental) equations, and eigen value problem of a matrix.							
CO-2	Students will learn to solve a large system of linear equations and matrix inversion by various numerical methods and techniques.							
CO-3	Discussion on interpolation will be useful in constructing approximate polynomial to represent the huge amounts of experimental data, and to find the intermediate values.							
CO-4	Study of ordinary differential equations and its solutions with various methods and applications in the field of Engineering.							

UNIT-I

Solution of Algebraic and Transcendental Equation and Eigen Value Problem**:** Solution of Algebraic and Transcendental Equation and Eigen Value Problem: Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe's Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT II

Solution of System of Equations and Matrix Inversion: Solution of linear algebraic equation: Gauss elimination and Gauss-Jordan methods- Method of Triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss - Jordan elimination, Crout's , Doolittle and Choleski Methods.

UNIT III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Gauss Central difference formulae, Bessel and Stirling formulae.

Numerical differentiation: Newton's forward difference formula to compute derivatives, Newton's backward difference formula to compute derivatives, Derivatives using Central difference formulae, to find the maxima and minima of a tabulated function.

Numerical Integration: by Newton's Cotes formulae, Trapezoidal and Simpson's 1/3rd and 3/8th rules, Romberg method

UNIT IV

Solution of Ordinary Differential Equation: Single step methods: Taylor series method, Picard's method of successive approximation, Euler, Modified Euler's and Improved Euler methods, Runge Kutta method of fourth order only. Multistep methods: Milne and Adams– Bashforth methods. Curve fitting: Introduction, Principle of Least squares, Method of Least squares, Fitting of a straight line, parabola and exponential functions.

Text Books:

1. M. K. Jain, SRK Iyengar and R.K. Jain, Numerical Methods For Scientific• & Engg 6e, New Age International (P) Ltd (2008).
2. Kendall E. Atkinson, An Introduction to Numerical Analysis, Wiley; 2 edition.

Reference Books :

1. S. C. Chapra and Raymond P Canale, Numerical Methods for Engineers,Tata McGraw Hill,Indian Edition.
2. James Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co. Pvt. Ltd.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-202N	Data Structure and Algorithms	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of C basics, and basic algorithms using data structures such as searching and sorting, operations of linked lists and basics of trees and graphs.							
Course Outcomes (CO)								
CO-1	Students will be able to recall 'C' basics and design basic algorithms using various data structures.							
CO-2	Students will be able to design implement various searching and sorting algorithms on arrays.							
CO-3	Students will be able to use pointers to perform various operations of linked lists.							
CO-4	Students will be able to understand the basics of trees and Graphs.							

UNIT-I

Overview of 'C': History, Characters used in 'C", Data Types, 'C' Tokens, Structures of 'C' program, Operators and Expressions, Flow of Control, I/O functions, Arrays, Structures, user defined data types Introduction: Overview, Concept of Data Structures, Design of suitable Algorithm, Algorithm analysis

UNIT-II

Arrays - Searching and Sorting: Introduction, 1-D arrays - addressing an element in an array, array traversal, insertion and deletion, Multi-D arrays, representation of arrays in physical memory, application of arrays, Searching algorithms: linear search, binary search. Sorting algorithms: selection sort, insertions sort, bubble sort, shell sort, merge sort, radix sort (Algorithm and Analysis). Stacks and Queues: Stacks operations, Applications of Stacks – Arithmetic operations using Infix to prefix and postfix notations, their conversion and evaluation, Queues operations, Circular, Priority queue and Deque.

UNIT-III

Pointers: Introduction, Pointer variables, pointers and arrays, array of pointer, pointers and structures, Dynamic allocation

Linked Lists: Introduction, linked lists, operations on linked lists (Creation, Traversing, Searching, Insertion and Deletion), Circular and doubly linked list, Linked Stacks and Linked Queues, Comparison of sequential and linked storage.

UNIT IV

Trees: Binary Trees, representation of trees (Linear and linked), Traversal of binary trees. Types of binary trees: Expression tree, Binary search tree, Heap tree, threaded binary trees. Graphs: Introduction, Graph terminology, various representations of Graphs, operations: Insertion, Deletion and traversal.

Text Books:

1. Data Structures using C by A. K. Sharma , Pearson Publication
2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH.

Reference Books :
1. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub
2. Data Structures and program design in C by Robert Kruse, PHI Expert Data Structures with C by R.B. Patel

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-204N	Electronic Measurement and Instruments	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of Electronics Measurements like measurement of voltage, current & resistance etc.							
Course Outcomes (CO)								
CO-1	Students will learn the techniques of measurement of resistance using different bridges.							
CO-2	AC Bridges & Voltage Indicating & Recording Devices will be introduced to the students.							
CO-3	Students will be able to recognize the functioning of different Analog & Digital Instruments.							
CO-4	Transducers & Data Acquisition Systems will be introduced to the students.							

UNIT-I

Measurement and Error: Functional elements and generalized configuration of a measuring Instrument, Characteristics of instruments, errors in measurements and their statistical analysis.
Measurement of Resistance: Wheat stone bridge, Carey-Foster Bridge, Kelvin double bridge, Measurement of Insulation resistance.

UNIT-II

A-C Bridges: Maxwell Inductance bridge. Maxwell Inductance Capacitance Bridge, Anderson's Bridge, Hay's Bridge, De-Sauty's Bridge, Schering's bridge and Wein's bridge.
Voltage Indicating and Recording Devices: Analog voltmeters and Potentiometers, Self balancing potentiometer and X-Y recorders, Galvanometers - Oscillographs, Cathode - Ray Oscilloscopes, Magnetic Tape Recorders

UNIT-III

Electronic Instruments: Wave analyzer, Distortion meter: Q-meter. Measurement of Op-Amp parameters.
Digital Instruments: Digital Indicating Instruments, Comparison with analog type, digital display methods, digital methods of time and frequency measurements, digital voltmeters.

UNIT-IV

Transducers: Classification of Transducers, Strain Gauge, Displacement Transducers - Capacitive Transducers, LVDT, Piezo-electric Transducers, Temperature Transducers – resistance thermometer, Thermocouples and Thermistors, Liquid level measurement Low pressure (vacuum) measurement.
Data Acquisition Systems: A to D and D to A converters, Analog and Digital Data Acquisition Systems, Multiplexing, Spatial Encoders, Telemetry.

Text Books:

1. A Course in Electrical and Electronics Measurements and Instrumentation: A.K. Sawhney; Dhanpat Rai & Sons.

Reference Books:

1. Electronics Instrumentation and Measurement Techniques: Cooper W.D & Helfrick A.D.; PHI
2. Doeblin E.O., Measurement Systems: Application & Design, Mc Graw Hill.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-206N	Electromagnetic Theory	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of Electric & Magnetic Fields and make them understand the phenomenon of propagation of electromagnetic waves.							
Course Outcomes (CO)								
CO-1	Basics of electrostatics including dielectric properties will be covered.							
CO-2	Basics of magneto-statics and Maxwell's equations will be covered.							
CO-3	Fundamentals of Uniform plane waves and their propagation in different mediums will be covered.							
CO-4	Fundamentals of Transmission Lines and different modes of wave propagation in waveguides will be covered.							

UNIT-I

Electric Field and Current: Introduction to Vectors:Addition, Subtraction, Multiplication & Differentiation. Coordinate Systems: Rectangular, Cylinderical & Spherical. Coulomb's law. Electric Field Intensity, Electric Potential,Field of a Line Charge, Field of a Sheet of Charge, Electric Flux Density,Electric Dipole, Current Density, Continuity of Current, Gauss's Law and Applications, Electric Field Behaviour in Dielectrics, Boundary Conditions at Interface between Two Dielectrics, Method of Images,Capacitance of Two Wire Line, Poisson's and Laplace’s Equations, Uniqueness Theorem.

UNIT-II

Magnetic Field and Maxwell Equations: Biot - Savart Law. Ampere's law, Magnetic Vector potentials, Force on a moving charge, Differential Current Element, Force and Torque on a Closed Circuit, Magnetic Boundary Conditions, the Magnetic Circuit,Faraday's Law, Maxwell's Equations in Point and Integral form for Free space, Good Conductors & Lossy Dielectric for Sinusoidal Time Variations& Static Fields, Retarded potentials.

UNIT-III

The Uniform Plane Wave: Plane Waves & its Properties, Wave Equation for Free Space and Conducting Medium, Propagation of Plane Waves in Lossy Dielectrics,Good Dieletrics& Good Conductors. The Poynting Vector and Power considerations, Skin Effect, Reflection of Uniform Plane Waves (Normal & Oblique Incidence).

UNIT-IV

Transmission Lines and Waveguides: The Transmission Line Equations, Graphical Methods, Smith chart, Time-domain and Frequency- domain Analysis, Reflection in Transmission Lines, SWR. TE, TM, TEM waves, TE and TM modes in Rectangular and Circular Waveguides, Cut-off & Guided Wavelength, Wave Impedance and Characteristic Impedance, Dominant Modes, Power Flow in waveguides, Excitation of Waveguides, Dielectric Waveguides.

Text Books: 1. Hayt W H., Engineering Electromagnetics, Tata McGraw Hill, 6th Edition.

References Books:

1 Jordan E C & Balmain K G, Electromagnetic Waves and Radiating Systems, PHI.
2 David K. Chang, Field and Waves Electromagnetics, Addison Wesley.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-208N	Analog Electronics	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of various models of BJT's and FET's, multistage amplifiers, concept of feedback and its topologies, oscillators and detail of operational amplifiers with its applications.							
Course Outcomes (CO)								
CO-1	To understand the concept of various amplifiers using BJT and FET and various transistor models.							
CO-2	Describe the frequency response of multistage amplifiers and the detailed concept of feedback topologies.							
CO-3	To understand the concept of Barkhausen criteria of oscillation and various RC and LC oscillators and their frequency of oscillation.							
CO-4	To understand the concept of Operational amplifier and its various applications such as current mirror, Schmitt trigger and various op-amp parameters.							

UNIT-I

Amplifier Models: Voltage amplifier, current amplifier, trans-conductance amplifier and transresistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

UNIT-II

Transistor Frequency Response: High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues.

Feedback Topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

UNIT-III

Oscillators: Review of the basic concept, Barkhausen criterion for oscillators,type of RC oscillators : RC phase shift oscillator , Wien bridge oscillator , LC oscillators : Hartley oscillator, Collpit oscillator , Clapp oscillator ,555 Timer as a monostable and astable multivibrator.

UNIT-IV

Op-Amp Applications: Schmitt trigger and its applications. Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages.

Text Books:

1. Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi

Reference Books:
1. Operational Amplifiers and Linear Integrated Circuits by Ramakant A Gayakwad,PHI.
2. A.S. Sedra & K.C.Smith, Microelectronics Circuits, Oxford University Press
3. Robert L. Boylestad & Louis Nashelsky, Electronic Devices & Circuit Theory,Pearson

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ECE-210N	Computer Architecture and Organization	3	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of basic structure of computer hardware & software, Control & processor design and memory & system organization.							
Course Outcomes (CO)								
CO-1	To understand the concept of basics of computer hardware & software.							
CO-2	To understand the concept of control design & processor design.							
CO-3	To familiarize with the concept of various memory systems.							
CO-4	To familiarize with the concept of system organization.							

Unit-I

Basic Structure of Computer Hardware and Software: Introduction to basic computer architecture, register transfer, bus and memory transfers, arithmetic, logic and shift micro operations. Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, RISC, Macros and Subroutines.

Unit-II

Control Design: Micro programmed control, control memory, address sequencing, micro program example, design of control unit, Hardwired Control: design methods, Multiplier Control Unit, CPU Control unit.

Processor Design: Decimal arithmetic unit – BCD adder, BCD subtraction, decimal arithmetic operations, ALU design, Forms of Parallel processing classification of Parallel structures, Array Processors, Structure of general purpose Multiprocessors.

Unit-III

Memory Organization: Memory hierarchy, main memory, auxillary memory, associative memory,cache memory, virtual memory, memory management, hardware multiprocessor architectures and their characteristics, interconnection structures, Random access memories: semiconductor RAMS, Serial – access Memories – Memory organization, Main Memory Allocation.

Unit-IV

System Organization: Pipeline and Vector Processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing, array processors, Input-output Organisation: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt,DMA, IOP serial communication.

Text Books:

1. Morris Mano, “Computer System Architecture”, PHI.
2. J.F. Heys, “Computer Organization and Architecture”, TMH.

Reference Books:

1. J. Hennessy and D. Patterson, Computer Architecture A Quantitative Approach, 3rd Ed, Morgan Kaufmann, 2002.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-212N	Data Structure Lab	0	0	2	40	60	100	3

Course Outcomes (CO)	
CO-1	Students will be able to recall 'C' basics and design basic algorithms using various data structures.
CO-2	Students will be able to design implement various searching and sorting algorithms on arrays.
CO-3	Students will be able to use pointers to perform various operations of linked lists.
CO-4	Students will be able to understand the basics of trees and Graphs.

List of Experiments:

1. Write a program to print a 2D array.
2. Write a program to find the factorial of an nth number using recursion.
3. Write a program to print Fibonacci sequence.
4. Using clock() function of time.h header file, compare the timings of linear search and binary search for an 1D array of 1000 elements.
5. Compare the timings of the following sorting algorithm
   i)Bubble sort
   ii)Selection sort
   iii)Insertion sort.
6. Implement stacks using arrays for the following user defined functions
   i) Size of stack
   ii) Number of elements in the stack
   iii) Pop with underflow check
   iv) Push with overflow check
7. Implement queues using arrays for the following user defined functions
   a. Size of queue
   b. Number of elements in the queue
   c. Insert an element with overflow check
   d. Delete an element with underflow check
8. Implement linked list for the following user defined functions
   a. Create a node and Insert an element
   b. Delete an element and its node
   c. Find the location of a given value
   d. Print the list in forward or reverse order .
9. Traverse a tree and print the elements in
   a. Preorder b. Post order c. In order
10. Traverse a graph and print the elements using
    a. Depth first search b. Breadth first search.

Note: Any 8 experiments from the above list and 2 more experiments (as developed by institute) are required to be performed by students in the laboratory.

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-214N	Electronic Measurement and Instruments Lab	0	0	2	40	60	100	3

Course Outcomes (CO)	
CO-1	To measure the unknown inductance and capacitance using various AC bridges.
CO-2	To measure the unknown frequency using different frequency bridges.
CO-3	To understand the concept of calibration of energy meter and B-H curve of different magnetic materials.
CO-4	To understand the concept conversion of voltmeter into ammeter using potentiometer.

List of Experiments:

1. To measure the unknown Inductance in terms of capacitance and resistance by using Maxwell's Inductance bridge.
2. To measure unknown Inductance using Hay's bridge.
3. To measure unknown capacitance of small capacitors by using Schering's bridge.
4. To measure 3-phase power with 2-Wattmeter method for balanced and unbalanced bridge.
5. To measure unknown capacitance using De-Sauty's bridge.
6. To measure unknown frequency using Wein's frequency bridge.
7. To measure unknown low resistance by Kelvin's Double bridge.
8. To test the soil resistance using Meggar (Ohm meter).
9. To calibrate Energy meter using standard Energy meter.
10. To plot the B-H curve of different magnetic materials.
11. To calibrate the Voltmeter using Crompton Potentiometer.
12. To convert the Voltmeter into Ammeter using Potentiometer.
13. Insulation testing of cables using Digital Insulation Tester.

Note: Any 8 experiments from the above list and 2 more experiments (developed by institute) are required to be performed by students in the laboratory.

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
ECE-216N	Analog Electronics Lab	0	0	2	40	60	100	3
Purpose	To make the students aware of different analog devices & amplifiers							
Course Outcomes (CO)								
CO-1	To design and calculate the gain , frequency response etc of the various configuration of transistor amplifier.							
CO-2	Describe the frequency response of and test the performance of various LC and RC oscillators.							
CO-3	To understand and design the various applications of 555 timer such as astable and mono stable multivibrator							

List of Experiments:

1. To Design a simple common emitter (CE) amplifier Circuit using BJT and find its gain and frequency response.
2. To Design a differential amplifier using BJT and calculate its gain and frequency response
3. To design RC coupled Single stage BJT amplifier and determination of the gain ,frequency response, input and output impedances.
4. To design a BJT Emitter follower and determination of the gain, input and output impedances .
5. To design and test the performance of BJT-RC Phase shift Oscillator for $f_0 \leq 10$ KHz.
6. To design and test the performance of BJT – Hartley Oscillators for RF range $f_0 \geq 100$KHz.
7. To design and test the performance of BJT – Colpitt Oscillators for RF range $f_0 \geq 100$KHz.
8. To design an astable multivibrator using 555 timer.
9. To design a monostable multivibrator using 555 timer.
10. To design Schmitt trigger using op-amp and verify its operational characteristics.

Note: Any 8 experiments from the above list and 2 more experiments (developed by institute) are required to be performed by students in the laboratory.

B. Tech. 4th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
MPC-202	Energy Studies	3	0	0	75	25	100	3
Purpose	To make the students conversant with the basics concepts and conversion of various form of Energy							
	Course Outcomes (CO)							
CO-1	An overview about Energy , Energy Management, Audit and tariffs							
CO-2	Understand the Layout and working of Conventional Power Plants							
CO-3	Understand the Layout and working of Non-Conventional Power Plants							
CO-4	To understand the role of Energy in Economic development and Energy Scenario in India							

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.

Energy Management**:** General Principles of Energy Management, Energy Management Strategy.

Energy Audit**:** Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources**:** Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non-Conventional Energy sources**:** Basic principle, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant, Bio energy plants, Geothermal energy plant sand tidal energy plants.MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

Text Books:

1. Energy Studies-Wiley Dream tech India.
2. G.D. Roy :Non conventional energy sources

Reference Books:

1. Non-conventional energy resources- Shobhnath Singh, Pearson. Gayakwad,PHI.
2. Soni, Gupta, Bhatnagar: Electrical Power Systems – Dhanpat Rai& Sons
3. NEDCAP: Non Conventional Energy Guide Lines

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

Semester-V

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-301N	Linear Integrated Circuits	4	1	0	75	25	100	3
Purpose	To familiarize the students with the concepts of Operational Amplifiers, its different configurations and applications. This is to make student aware of different filters and other special ICs using OP Amp.							
Course Outcomes (CO)								
CO-1	To understand significance of Op Amps, its parameters and different configurations used for different applications. This section builds the basic foundation on amplifiers.							
CO-2	This section focus on the frequency response of Op-amp and its various applications. Frequency response section acquaints the students with the knowledge of filters also.							
CO-3	A part of this course makes the student aware of active filters, oscillators, comparators and converters. This makes the students able to use OP Amp to as A/D or D/A Converters.							
CO-4	The course also includes Specialized IC Applications like 555 timer, this helps the students as a basic building block in their upcoming projects.							

UNIT-I

Differential and Cascade Amplifier: Balanced and unbalanced output differential amplifier, FET differential amplifier, current mirrors, level translators, cascade or CB-CE configuration of amplifier, operational amplifier, block diagram representation of op-amp, introduction to idea op-amp, characteristics, parameters, interpretation of data sheets, data specification of op-amp & main parameter like CMMR, thermal drift, offset voltage & current practical op-amp and its equivalent circuit, op-amp circuit configurations.

UNIT-II

Frequency response of an Op-amp: Frequency response compensating network, frequency response of internally compensated and non-compensated op-amp. High frequency op-amp equivalent circuit, open loop and closed loop frequency response, circuit stability, slew rate.

Operational Amplifier with feedback: Block diagram representation of feedback amplifier, voltage series feedback, voltages shunt feedback, differential amplifier.

Op-amp application: DC and AC amplifier, peaking amplifier, summing, scaling, averaging and instrumentation amplifier, differential input and output amplifier, voltage to current converter, current to voltage converter, very high input impedance circuit, integrator, differentiator, voltage limiters, voltage regulator, voltage to frequency converter & frequency to voltage converter.

UNIT-III

Active filters & Oscillators: Introduction to active filters, Butter worth and Chebyshev approximation to low pass filter and high pass, band pass filters. Oscillators, criterion for oscillation, phase shift, Wein bridge, Quadrature, square wave, saw tooth and voltage controlled oscillator.

Comparators & Converters:- Introduction to basic comparator, zero crossing detector, Schmitt trigger, comparator characteristics, analog to digital & digital to analog converters, sample & hold circuit, peak detector.

UNIT-IV

Specialized IC Applications:- Universal active filters, switched capacitor filter, the 555 & 556

timers and their applications. Phase locked loop and voltage regulators.

Text Books:

1. R.A.Gayakwad: Op-amp & Linear Integrated Circuits(PHI).
2. Integrated-Circuit Op-amp: George B. Rutkoswaki (PHI).

References Books:

(1)D.Roy Chodury :- Linear Integrated Circuits(New age Internation
(2) Millman & Halkias : Integrated Electronics (TMH)

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-303N	VLSI Technology	4	1	0	75	25	100	3

Course Outcomes (CO)	
CO-1	Students will be able estimate oxide thickness, growth rate, etch rate, deposition rate, and perform pattern etching etc. using knowledge of mathematics, science, engineering and practices.
CO-2	Students can design and conduct experiments such as oxidation, metallization and analyze growth / deposition rate, thickness etc.
CO-3	Shall be able to understand system, design such as CVD reactor, PVD chamber etc.
CO-4	Understanding of professional and ethical responsibility while working in clean rooms.

UNIT-I

Clean Room Technology - Clean room concept – Growth of single crystal Si, surface contamination, cleaning & etching, cleaning of p-type & n-type Si-wafer by solvent method & RCA cleaning, Fabrication process of p-n diode.

UNIT-II

Oxidation – Growth mechanism and kinetic oxidation, oxidation techniques and systems, oxide properties, oxide induced defects, charactrisation of oxide films, Use of thermal oxide and CVD oxide; growth and properties of dry and wet oxide, dopant distribution, oxide quality, Isolation Techniques with reference to VLSI circuits

UNIT-III

Solid State Diffusion – Fick's equation, atomic diffusion mechanisms, measurement techniques, diffusion in polysilicon and silicon di-oxide diffusion systems. Ion implantation – Range theory, Equipments, annealing, shallow junction, high energy implementation.

UNIT-IV

Mask making, E-beam writing, Lithography – Optical lithography, Lift-off technique, Some Advanced lithographic techniques, Physical Vapour Deposition – APCVD, Plasma CVD, MOCVD. Metallisation - Different types of metallisation, uses & desired properties, Fabrication process of Schottky diodes, VLSI Process integration and NMOS fabrication process

Text Books:

1. VLSI Technology, Author: Sze, S.M.; Notes: Wiley, 1985;
2. An Introduction to Semiconductor Microtechnology, Author: Morgan, D.V., and Board

Reference Book:

1. Semiconductor Devices Physics and Technology, Author: Sze, S.M.; Notes: Wiley, 1985

Notes: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-305N	Control System Engineering	4	1	0	75	25	100	3
Purpose	The purpose of this course is to create awareness about the various types of control systems with the techniques to analyze them so that the learner is able to mathematically design and evaluate the conditions for which a control system can provide stable output with improved performance.							
Course Outcomes (CO)								
CO-1	Learner will be able to design and simplify the mathematical and graphical models of a control system through block diagram and signal flow graph method.							
CO-2	This section interprets and applies block diagram representations of control systems and design PID controllers based on empirical tuning rules.							
CO-3	This acquaints the learner to compute gain and phase margins from Bode diagrams and Nyquist plots and understand their implications in terms of robust stability.							
CO-4	Learner will able to apply the compensation technique using state variable approach to covert an unstable system into a stable system under certain conditions.							

UNIT-I

Concept of control, Classification of control systems, Block diagram reduction techniques ,mathematical modeling of physical system (Electrical, Mechanical and Thermal), calculation of transfer function using signal flow graphs, Effect of feedback and parameter variation on system performance.

UNIT-II

Time – Domain Analysis: Standard Test signals, Transient response of first, second & higher order systems to(unit step, unit ramp and unit impulse signal), steady state errors and static error constants in unity feedback control systems, generalized error constants, P, I, D, P/I, P/D, P/I/D and ON/OFF control action.

UNIT-III

Time Domain Stability Analysis: Concept of absolute, relative and absolute stability, Routh – Hurwitz criterion, Root-locus analysis of control systems.

Frequency Domain Analysis: frequency domain specifications, Polar and inverse polar plots, Nyquist plot(Gain and phase margins), Logarithmic plots (Bode plots), gain and phase margins to relative stability for open loop response and close loop response.

UNIT-IV

Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques, feedback compensation.

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability

Text Books:

1. I. J. Nagrath & M. Gopal, " Control system Engineering New Age International", 1999
2. K. Ogata, "Modern control Engineering", Pearson 2002.

Reference Books:

1. Liner Control System by R.S. Chauhan, (Umesh Publications)
2. B. C. Kuo, "Automatic control system", Prentice Hall of India, 7th edition 2001.
3. Feedback control system Analysis and Synthesis by D'Azzo and Houpias.
4. Automatic control systems S. Hasan Saeed (S.K. Kataria & sons)

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-307N	Antennas & Wave Propagation	3	1	0	75	25	100	3
Purpose	To familiarize the students with the performance parameters of antenna, methods of analysis of antenna, antenna used for various applications and different ways of propagating the signal.							
Course Outcomes (CO)								
CO-1	To understand the performance parameters of antenna and apply principles of electromagnetic to explain antenna radiation. This also explains various antenna parameters.							
CO-2	Understanding the mechanism of calculating the radiated fields of antenna and to calculate the radiated fields of some common Antennas.							
CO-3	To understand the requirements, principals, and structures for an antenna to be broadband and aperture type antenna.							
CO-4	To understand the different ways of signal propagation and describe effects of atmosphere on radio wave propagation, also derive expressions for ground.							

UNIT – I

Basic Principles And Definitions**:** Retarded vector and scalar potentials, Radiation and induction fields. Radiation from elementary dipole (Hertzian dipole, short dipole, linear current distribution), half wave dipole, Antenna parameters: Radiation resistance, Radiation pattern, Beam width, Gain, Directivity, Effective height, Effective aperture, Bandwidth and Antenna Temperature.

UNIT – II

Radiating Wire Structures And Antenna Arrays**:** Folded dipole , Monopole, Biconical Antenna, Loop Antenna, Helical Antenna. Principle of pattern multiplication, Broadside arrays, End fire arrays, Array pattern synthesis, Uniform Array, Binomial Array, Chebyshev Array, Antennas for receiving and transmitting TV Signals.

UNIT – III

Aperture Type Antennas**:** Radiation from rectangular aperture, E-plane Horns, H-plane Horns, Pyramidal Horn, Lens Antenna, Reflector Antennas

Broadband and Frequency Independent Antennas**:** Broadband Antennas. The frequency independent concept: Rumsey's principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral antenna.

UNIT – IV

Propagation of Radio Waves**:** Different modes of propagation, Ground waves, Space waves, Surface waves and Troposphere waves, Ionosphere, Wave propagation in the ionosphere, critical frequency, Maximum Usable Frequency (MUF), Skip distance, Virtual height.

Text Books:

1. Robert E.Collin, Antenna & Wave Propagation, McGraw Hill

Reference Books:

1. John D. Kraus, Antennas, McGraw Hill.
2. E.C.Jordan and K.G.Balmain, Electromagnetic Waves and Radiating Systems, PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-309N	Digital System Design	3	1	-	75	25	100	3
Purpose	To familiarize the students with the synchronous and asynchronous sequential circuits and their designing, state finite machine, iterative networks etc.							
Course Outcomes (CO)								
CO-1	To understand various types of converters, designing of two level NAND and NOR gates							
CO-2	To understand the designing of synchronous and asynchronous sequential circuits.							
CO-3	To understand the concept of finite state machine.							
CO-4	To understand the designing of pattern detector, state machine design with SM Chart etc.							

UNIT-I

Combination Circuit Design**:** Adders, Subtractors, BCD Adder code converters, 7-segment display, designing using multiplexer, demultiplexer, decoder, encoder. Design of two level NAND only and NOR only networks, Design of multilevel NAND only NOR gate networks.

UNIT-II

Synchronous Sequential ckt Design**:** Flip-flop, FSM. Sequence detector, party checker & Detector and different application of sequential circuits, state table state diagram. Moose & mealy sequential ckt with state diagram reduction of state table using merger graph method & moose method, computing M/C, limitation & capabilities of sequential Circuit

UNIT-III

Asynchronous Sequential ckt. **:** FSM, Racer, state table & flow table diagram, compatibility chart state assignment in Asynchronous circuit.

UNIT-IV

Iterative networks: iterative networks, design of parity checker, comparator, design of pattern detector, state machine design with SM charts, state machine charts, derivation of SM charts, memories: read only memory, ROM applications, Read write memories, static RAM, Dyanmic RAM, Structure and Timings.

Text Books:

1. Z.Kohavi by Switching & System (McGraw Hill)
2. W.Fletcher :- An Engineering Approach to Electronic Design(PHI)

Reference Books:

1. Floyd: - Digital Fundamentals (UBS)
2. Morris Mano:- Digital Logic &Computer Design(PHI).

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
EL-311N	Linear Integrated Circuits Lab	0	0	3	40	60	100	3
Purpose	To familiarize the students with different configurations of Operational Amplifiers. This is to make student aware of different filters and special ICs using OP Amp.							
Course Outcomes (CO)								
CO-1	To study different configurations of OP AMP for different applications practically.							
CO-2	To study different configurations of filters using OP AMP for different applications practically. This also includes practical implementation of special IC 555.							

LIST OF EXPERIMENTS

1. To study the OPAMP as inverting and non-inverting
2. To study the OPAMP as differentiator
3. To study the OPAMP as integrator
4. To demonstrate the operation of low pass filter and design the second order low pass filter.
5. To demonstrate the operation of high pass active filter
6. To study the frequency response of band pass filter
7. To study the notch filter
8. To construct the astable multivibrator using IC 555
9. To study the operation of the Schmitt trigger using the IC 741.
10. To study the phase shift wein bridge oscillator

Note : *At least 8 experiments are to be performed with 6 from above list, the remaining may either be performed or designed & set by concerned institution as per the scope.*

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
EL-313 N	Control System Engineering Lab	0	0	3	40	60	100	3
Purpose	To study control system engineering and its design to the practical level.							
Course Outcomes (CO)								
CO-1	To encourage students to work as a team (group) and learn to communicate effectively.							
CO-2	The practical and wide applications of control systems in this course might lead some students to choose it as a research topic of interest, for either graduate or undergraduate							
CO-3	To study & design different control systems.							

LIST OF EXPERIMENTS

1. To study D.C. Position control system.
2. To study linear system simulator.
3. To study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. To study D.C motor speed control.
5. To study the stepper motor characteristics and its control through microprocessor kit.
6. To study Temperature control system.
7. To study Compensation design
8. To study Digital control system.

B. Tech. 5th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
EL-315 N	Digital System Design Lab	0	0	2	40	60	100	3
Purpose	To familiarize the students with the basics of design of conventional electronic circuits, the features of VHDL, design circuits using gate level modeling.							
Course Outcomes (CO)								
CO-1	To describe, design, simulate, and synthesize circuits using the Very hardware description language.							
CO-2	To design and modeling of combinational and sequential digital systems.							
CO-3	To develop program codes for synthesis-friendly combinational and sequential logic circuits.							
CO-4	To understand the advanced features of VHDL and be able to write optimized codes for complex systems.							

LIST OF EXPERIMENTS:

ANY FIVE EXPERIMENTS: VHDL

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
a. half adder
b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
a. multiplexer
b. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
a. decoder
b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a counter and check the wave forms and the hardware generated

ANY FIVE EXPERIMENTS USING: using FPGA (Spartan 3) & CPLD

1. Design of Half-Adder, Full Adder, Half Subtractor, Full Subtractor
2. Design a parity generator
3. Design a 4 Bit comparator
4. Design a RS & JK Flip flop
5. Design a 4: 1 Multiplexer
6. Design a 4 Bit Up / Down Counter with Loadable Count
7. Design a 3: 8 decoder
8. Design a 8 bit shift register
9. Design a arithmetic unit
10. Implement ADC & DAC interface with FPGA
11. Implement a serial communication interface with FPGA
12. Implement a Telephone keypad interface with FPGA
13. Implement a VGA interface with FPGA
14. Implement a PS2 keypad interface with FPGA
15. Implement a 4 digit seven segment display

Note : *At least 9 experiments are to be performed with 8 from above list, the remaining may either be performed or designed & set by concerned institution as per the scope.*

Semester-VI

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-302N	DIGITAL SIGNAL PROCESSING	4	1	0	75	25	100	3
Purpose	To make students aware about the digital signal processing in FIR & IIR filter							
Course Outcomes (CO)								
CO-1	This section provides the detail about the analysis of LTI system in Z transform							
CO-2	This section describe how we implement discrete time system in FIR & IIR systems							
CO-3	This section describe how we design FIR filters by frequency sampling method							
CO-4	This section describe how we design IIR filters using various method							

UNIT-I

Z – Transform Analysis of LTI System**:-** Transform its properties, System Function of a linear Time- Invariant system. Inversion of the Z Transform, the one-sided Z-transform, Solution of difference equations. Analysis of LTI system in Z- domain, transient and steady- state response. Causality and stability. Pole- Zero Cancellations. Shur- Cohn Stability test. Jury Test Shur-Cohn stability criterion.

DFT and FFT**:** DFT and its properties, Circular Convolution and fast linear convolution, Linear filtering using DFT. Direct Computation of DFT, FFT algorithms, Radix-2 and Radix-4 algorithms.

UNIT-II

Implementation of Discrete-Time Systems**:** Structure for the Realization of Discrete-Time Systems, Structure for FIR Systems: Direct-Form Structure, Cascade-Form Structures, Frequency-Sampling Structures; Structure for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures, Lattice and Lattice-Ladder Structures for IIR Systems.

UNIT-III

Design of FIR Filters**:** Characteristics of practical frequency selective filters. Filters design specifications peak and pass band ripple, minimum stop band attenuation. Design of FIR filters using windows functions(Kaiser window, rectangular, Hamming and Blackman window) method comparison of design methods for FIR filters, Gibbs phenomenon, design of FIR filters by frequency sampling method.

UNIT-IV

Design of IIR Filters: Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse invariance method, bilinear transformation method, characteristics of Butterworth, Chebyshev, and Elliptical analog filters and design of IIR filters.

Text Books:

1. Digital Signal Processing by J.G. Proakis and D.G. Manalakis-PHI
2. Digital Signal Processing by: A.V. Oppenheim and R.W. Schafer-PHI

References Books:

1. Element of Digital Signal Processing by N. Sarkar Khanna Publishers.
2. Digital Signal Processing by S. K. Mitra –TMH.
3. Digital Signal Processing by Rabinar, Gold-PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-304N	Microprocessor & Interfacing	3	1	0	75	25	100	3
Purpose	To make students aware about the basic of Microprocessor systems & its advance technique							
Course Outcomes (CO)								
CO-1	This section describe the basic 8085 & 8086 microprocessor architecture							
CO-2	This section provide the detailed description of 8086							
CO-3	This section describe 8086 Interrupt & how we interface 8086 to another device							
CO-4	This section deal with the advance microprocessor 80286 & 80386							

. **UNIT I**

8085 Microprocessor**:** Introduction to microprocessor, 8085 microprocessor Architecture, Pin diagram, timing diagram, instruction set

8086 Microprocessor Architecture**:** architecture, details of sub blocks such as EU, BIU, pin diagram of 8086

UNIT II

8086 Processor**:** memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals, types of buses, and timing diagrams in minimum and maximum modes.

Instruction Set of 8086**:** Instruction execution timing, assembler instruction format, data transfer, arithmetic, branch, looping, NOP and HLT, flag manipulation, logical, shift and rotate instructions, assembler directives and operators

UNIT III

8086 Interrupts: 8086 Interrupts and Interrupt responses, hardware interrupt application.

Reset and Clock generation using 8284 and Wait State generation, Memory Devices, Address Decoding Techniques

Interfacing Device**:** 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer

UNIT IV

Interfacing: 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller

Introduction to Advanced Processors**:** Real and virtual mode of execution, Introduction to 80286 and 80386

Text books:

1. Microprocessor Architecture, Programming & Applications with 8085: Ramesh S Gaonkar; Wiley Eastern Ltd.
2. Microprocessors and interfacing : Hall; TMH, Bhurchandi

Reference books:
1. The Intel Microprocessors 8086- Pentium processor : Brey; PHI
2. Advanced Microprocessors and Interfacing : Badri Ram; TMH

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-306N	Digital CMOS Design	3	1	0	75	25	100	3
Purpose	To make the students aware of Digital Vlsi system and its related new technique							
Course Outcomes (CO)								
CO-1	This section provide the detail about the basic principle of MOS transistor & introduction of large and small MOS models							
CO-2	This section describes symbolic & physical layout system of MOS layers.							
CO-3	This section provides the detail of Combinational and Sequential logic structure used in CMOS logic family & discuss about the Flip-Flops.							
CO-4	This section describe how we design ALU subsystem using CMOS logic family							

. **UNIT-I**

Introduction: Basic principle of MOS transistor, Introduction to large signal and small signal MOS models for digital design, MOS Switches, Threshold Voltage, Pull-up to Pull down ratio Calculation The MOS Inverter: Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, BiCMOS Inverter, transfer characteristics, logic threshold, Noise margins, Latch-up, Propagation Delay and Power Consumption.

UNIT-II

Symbolic and Physical Layout Systems: MOS Layers Stick/Layout Diagrams, Layout Design Rules, Transistor layout, Inverter layout, CMOS digital circuit layout Issues of Scaling, Scaling factor for device parameters. Performance Estimation: Resistance Estimation, Capacitance Estimation, Inductance Estimation, Switching characteristics, CMOS-gate transistor Sizing.

UNIT-III

Combinational and Sequential Logic Structures: CMOS Logic Families - static, dynamic and differential logic families, CMOS Complimentary logic, Pseudo NMOS logic, Dynamic Logic Circuits: Basic principle, non ideal effects, domino CMOS Logic, high performance dynamic CMOS Circuits, Clocking Issues, Two phase clocking, pass Transistor logic, transmission gates logic circuits, complimentary switch logic, Registers, CMOS Schmitt trigger.

UNIT- IV

Subsystem Design: Design of ALU Subsystem: design 4-bit simple and carry look ahead adder, multiplier design: serial-parallel multiplier, Braun Array, Wallace tree Multiplier, Design of 4-bit Shifter. CMOS Memory Design: Semiconductor memories, memory chip organization, RAM Cells, dynamic memory cell, Programmable logic arrays

Text Books:

1. J. M. Rabaey, A. P. Chandrakasan and B. Nikolic, "Digital Integrated Circuits" Second Edition, PH/Pearson, 2003.
2. D. A. Pucknell and K. Eshraghian, "Basic VLSI Design", Third Edition, PHI, 1994.

Reference Books:

1. S. M. Kang and Y. Leblebici, "CMOS Digital Integrated Circuits: Analysis and Design", Third Edition, MH, 2002.
2. W. Wolf, Modern VLSI Design: System on Chip, Third Edition, PH/Pearson, 2002.
3. N. Weste, K. Eshraghian and M. J. S. Smith, Principles of CMOS VLSI Design" Pearson, 2001.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-308N	Microwave and Radar Engineering	3	1	0	75	25	100	3
Purpose	The objective of this course is to make the students aware of Microwave & Radar Engg.Technique							
Course Outcomes (CO)								
CO-1	This section describe introduction of Microwave & its related some decive							
CO-2	This section provides the details how we design microwave & problem based on smith chart							
CO-3	This section tell us about the device used in Microwave & discussion about the waveguide							
CO-4	This section describe about the Radar Engg. & its related parameter							

UNIT I

Introduction to Microwave and tubes, Advantages of microwaves, Microwave devices: Multicavity klystron and magnetron, Tunnel diodes, GUNN Diodes, Parametric amplifiers, TWT, IMPATT, TRAPTT, Microwave solid state devices.

UNIT-II

Challenge in microwave design, Use of Smith chart to find unknown impedance, impedance matching design network, Equivalent voltage and current concept at microwave frequency. Problems based on Smith Chart, Scattering parameters, properties of scattering parameters, network analyzer, network analyzer, Relationship between S-parameters and Transmission parameters.

UNIT-III

Microwave Circuits: Passive microwave devices (E-plane, H-Plane Tee, Magic Tee, Circulator, Attenuator, Isolators, Directional Coupler, TE, TM and TEM modes in rectangular waveguides and circular waveguides, Resonators and phase shifter

UNIT-IV

Radar Engg. : Introduction, Radar range equation, parameters affecting the range, Doppler effect, CW and pulse Doppler Radar, MTI delay lines and canceller, range gate pulse, MTI & Doppler radar, non coherent MTI. Noise and clutter, Radar displays, applications of radar

Text Books:

1. Liao S.Y. : Microwave Circuit & Devices, PHI
2. M. Kulkarni : Microwave & Radar Engineering, Umesh Publication

Reference Books:

1. Skolonik M. K. : Introduction to Radar system, McGraw Hill.
2. Siegman A.E. : An introduction to lasers & Masers, McGraw Hill.
3. Gautam A. K. : Microwave Engineering , S.K. Kataria & Sons.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-310N	Biomedical Instrumentation	3	1	0	75	25	100	3
Purpose	The objective of this course is to make the students aware of Biomedical Instrument in which used in hospital & in daily routine life,							
Course Outcomes (CO)								
CO-1	This section describe the basic instrument of biomedical & its detail discussion .							
CO-2	This section provide the details about the X-ray production and interaction, Ultrasound imaging systems and its interaction							
CO-3	This section tell us about the biomedical telemetery and telemedicine							
CO-4	This section provide the detail about the external pacemakers, Implantable pacemakers, Programmable Pacemakers							

UNIT-I

Introduction to Biomedical Instrumentation**:** Basic Anatomy and Physiology: Circulatory system, Nervous system and Respiratory system, Review of development of biomedical instrumentation and Biometrics, Review of transducers, Sensors and electrodes.

Biomedical Devices and Measurements**:** Cardiovascular Measurement: The heart out cardio vascular system, Electrocardiography, Photocardiography,Respiratory system measurement: Respiratory mechanism, measurement of gas volume, flow rate, measurement of gas concentration in inhaled aided respiratory controller. Measurement of electrical activities in muscles and brain: Electromyography, Electroencephalograph and their interpretation.

UNIT-II

Modern Imaging System**:** Introduction to Ionising and Non-ionising radiation, principles of X-ray production and interaction, special techniques, CAT, mammography, Ultrasound Imaging Systems and its interaction, Magnetic Resonance Imaging System, Basic NMR components different imaging methods, image processing, filters, enhancements and restoration and image segmentation

UNIT-III

Biomedical Telemetry and Telemedicine**:** Introduction to Biotelemetry, Physiological parameters, Wireless telemetry, Single channel telemetry systems, Multichannel wireless telemetry system, Multipatient telemetry, Implantable telemetry systems, transmission of analog physiological signals over telephone, Telemedicine, Application of Telemetry in Patient care

UNIT-IV

Cardiac Pacemakers and Defibrillators**:** Cardiac pacemakers: External pacemakers, Implantable pacemakers, Programmable Pacemakers, Performance aspects of Implantable pacemakers, Power sources, Pacing system analyzers Cardiac Defibrillators: Dc defibrillator, Defibrillator electrodes, Performance aspects, Implantable Defibrillator analyzer.

Text Books :

1. Handbook of Biomedical Instrumentation, Khandpur
2. Medical Instrumentation: Application and Design, J.G.Webster, Houghton Mifin.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**practical**	**Total**	
EL-312N	Digital Signal Processing Lab	0	0	3	40	60	100	3
Purpose	To make students aware about the designing of digital systems using MATLAB							
Course Outcomes (CO)								
CO-1	This lab will explain the coding of MATLAB system tool							
CO-2	Student will be able to understand the basic communication technique on MATLAB and to read the result on the screen							

Perform the Experiments using MATLAB

1. To develop a program for computing Z- transform in factored form, Plot its poles and zeros , and then determine its ROCs.
2. To develop a program for computing Inverse Z-transform of a rational transfer function.
3. To develop a program for linear convolution and circular convolution .
4. To develop a Program for computing discrete Fourier transform .
5. To develop a Program for computing the convolution by overlap-add method and overlap save-method.
6. To develop Program for realization of IIR Digital filters (Direct, Cascade, Parallel).
7. To develop a program for sampling theorem .
8. To design FIR filters using windows technique.
9. To design analog filter (Low pass, High pass).
10. To design analog filter (Band pass, Band stop)
11. To design IIR filters using (Impulse Invariant method).
12. To design IIR filters using (bilinear transformation).

Note: Any 8 experiments from the above list and 2 more from others (developed by institute) are required to be performed by students in the laboratory.

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**practical**	**Total**	
EL-314N	Microprocessor and Interfacing Lab	0	0	3	40	60	100	3
Purpose	To make students aware about the Microprocessor systems & how we implement it in practically.							
Course Outcomes (CO)								
CO-1	Student will be able to understand execution of various experiments on Microprocessor kits.							

Objective: Write the efficient Assembly Language Program for different problem statements and implement different system interfacing.

Write an Assembly Language Program to

1. Add / Sub two 16 bit numbers.
2. Find sum of series of numbers.
3. Multiply two 16 bit unsigned/ signed numbers.
4. Divide two unsigned/ signed numbers (32/16 , 16/8, 16/16, 8/8)
5. Add / Sub / multiply / Divide two BCD numbers.
6. Find smallest/ largest number from array of n numbers.
7. Arrange numbers in array in ascending/ descending order.
8. Perform block transfer data using string instructions / without using string instructions.
9. Compare two strings using string instructions / without using string instructions.
10. Display string in reverse order, string length, Concatenation of two strings.
11. Convert Hex to Decimal, Decimal to Hex.
12. To find 1's and 2's complement of a number.

Note: Any 8 experiments from the above list and 2 more from others (developed by institute) are required to be performed by students in the laboratory.

B. Tech. 6th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**practical**	**Total**	
EL-316N	Microwave Lab	0	0	3	40	60	100	3
Purpose	To give the students an idea about the study and analysis of components used in Microwave Engg.							
Course Outcomes (CO)								
CO-1	Students will learn the steps to analyze microwave components.							
CO-2	Students will be able to find the characteristics of microwave components.							
CO-3	Students will learn the steps to analyze various antennas.							
CO-4	Students will be able to find the characteristics of various antennas.							

LIST OF EXPERIMENTS:

1. To study microwave components.
2. To study the characteristics of the reflex Klystron tube and to determine its electronic tuning range.
3. To determine the frequency and wavelength in a rectangular waveguide working in TE 10 mode.
4. To determine the standing wave ratio and reflection coefficient.
5. To study the I-V characteristics of gunn diode.
6. To study the magic Tee.
7. To study the isolator and attenuator.
8. To measure the coupling coefficient and directivity of a waveguide directional coupler.
9. To measure the polar pattern and the gain of a waveguide horn antenna.
10. To measure the insertion loss and attenuation.

Semester-VII

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-401N	Fuzzy Logics And Neural Networks	4	1	0	75	25	100	3
Purpose	The objective of this course is to make the students aware about Neural & Fuzzy Logics and its application.							
Course Outcomes								
CO 1	Understanding of different Fuzzy Arithmetic, Algebraic operations and Fuzzy sets.							
CO 2	Introduction to Fuzzy control and its applications							
CO 3	Identify and understand of Neural Networks, Artificial Neuron model and neural controller							
CO 4	Application of Neural Network							

UNIT I

Neurals Networks: Fundamental of neural network, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning Methods, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Radial Basis functions, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNIT II

Fuzzy Sets: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Extension principle and fuzzy relations Fuzzy Logic: Fuzzification and defuzzification, Membership Function, Linguistic Variables, Linguistic hedges, Fuzzy rules and reasoning, lamda cut-sets. Arithmetic operations on Fuzzy numbers.

UNIT III

Fuzzy Inference System: Fuzzy Modeling, Mamdani Fuzzy model, TSK Fuzzy model, Fuzzy Controller, Industrial Applications.

Introduction to Neural Fuzzy Networks: Architecture of Neuro Fuzzy Networks, Hybrid learning algorithms, Neuro-fuzzy Control.

UNIT IV

Introduction to Evolutionary Techniques: Genetic Algorithm, Basic Concepts, Flow Chart of GA, Genetic representations (Encoding), Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Convergence of GA and Applications.

Text Books:

1. J.M Zurada , " Introduction to Artificial Neural Network" , Jaico Publishers
2. H.J. Zimmermann" Fuzzy set theory & its Applications ", Allied Publishers Ltd.

Reference Books:

1.James A. Anderson" Introduction to Neural Networks", Prentice Hall India.
2.Nil Junbong " Fuzzy Neural Control Principles & Algorithm", PHI.
3.N.K. Bose" Neural Network Fundamental with Graphics ", TAT A McGraw Hill.
4.Klir George J. " Fuzzy sets and Fuzzy Logic Theory and Applications", PHI.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-403 N	Embedded System Design	4	1	0	75	25	100	3
Purpose	The objective of this course is to make the students aware about embedded systems design including different type of microcontroller and their designing.							
Course Outcomes								
CO 1	Implement combinatorial logic and sequential systems in terms of basic digital building blocks using simulation software. You will be able to perform some optimizations.							
CO 2	Design, test and critically evaluate embedded solutions to real world situations using digital components (sequential and combinational).							
CO 3	Develop software systems for embedded devices using assembler code.							
CO 4	Design, test and critically evaluate embedded solutions to real world situations using (embedded) computer systems interfaced to digital hardware.							

UNIT I

Types of Microcontrollers**:** Embedded microcontrollers, External memorymicrocontrollers; Processor Architectures: Harvard V/S Princeton , CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.

UNIT II

Microcontroller architecture: Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

UNIT III

Interrupts And I/O Ports: Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.

UNIT IV

Programming with microcontrollers**:** Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.

Designing using microcontrollers**:** Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor.

Text Books**:**

1. Design with PIC Microcontrollers by John B. Peatman , Pearson.

Reference Books **:**

1. Programming and Customizing the 8051 Microcontroller : Predko ; TMH.
2. Designing Embedded Hardware : John Catsoulis ;SHROFF PUB. & DISTR. ND.
3. Programming Embedded Systems in C and C++: Michael Barr; SHROFF PUB. & DISTR.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-421 N	Robotics	3	1	0	75	25	100	3
Course Outcomes								
CO 1	The basic concepts related to robot, Parts of robots, End effectors and to make the student familiar with the various drive systems for robot.							
CO 2	Various sensors and machine vision and their applications in robots.							
CO 3	About various control system, robot programming, Artificial intelligence and safety standards of robots							
CO 4	Industrial and Non-industrial Applications of robots.							

UNIT-I

Fundamentals of Robot: Definition, History and Development in robot technology. Robot Technology: Characteristics, Basic Components, Robot Anatomy, Robot Generations, Robot selection, Present and Future Applications. Robot Drive Systems and End Effectors: Robot Classification: Arm geometry, Degrees of freedom, Power sources, Types of motion, Path Control. Robot End Effectors: Mechanical grippers, Vacuum, Magnetic, Adhesive. Special purpose grippers, Process tooling, Compliance, Robot Drive systems: Hydraulic, Pneumatic and Electric system.

UNIT-II

Sensor : Requirements of a sensor, Sensor classification, Principles and Applications of the following types of sensors : Position of sensors (Potentiometer, Encoder, LVDT, Resolvers, LMDT, Hall – effect sensors),Velocity sensors(Encoder, Tachometer, Differentiation of position signal),Acceleration sensors, Force and Pressure Sensors(Piezoelectric, Force sensing resistor, Strain Gauge, Antistatic foam), Torque Sensors, Micro switches, Visible light and Infrared Sensors, Touch and Tactile sensors, Proximity Sensors(Magnetic, optical, Ultrasonic, Inductive, Capacitive, Eddy Current), Range Finder (Ultrasonic, Light-based, GPS), Sniff Sensors, Taste Sensors, Vision Sensors, Voice recognition devices, Voice synthesizers, RCC. Machine Vision : Visual sensing, Architecture of robotics vision system, Machine vision: Image acquisition (Vidicon tube, CCD), Digitization, Image processing, Image Analysis, Image interpretation. Machine vision application, other optical methods.

UNIT-III

Control System, Programming and Artificial Intelligence: Control Systems: PLC, PID, CNC, MPU, URC. Robot programming: Programming methods, Languages, levels of robot programming, Program statements. Elements of Artificial Intelligence, System architecture, Application of fuzzy logic in robotics, Robot Safety, safety standards.

UNIT-IV

Robot Applications: Industrial applications, Automation in manufacturing, Robot applications, Material handling, Processing application, Assembly application, Inspection application, evaluating the potential of a robot application, future applications, challenge for the future, Innovations, Nonindustrial application.

Text Books:

1. James G. Keramas, " Robot technology fundamentals", Delmar Publishers.
2. Saeed B. Niku, "Introduction to robotics analysis,control and applications", 2nd ed., Wiley India.
3. R. K. Mittal,I.J.Nagrath, "Robotics and Control", TMH Education Pvt. Lmt. Industrial Robotics- By M.P Grover Tata McGraw Hill

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-423 N	Microcontrollers	3	1	0	75	25	100	3
Purpose								
Course Outcomes								
CO 1	This section will provide basic concepts of various types of microcontrollers.							
CO 2	This section will provide details description and instruction set of 8051 microcontroller.							
CO 3	This section will provide interfacing part of 8051 with peripheral devices.							
CO 4	This section will provide basic concept and architecture of PIC microcontroller.							

UNIT-I

Introduction: Comparing Microprocessors and Microcontrollers. survey of microcontrollers- 4 bit, 8 bit, 16 bit, 32 bit microcontrollers. Applications of microcontrollers.

8051 Architecture: Block diagram, pin diagram of 8051. Functional descriptions of internal units, registers, PSW, internal RAM ROM, Stack, Oscillator and Clock. UO Pins, Ports and Circuits connecting external memory. Counters and timers. Serial data interrupt Serial data transmission Reception and transmission modes. Timer flag interrupt. External interrupt, software generated interrupts. External memory and memory space decoding, expanding I/Os, memory mapped I/O Reset & CLK Circuits.

UNIT-II

8051 Instruction set and programming: 8051 Instruction syntax, addressing modes, Data transfer instructions, logical instructions, arithmetic instructions, Jump and Call instructions. Interrupts and interrupt handler subroutines. Writing assembly Language programs. Time delays and its types.Lookup tables. Serial data transmission using time delays and polling. Interrupt driven serial transmission and reception.

UNIT-III

8051 applications: Interfacing Keyboards Programs for small keyboards and matrix keyboards. Interfacing multiplexed displays, numeric displays and LCD displays. Measuring frequency and pulse width. Interfacing ADCs & DACs. Hardware circuits for handling multiple interrupts. 8051 Serial data communication modes- Mode 0, Mode I, Mode 2 and Mode 3.

UNIT-IV

PIC Microcontroller: Introduction to PIC microcontrollers, PIC architecture, comparison of PIC with other CISC and RISC based systems and microprocessors, memory mapping and assembly language programming, addressing modes, instruction set.

I/O Programming: PIC I/O ports, I/O bit manipulation programming, timers/counters, programming to generate delay and waveform generation, Peripherals devices interfacing.

Text books:

1. KJ.Ayala, The 8051 Microcontroller - 2'd cd. Penram International.
2. Intel's manual on " Embedded Microcontrollers"
3. PIC microcontroller-programming in basic by Milan Verle

Reference Books:

1. Programming PIC microcontrollers with PIC basic by Chuck Helebuyck.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-425 N	Renewable Energy Resources	3	1	0	75	25	100	3

Course Outcomes	
CO 1	This section will provide basic concept of energy conversion system.
CO 2	This section will provide description of solar systems and electric/thermal power generation systems.
CO 3	This section will provide description of hydro power systems.
CO 4	This section will provide description of wind energy, tidal energy etc.

UNIT-I

Introduction: Direct energy conversion, description, working principle, magneto hydrodynamic systems (MHD), thermoelectric generators, thermionic generator, fuel cells, solar cells, EMF generated, power output, losses and efficiency, applications, hydrogen conversion and storage systems.

UNIT-II

Extraterrestrial solar radiation, components of radiation, geometry of earth and sun, geometry of collector arid the solar beam, effects of earth's atmosphere, measurements of solar radiation, calculation of heat balance for a solar collector, type of water heaters, selective surfaces, crop heaters, space heating, space cooling, water desalination, solar ponds, solar concentrators, electric power system, problems.

Silicon p-n junction, photon absorption, solar radiation input, photovoltaic circuit properties And loads, limit to cell efficiency, solar cell construction type and adaptations of photovoltaic, other types of photoelectric, and thermo electric generation and problems

UNIT-III

Principles of hydro power, assessing the resource for small installations, an impulse turbine, reaction turbines, hydro electric systems, the hydraulic rain pump, wind turbine types and terms, linear momentum and basic theory, dynamic matching, steam tube theory, characteristics of the wind, power extraction by a turbine, electricity generation, mechanical power, problems.

Introduction, tropic level photosynthesis, photosynthesis at the plant level, thermodynamic considerations, photosynthesis, molecular level photosynthesis, synthetic photosynthesis, bio fuel classification, bio-mass production for energy farming, direct combustion for heat, pyrolysis (destructive distillation), alcoholic fermentation, anaerobic digestion for bio-gas, agrochemical fuel extractions, problems

UNIT-IV

Introduction, wave motion, wave energy and power,wave patterns, devices, the causes of tides, enhancement of tides flow power, tidal range power, world range power sites, problems.

Principles of Ocean Thermal Energy Conversion (OTEC), heatexchangers, pumping requirements, other practical considerations, introduction to geothermal energy, geophysics, dry rock and hot aquifer analysis, harnessing geothermal resources, problems.

Text/References Books:

1. Renewable Energy Rsources by John W. Twidell and Anthony D. Weir, published by E.& F. N. Spon Ltd. London.
2. Non-Conventional energy sources by Rai G D, Khanna Publishers, New Delhi

Note:- *The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-431 N	MEMS	3	1	0	75	25	100	3
Course Outcomes								
CO 1	Students will be using knowledge of mathematics, science, and engineering to understand various MEMS devices.							
CO 2	Students be able to understand various processes used such as oxidation, metallization, fabrication and packaging of MEMS devices.							
CO 3	Understanding basic principles of bulk micromachining and clean rooms practices							
CO 4	Understand materials and MEMS packaging techniques.							

UNIT-I

Introduction to Microsystems: Overview of microelectronics manufacture and Microsystems technology. Definition - MEMS materials. Laws of scaling. The multi disciplinary nature of MEMS. Survey of materials central to micro engineering. Applications of MEMS in various industries.

UNIT-II

Micro Sensors and Actuators: Working principle of Microsystems - micro actuation techniques, micro sensors – types, Microactuators and types,micropump, micromotors, micro – valves, microgrippers – micro- accelerometers.

UNIT-III

Fabrication Process Substrates - single crystal silicon wafer formation, Clean room practices, Photolithography, Ion implantation, Diffusion, Oxidation, CVD - Physical vapor deposition, epitaxy - etching process.

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UNIT-IV

Micro System Manufacturing Bulk Micro manufacturing - surface micro machining – LIGA Micro system packaging materials - die level - device level - system level - packaging techniques – die preparation – surface bonding wire bonding - sealing. Introduction to assembly, Introduction to Micro-system design.

Text Books:

1. MEMS and Microsystems Design and Manufacture" by Tai-Ran Hsu. Tata McGraw-Hill Publishing Company Ltd.
2. Foundation of MEMS" by Chang Liu. Pearson Education.
3. MEMS Handbook", Mohamed Gad – el – Hak, CRC Press, 2002.
4. Rai - Choudhury P. MEMS and MOEMS Technology and Applications", PHI Learning Private Limited, 2009.

Reference Books:

1. Francis E.H. Tay and Choong .W.O, "Micro fluidics and Bio mems application", IEEE Press New York, 1997.
2. Trimmer William S., Ed., "Micromechanics and MEMS", IEEE Press New York, 1997.
3. Maluf, Nadim, "An introduction to Micro electro mechanical Systems Engineering", AR Tech house, Boston 2000.
4. Julian W.Gardner, Vijay K.Varadan, Osama O. Awadel Karim, "Micro sensors MEMS and Smart Devices", John Wiby & sons Ltd., 2001.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-433 N	Nanoelectronics	3	1	0	75	25	100	3
Course Outcomes								
CO 1	Students will be using physics, mathematics, and material science engineering to understand the latest development in the area of Microelectronics leading to Nanoelectronics							
CO 2	Students be able to understand the fundamentals of classical CMOS technology and issues in scaling MOSFET in the sub-100nm regime							
CO 3	Understanding basic principles of non classical transistors with new device structure and nano materials.							
CO 4	Understand the issues in realizing Germanium and compound semiconductor MOSFET.							

UNIT 1

Overview: Nano devices, Nano materials, Definition of Technology node, Basic CMOS Process flow, MOS Scaling theory, Issues in scaling, Short channel effects, Description of a typical 65 nm CMOS technology, Requirements for Non classical MOS transistor, MOS capacitor, Role of interface quality and related process techniques, Gate oxide thickness scaling trend, SiO2 vs High-k gate dielectrics. Integration issues of high-k , Interface states, bulk charge, band offset, stability, etc.

UNIT II

Metal Gate Transistor : Motivation, requirements, Integration Issues, Transport in Nano MOSFET, velocity saturation, ballistic transport, injection velocity, velocity overshoot, SOI - PDSOI and FDSOI., Ultrathin body SOI - double gate transistors, Vertical transistors - FinFET and Surround gate FET, Metal source/drain junctions - Properties of schotky junctions on Silicon, Germanium and compound semiconductors –Work function pinning, Germanium Nano MOSFETs : strain , quantization , Advantages of Germanium over Silicon.

UNIT III

PMOS versus NMOS, Compound semiconductors - material properties, MOSFETs Compound semicocnductors MOSFETs in the context of channel quantization and strain , Hetero structure MOSFETs exploiting novel materials, strain, quantization. Synthesis of Nanomaterials : CVD, Nucleation and Growth, ALD, Epitaxy, MBE. Compound semiconductor hetero-structure growth, emerging nano materials: Nanotubes, nanorods and other nano structures, LB technique, Soft lithography etc. Microwave assisted synthesis, Self assembly etc.

UNIT IV

Characterization : Quantum wells and Thickness measurement techniques: Contact - step height, Optical - reflectance and ellipsometry, AFM, Nanomaterials Characterization techniques: FTIR, XRD, AFM, SEM, TEM, EDAX and interpretation of results.

Reference Books **:** 1.Fundamentals of Modern VLSI Devices, Y. Taur and T. Ning, Cambridge University Press. Silicon VLSI Technology, Plummer, Pearson Education India.

2.Encyclopedia of Materials Characterization, Edited by: Brundle, C.Richard; Evans, Charles A. Jr.; Wilson, Shaun ; Elsevier

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-435 N	Electronic Waste Management	3	1	0	75	25	100	3
Purpose	The objective of this course is to make the students aware about Materials Used In Manufacturing Electrical and Electronic Products and Electronic Waste Management							
Course Outcomes								
CO 1	Describe the major categories of waste, sources of pollution in coastal environments							
CO 2	Students will be able to learn about effects of ocean pollutants and environmental effects of electronic waste.							
CO 3	Students will be able to learn about chemical and physical properties of Solid waste.							
CO 4	Study of Disposal techniques, ways in which battery recycling rates can be improved.							

UNIT-I

Introduction:

Introduction to E-waste, classification of E-waste, legislative influences on electronic recycling, WEEE and ROHS directive, treatment options for WEEE, material composition of WEEE, health and safety implication

UNIT-II

Materials used in manufacturing electrical and electronics products:

Overview, ROHS directive and prescribed materials – lead, brominated flame retardants, soldering and move to lead free assembly, printed circuit board materials, encapsulant of electronic components, indium tin oxide and LCD screens, polymeric materials in enclosures, casing and panels, material composition of mobile phones, computers, televisions, washing machines and other electronic components, useful components and hazardous components in electronic waste.

UNIT-III

Dumping,Burning and Landfill:

Introduction, landfills, pollutions from landfill, landfill site construction, burning, incineration, thermal processing, current practices in India, case studies and projects.

Integrated approach to electronic waste recycling:

Separation and sorting, treatment, emerging technologies like separation, thermal treatment, sensing technologies, plastics to liquid fuels, sorting, crushing, automated disassembly, design for recycling and inverse manufacturing. Design methodology and resource efficiency, environmentally sound treatment technology for E-waste, eco-design guidelines for manufacturing, case studies and project.

UNIT-IV

Electronic waste management:

Methods for electronic waste management, national and international efforts, corporate social responsibility, extended producer responsibility(EPR), current practices in India, case studies and project.

Text Books:

1. E-waste implications, regulations and management in India and current global best practices by rakeshJohri (2008), TERI publishing.

2. E-Waste: Managing the digital dump yard by Vishaka Munshi, ICFAI.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 7th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Sessional**	**Practical**	**Total**	
EL-407 N	Neural Networks Lab	0	0	3	40	60	100	3
Purpose	To make students understand about the applications of refrigeration and Air-conditioning.							
Course Outcomes:								
CO1	Understanding of different Fuzzy Arithmetic, Algebraic operations and Fuzzy sets.							
CO2	Introduction to Fuzzy control and its applications							
CO3	Identify and understand of Neural Networks, Artificial Neuron model and neural controller							
CO4	Application of Neural Network							

List of Experiments:

1. NN for AND, OR gate using perceptron.

2. Perceptron to classify odd and even numbers.

3. NN for alphabet recognition using backpropagation.

4. Hopfield network for recognizing patterns such as '+' and '-'.

5. NN for EXOR classification using Back propagation.

6. CPN for image classification.

7. Name and Telephone number recognition system

Semester-VIII

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-402 N	Computer Communication Network	3	1	0	75	25	100	3
	Course Outcomes (CO)							
CO-1	This Section basically aware the students about types of networks and network topologies.							
CO-2	This section provides the concept of functioning of Data Link Layer.							
CO-3	This section provides the details of functioning of network layer.							
CO-4	The students will be able to understand the functioning of presentation layer.							

UNIT-I

Introduction: Uses of Computer Networks, Network Hardware, Network Software, Reference models, Examples of Networks & Data communication Services, Network Standardization. THE Physical Layer: Theoretical basis for Data communication, Transmission media, Wireless Communication, The Telephone System, Narrowband ISDN, Broadband ISDN and ATM, Cellular Radio, Communication Satellites.

UNIT-II

Data Link Layer: Data Link Layer Design issues, Error Detection & correction, Elementary Data Link protocols, Sliding Window Protocols, Protocol Specification & Verification, Example of Data Link Protocols. THE MEDIUM ACCESS SUBLAYER: Aloha Protocols, LAN Protocols, IEEE Standards, Fiber optic Networks, Satellite Networks, Packet switching, radio Networks.

UNIT-III

Network Layer: Design issues, routing algorithms, congestion control Algorithms, internetworking. TRANSPORT & SESSION LAYER: Protocol design issues, connection Management, remote procedure calls.

UNIT-IV

Presentation Layer: Design issues, abstract Syntax notation, data compression technique, cryptograph. APPLICATION LAYER: Design issues, file transfer, access and management, electronic mail, virtual terminals, applications and examples.

Text/References Books:

1. Tanenbaum A.S, Computer Networks, PHI.
2. Forouzan B.A, Data Communications and Networking, Tata-Mc-Graw Hill.
3. Stallings W, Data and Computer Communications, PHI.
4. Ahuja V, Design and Analysis of Computer Communication, McGraw Hill.
5. Bee K.C.S, Local Area Networks, NCC Publication

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-404N	Optical Communication	3	1	0	75	25	100	3
Purpose	To make the students conversant with the basics concept of Optical Fiber Communication, Optical sources and detectors.							
	Course Outcomes (CO)							
CO-1	This Section will aware the students about the basics of fibers, principals and the types of fibers.							
CO-2	This Section describes the modes in the fibers, attenuations and the other effects in the fibers.							
CO-3	This section is all about the optical sources, their structures and their characteristics.							
CO-4	This section is all about the optical detectors, their structures and their characteristics.							

UNIT-I

Overview of Optical Fiber Communication: Advantages of optical fiber communication. Optical Fiber waveguides: Introduction, Ray theory transmission Total internal reflection, acceptance angle, numerical aperture, skew rays. Electromagnetic mode theory for optical propagation: Electromagnetic waves, modes in a planar guide, phase and group velocity, phase shift with total internal reflection

UNIT-II

Cylindrical Fiber modes, mode coupling, step index fibers Graded index fibers, Single mode Fiber: Cut-off wavelength, Mode field diameter and spot size, effective refractive index, Group delay and mode delay factor

Signal Distortion in Optical Fibers - Attenuation, Material Absorption, losses in silica glass fibers; Intrinsic absorption, Extrinsic absorption. Linear scattering losses; Ray light scattering, Mie scattering. Non linear Scattering losses: fiber bending losses; Dispersion, Chromatic dispersion: material dispersion, waveguide dispersion. Intermodal dispersion: Multimode step index fiber, Multimode graded index fiber. Overall fiber dispersion Multimode fiber, Dispersion modified single mode fibers, Dispersion–shifted fiber, dispersion flatted fibers, nonzero-dispersion shifted fibers (MZ-DSF), Polarization

UNIT-III

Optical Sources - Light Emitting Diodes (LEDs): Structures, light source materials, Quantum Efficiency on LED Power Modulation of a LED, Laser Diodes- models and threshold conditions, laser diode rate equations, External quantum efficiency, resonant frequency, laser diode structures and radiation patterns, single mode lasers modulation of laser diodes, laser lines.

UNIT-IV

Source to fiber power launching, Source Output patterns, Power coupling calculation, Power launching versus wavelength, Photo detectors: PIN photo detector, Avalanche photodiodes. Photo detector Noise: Noise sources, signal to noise ratio. Detector Response time: response time structure of in GaAs APDs, Temperature effect on Avalanche gain, comparison of photo detectors

Text Books**:**

1. John M. Senior, "Optical Fiber Communications", PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 2008.

Reference Books:

1. Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.
2. Joseph C. Plais, "Fiber Optic Communication", Pearson Education, 4th Ed, 2004.

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-406N	Optical Communication and Networking Lab	0	0	2	40	60	100	3
Purpose	To make the students understand various kind of commands ,servers and file transfer protocols							
	Course Outcomes (CO)							
CO-1	Understand and connect various components for networking lab							
CO-2	To have a look at various kind of connectors and how to use							
CO-3	To know about the software used for networking and communication							
CO-4	To know about how to develop a file server							

Part - A

1. Familiarisation of different types of cables and different commands.
   a) Identify Cat5 cable , RJ 45 Connector , Crimping Tool , Wire Stripper
   b) Use Wire Stripper for Cutting wire shield and Understanding of Internal Structure of Cat 5 Cable
   c) Finding Pin No-1 on RJ 45 Connector and Inserting Wires in connector
   d) Crimping of RJ45 connector using Crimping tool
   e) Preparation of Straight cable (used for Dissimilar devices such as PC to Switch , PC to router) and Cross cables (used for similar devices such as PC to PC , Router to Router , Switch to Switch)
   f) Understand different commands like ping, treacert, ifconfig, dig etc..
2. Making a subnet and configuring router
   a) Understand the working of a router & method to access the router via console or using telnet, different types of cables used for connectivity.
   b) Different types of show commands & their purpose.
   c) Assignment of IP address and enabling layer 3 connectivity. d) Implement sub netting
3. Configuring web and DHCP servers
   a) Understand Internet Information Services tool and its installation.
   b) To configure web services using IIS tool.
   c) Configure DHCP
4. Configuring VLAN
   a) Understand the configuration of Vlan in a switch
   b) How to make the port of a switch as an access port & a trunk port, purpose of the Vlan in a network
   c) Different types of show commands & their purpose.
5. To implement a simple file transfer protocol (FTP) using connection oriented and connectionless sockets.
6. To develop a concurrent file server that spawns several threads, one for each client requesting a specific file.
7. To develop a simple chatting application using
   (i) Connection oriented and
   (ii) Connectionless sockets

Part – B (Any 4 Experiments)

1. To setting up fiber optic analog link.
2. Study and measurement of losses in optical fiber.
3. Study and measurement of numerical aperture of optical fiber.
4. Study and perform time division multiplexing (digital).
5. Study of framing in time division multiplexing.
6. Study of Manchester coding and decoding.
7. Study of voice coding and codec chip.
8. Study and measure characteristics of fiber optic LED's and photo detector.

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-422N	Operation Research	3	1	0	75	25	100	3
Purpose	To introduce the students about Different types of operation research models.							
	Course Outcomes (CO)							
CO-1	To introduce the students about Linear Programming problem-Formulation and graphical solution.							
CO-2	To introduce the students about Dual simplex method. Sensitivity analysis.							
CO-3	To introduce the students about Network minimization, shortest route problem, Maximum flow problem and project of scheduling by PERT,CEM.							
CO-4	To introduce the students about Critical path calculations.							

UNIT-I

Different types of o.r. models, their construction and general methods of solution. Linear Programming problem-Formulation and graphical solution. The standard form of the L.P.model. The simplex method, The dual of L.P.P, Primal-dual relationship, Dual simplex method, Sensitivity analysis, Transportation problem, its solution and applications, The assignment model, Travelling salesman problem.

UNIT-II

Network minimization, Shortest route problem, Maximum flow problem, Project of scheduling by PERT, CPM.

UNIT-III

Critical path calculations, Construction of the time chart and resource leveling, Integer programming-examples, method of and algorithms, cutting plane algorithm only.

UNIT-IV

Dynamic Programming, Examples of D.P.models, Bellman‘s Principle of optimality and method of recursive optimization, simple problems only involving up to one constraint.

Text Books: -

1. Taha H.A Operations Research-An Introduction, PHI
2. Wanger H.M, Principles of Operation Research, PHI

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-424N	Artificial Intelligence and Expert system	3	1	0	75	25	100	3
	Course Outcomes (CO)							
CO-1	To make the students familiar with Expert system and their features.							
CO-2	To introduce the Problem areas addressed by Expert system.							
CO-3	To introduce the organization of Expert Systems.							
CO-4	To introduce the design and architectures of Expert system.							

UNIT – I

Introduction to Expert System: What are Expert Systems, Features of Expert System, features of good Expert System, Types of applications of Expert Systems; relationship of Expert Systems to Artificial Intelligence and to Knowledge-Based Systems. Problem areas addressed by ES, ES success factors. Role of human in Expert System, Expert System organization.

UNIT – II

Expert system development life: cycle Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems. Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation.

UNIT – III

Expert System Tools: Knowledge representation in expert systems-using rules semantic nets, frames, Types of tools available for expert system building and how they are used, Stages in the development of expert system tools, Examples of knowledge engineering.

Building an Expert Systems: Necessary requirements for expert systems development, Task in building expert systems, Stages of expert system development, Examples of the expert system building process, Examples of expert system used in different areas, Architecture of Rule based Expert system, Non Rule based Expert system.

UNIT – IV

Types of Expert System : An analysis of some classic expert systems, Limitations of first generation expert systems, Deep expert systems, Co-operating expert system, Neural Expert System, Fuzzy Expert System, Real Time Expert Systems, Applications of Expert System.

Text/Reference Books:

1. David W. Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill Book Company.
2. Peter Jackson: Introduction To Expert Systems, Addison WesleyElaine Rich and Kevin Knight: Artificial Intelligence and Expert Systems, McGraw Hill Book Company.
3. Elias M. Awad : Building Expert Systems, principles, procedures, and applications, west publishing co.1996.
4. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems, Prentice

Hall (April 1, 1990).

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-426N	Analog Filter Design	3	1	0	75	25	100	3
Purpose	To make the students to aware about the different types of filter to design and their applications							
	Course Outcomes (CO)							
CO-1	This section is designed to have the knowledge of fundamentals of filters & op-Amp							
CO-2	This section is designed to have the knowledge of realizing first order , second order filters with different parameters							
CO-3	This section is designed to have the knowledge of designing second order filters with arbitrary transmission zeros.							
CO-4	This section is designed to have the knowledge of realizing the Low pass Chebeshev filters.							

UNIT-I

Introduction: Fundamentals, Types of filters and descriptive terminology, why we use Analog Filters, Circuit elements and scaling, Circuit simulation and modeling. Operational amplifiers: Opamp models, Opamp slew rate, Operational amplifiers with resistive feedback: Non inverting and Inverting, Analyzing Opamp circuits, Block diagrams and feedback, The Voltage follower, Addition and subtraction, Application of Opamp resistor circuits.

UNIT-II

First Order Filter: Bilinear transfer functions and frequency response – Bilinear transfer function and its parts, realization of passive elements, Bode plots, Active realization, The effect of A(s), cascade design. Second order low pass and band pass filters: Design parameters, Second order circuit, frequency response of low pass and band pass circuits.

UNIT-III

Second order filters with arbitrary transmission zeros: By using summing, By voltage feed forward, cascade design revisited. Low pass filters with maximally flat magnitude: the ideal low pass filter, Butterworth response, Butterworth pole locations, low pass filter specifications, arbitrary transmission zeros.

UNIT-IV

Low pass filter with equal ripple (Chebyshev) magnitude response: The chebyshev polynomial ,The chebyshev magnitude response, Location of chebyshev poles, Comparison of maximally flat & equal–ripple responses, Chebyshev filter design Inverse chebyshev and cauer filters: Inverse chebyshev response, From specifications to pole and zero locations, Cauer magnitude response, Chebyshev rational functions, Cauer filter design.

Text Books:

1. Rolf. Schaumann, Haiqiao Xiao, Mac. E. Van Valkenburg, “Analog Filter Design”, 2nd Indian Edition, Oxford University Press.

Reference Books:
1. J. Michael Jacob ,"Applications and Design with Analog Integrated Circuits", Second edition, Pearson.

2. T. Deliyannis, Yichuang Sun, J.K. Fidler, "Continuous-Time Active Filter Design", CRC Press.

Note: - *The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-432N	Electronics System Design	3	1	0	75	25	100	3
Purpose	To make the students to aware about the design of the various logic circuits.							
	Course Outcomes (CO)							
CO-1	Students will be aware of basics of the digital iterative networks.							
CO-2	This Section describes the designing of the sequential machines.							
CO-3	This Section describes the designing of multi input systems controller design with FPGA , CPLD							
CO-4	This Section describes the designing of the sequential state machines.							

UNIT-I

MSI and LSI Circuits And Their Applications: Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR Inverter Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

UNIT-II

Sequential Machines: The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

UNIT-III

Multi Input System Controller Design**:** System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional,MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers in System Controllers, Programmable System Controllers, ROM, PLA And PAL Based Design. Introduction to the CPLD & FPGA.

UNIT-IV

Asynchronous Finite State Machines**:** Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Text Books**:**

1. Fletcher, “An Engineering Approach to Digital Design” PHI 1990
2. Z. Kohavi, “Switching and Finite Automata Theory”, TMH

Reference Books**:**

1. Markovitz, “Introduction to Logic Design”, TMH
2. Morris Mano, “ Digital Design”, PHI

Note:- *The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit.*

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-434N	Electronics Switching Theory	3	1	0	75	25	100	3
Purpose	To make the students to learn about different switching circuits and control of switching.							
	Course Outcomes (CO)							
CO-1	This section aware the students about the history & evolution of the switching systems.							
CO-2	This Section describes the different parameters of digital switching at different timings..							
CO-3	This Section describes the control of the switching systems & signaling							
CO-4	This Section describes the packet switching, ATM, Memory switch.							

UNIT-I

Evolution of switching systems: Introduction, Message switching, Circuits switching, Functions of a switching system, Register transistor-senders, Distribution frames, Crossbar switch, A general trucking, Electronic switching, Reed- electronic system, Digital switching systems.

UNIT-II

Digital Switching: Switching functions, Space Division Switching, Time Division Switching, Two-Dimensional Switching, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Telecom Engineering: Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking models and Loss Estimates, Delay Systems

UNIT-III

Control of switching systems: Introduction, Call-processing functions, Common control, Reliability, availability and security; Stored-program control. Signaling: Introduction, Customer line signaling, Audio-frequency junctions and trunk circuits, FDM carrier systems, PCM signaling, Inter register signaling, Common-channel signaling principles, CCITT signaling system no. 6 and 7, Digital customer line signaling.

UNIT-IV

Packet Switching: Packet Switching, Statistical Multiplexing, Routing Control (dynamic routing, virtual circuit routing and fixed-path routing), Flow Control, X.25, Frame Relay, TCP/IP ATM Cells, ATM Service Categories, ATM Switching (ATM Memory Switch, Space-Memory Switch, Memory-Space Switch, Memory-Space Memory switch, Banyan Network Switch).

Text Books:

1. Thiagarajan Viswanathan & Manav Bhatnagar, "Telecommunication Switching Systems and Networks", PHI.
2. J.E. Flood, "Telecommunication Switching, Traffic and Networks", Pearson Education.
3. John C. Bellamy, "Digital Telephony", John Wiley, 3rd Ed.

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit.

B. Tech. 8th Semester Electronics Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
EL-436N	Quality and Reliability of Electronics system	3	1	0	75	25	100	3
	Course Outcomes (CO)							
CO-1	This section of the subject makes the student aware about various probability distribution functions.							
CO-2	This section explains about reliability data analysis.							
CO-3	This section describes the reliability of electronics system design.							
CO-4	This section describes the basics of quality management system.							

UNIT-I

Introduction:-Definition of reliability, quality, availability, maintainability, types of failures, various parameters of system effectiveness, concept of failure modes, difference between MTTR and MTTF. Reliability mathematics: Classical set theory, Boolean algebra, sample space, definition of probability, basic properties of probability, conditional probability, and random variables. Probability distribution: Exponential distribution, gamma distribution, binomial distribution, normal distribution and Weibull distribution.

UNIT-II

Reliability Data Analysis: - The reliability function, bathtub curve, data collection, storage & recovery of data, component reliability from test data, linear hazard model & exponential hazard model. System Reliability: Systems with components in series, systems with components in parallel, series –parallel systems, Fault tree techniques, K-out of m systems.

UNIT-III

Electronics System Reliability:- Reliability of electronic components, component types and failure mechanics, circuit and system aspects, reliability of electronic system design, parameter variation and tolerance.

UNIT-IV

Quality Management System & TQC: - Quality policy, cost & quality, concept of TQM, management of reliability & quality, elements of quality systems, essential steps in implementing quality system for ISO:9000.

Text Books:

1. 1. Practical Reliability Engineering/ Patrick D.T., O'Connor/ John Wiley & Sons 4th edition).
2. Reliability Engineering/ E. Balagurusamy/ Tata McGraw- Hill.

Reference Books:

1. Quality control & Total quality Management / P.L.Jain/ Tata McGraw- Hill.
2. Reliability and Maintainability Engineering / Charles E. Ebeling / TMH .

Note:- *The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit.*

DISTRIBUTION OF WEIGHTAGE FOR THEORY AND PRACTICAL MINOR AND MAJOR TESTS IN B.TECH. COURSES OF KURUKSHETRA UNIVERSITY, KURUKSHETRA (MECH. ENGG.), (AERONAUTICAL ENGG.), (AUTOMOBILE), (CIVIL ENGG.),(MECHATRONICS ENGG.), (TEXTILE ENGG.), (CHEMICAL ENGG.), (CSE), (IT), (ECE), (ELECTRICAL ENGG.), (ELECTRICAL & ELECTRONICS ENGG.), (ELECTRONICS ENGINEERING), (BIOTECHNOLOGY), (FOOD TECHNOLOGY) (RECOMMENDED BY ADHOC BOARD OF STUDIES MEETING HELD ON 25-07-2018 AT UIET, KUK)

The grade awarded to a student in any particular course will be based on performance of the student in Minor Tests (best two out of three) co-curricular activities (assignments, attendance, Viva-Voce, lab. work, seminar, workshop presentation, group discussions, quiz etc.) and Major Test at the end of semester. The distribution of the weightage will be as under:-

Distribution of Weightage for Theory Courses for Minor Test (25%). The following bifurcation would be followed:-

1. Sessional Test I
   Sessional Test- II 60%
   Sessional Test-III*
2. Assignments/problem solving/group discussions/quiz/seminar/ mini-project/Class performanceetc 20%
3. Class Attendance 20%

   Total Weightage 100%

   *Marks of TWO best Sessionals shall be considered

   Weighatge for Major Test- 75%

Distribution of Weightage for Laboratory Courses in Minor Tests

1. Lab Experiments/ Procedure Writing/Tabulation/Submission of Lab Records etc 40%
2. Viva-voce 30%
3. Class Attendance 30%

   Total Weightage 100%

Distribution of weightage for Laboratory Courses for End Term Examination (Major Test)

1. Lab Experiments/ Procedure Writing/ Tabulation/Equation as applicable 50%
2. Viva-voce 50%

   Total Weightage 100%

QUESTION PAPER TEMPLATE COMMON FOR ALL B. TECH. COURSES OF KUK (MECH. ENGG.), (AERONAUTICAL ENGG.), (AUTOMOBILE), (CIVIL ENGG.),(MECHATRONICS ENGG.), (TEXTILE ENGG.), (CHEMICAL ENGG.), (CSE), (IT), (ECE), (ELECTRICAL ENGG.), (ELECTRICAL & ELECTRONICS ENGG.), (ELECTRONICS ENGINEERING), (BIOTECHNOLOGY), (FOOD TECHNOLOGY) (RECOMMENDED BY ADHOC BOARD OF STUDIES MEETING HELD ON 25-07-2018 AT UIET, KUK)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

THEORY EXAMINATION –.....20.....		**TIME – 3 Hrs.**
B.TECH -	**SEMESTER -**	**M.M. - 75**

COURSE NO. -	**COURSE TITLE -**

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least ne from each unit.

PART-A (15 Marks)

Note :- The objective of this section is to check the Cognitive Level (Knowledge & Understanding) of the students.

The Paper setter is advised to set each question with unique words such as: Define, Identify, List, Name, Recognise, Match, Give Examples, in questions.

Q. No. – 1 Answer the following questions. 5x3=15

(i)	
(ii)	
(iii)	
(iv)	
(v)	

PART-B (20 Marks)

Note :- The objective of this section is to check the Cognitive Level (Understanding, Apply & Analyze) of the students.

The Paper setter is advised to set each question with unique words such as: Interpret, Classify, Predict, Observe, Solve, Calculate, Determine, Develop, Examine, Analyse, Distinguish, in questions. **The paper setter may subdivide the questions into parts if so required**.

UNIT-I		
2		**5**
UNIT-II		
3		**5**
UNIT-III		

4		**5**
UNIT-IV		
5		**5**

PART-C (40 Marks)

Note :- The objective of this section is to check the Cognitive Level (Apply, Analyse, Evaluate & Create) of the students.
The Paper setter is advised to set each question with unique words such as: Solve, Calculate, Develop, Examine, Explain, Conclude, Illustrate, Discriminate, Defend, Select, Consider, Distinguish, Justify, Design, Compose, Create, Plan, Substitute, Develop, Rearrange, Express, Propose, Validate, in questions. **The paper setter may subdivide the questions into parts if so required**.

UNIT-I		
6		**10**
7		**10**
UNIT-II		
8		**10**
9		**10**
UNIT-III		
10		**10**
11		**10**
UNIT-IV		
12		**10**
13		**10**

DISTRIBUTION OF WEIGHTAGE FOR THEORY AND PRACTICAL MINOR AND MAJOR TESTS IN M.TECH. COURSES OF KURUKSHETRA UNIVERSITY, KURUKSHETRA (CIVIL ENGINEERING), CIVIL (GEOTECH ENGINEERING), CIVIL (TRANSPORT ENGINEERING), CIVIL (STRUCTURE ENGINEERING), CIVIL (HIGHWAYS),ME (MANUFACTURING SCIENCE &ENGINEERING, ME (CAD /CAM), ME (MANUFACTURING SYSTEMS), ME (MANUFACTURING TECHNOLOGY), ME (INDUSTRIAL & PRODUCTION ENGINEERING), (MECHANICAL ENGINEERING), ELECTRICAL ENGINEERING, ELECTRICAL POWER SYSTEM, POWER ELECTRONICS AND DRIVES, ELECTRONICS AND COMMUNICATION ENGINEERING, COMPUTER SCIENCE & ENGINEERING, INFORMATION TECHNOLOGY, BIO-TECHNOLOGY, FOOD TECHNOLOGY (RECOMMENDED BY ADHOC BOARD OF STUDIES MEETING HELD ON 25-07-2018 AT UIET, KUK)

The grade awarded to a student in any particular course will be based on performance of the student in Minor Tests (best two out of three) co-curricular activities (assignments, attendance, Viva-Voce, lab. work, seminar, workshop presentation, group discussions, quiz etc.) and Major Test at the end of semester. The distribution of the weightage will be as under:-

Distribution of Weightage for Theory Courses for Minor Test (40%). The following bifurcation would be followed:-

1. Sessional Test I
   Sessional Test- II 60%
   Sessional Test-III*
2. Assignments/problem solving/group discussions/quiz/seminar/ mini-project/Class performanceetc 20%
3. Class Attendance 20%
   Total Weightage 100%
   *Marks of TWO best Sessionals shall be considered
   Weighatge for Major Test- 60%

Distribution of Weightage for Laboratory Courses in Minor Tests

1. Lab Experiments/ Procedure Writing/Tabulation/Submission of Lab Records etc 40%
2. Viva-voce 30%
3. Class Attendance 30%
   Total Weightage 100%

Distribution of weightage for Laboratory Courses for End Term Examination (Major Test)

1. Lab Experiments/ Procedure Writing/ Tabulation/Equation as applicable 50%
2. Viva-voce 50%
   Total Weightage 100%

QUESTION PAPER TEMPLATE COMMON FOR ALL B. TECH. COURSES OF KUK(CIVIL ENGINEERING), CIVIL (GEOTECH ENGINEERING), CIVIL (TRANSPORT ENGINEERING), CIVIL (STRUCTURE ENGINEERING), CIVIL (HIGHWAYS),ME (MANUFACTURING SCIENCE &ENGINEERING, ME (CAD /CAM), ME (MANUFACTURING SYSTEMS), ME (MANUFACTURING TECHNOLOGY), ME (INDUSTRIAL & PRODUCTION ENGINEERING), (MECHANICAL ENGINEERING), ELECTRICAL ENGINEERING, ELECTRICAL POWER SYSTEM, POWER ELECTRONICS AND DRIVES, ELECTRONICS AND COMMUNICATION ENGINEERING, COMPUTER SCIENCE & ENGINEERING, INFORMATION TECHNOLOGY, BIO-TECHNOLOGY, FOOD TECHNOLOGY (RECOMMENDED BY ADHOC BOARD OF STUDIES MEETING HELD ON 25-07-2018 AT UIET, KUK)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

THEORY EXAMINATION – .....20.....	
M.TECH -	**SEMESTER -**

TIME – 3 Hrs.

M.M. - 60

COURSE NO. -

COURSE TITLE -

Note- Attempt Five Questions in all with Q. 1 (Part-A) as Compulsory Question and four questions, selecting one question from each unit in Part-B.

PART-A (COMPULSORY)

The Paper setter is advised to set each question with unique words such as: Define, Identify, List, Name, Recognise, Match, Explain, Interpret, Classify, Discuss, Select, Predict, Describe, Give Examples, Observe, in questions. The Paper Setter may increase the number of questions in this part if so required.

Q. No. 1 Answer the following questions(Objective/Short Answer Type Questions) 12

(i)	
(ii)	
(iii)	
(iv)	
(v)	
(vi)	

PART-B

The Paper setter is advised to set each question with unique words such as: Define, Identify, List, Name, Recognise, Match, Explain, Interpret, Classify, Discuss, Select, Predict, Describe, Give Examples, Observe, in questions. The Paper Setter may increase the number of questions in this part if so required.

UNIT-I		
2		**12**
3		**12**
UNIT-II		
4		**12**
5		**12**
	UNIT-III	

6		**12**
7		**12**
	UNIT-IV	
8		**12**
9		**12**

Scheme of Examination for B.A..B.Ed. (Four Years Integrated) Regular Programme

Table1. Semester I Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC1(I) Hindi/ English	3	3	1(T)	0	5	20	80	------	100
2	4	AEC2(I) Information and Communication Technology (ICT) in Education-I	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
Any One from Language Group											
3	4	ENG 101 / HIN 101 English / Hindi	3	3	1(T)	2	5	20	80	---	100
Any Two from Core Subject Group											
4	4	GEO 101 Geography	3	3	1(P)	2	5	20	60	20	100
5	4	HIS 101 / POL 101 / ECO 101 History / (Political Science or Economics)	3	3	1(T)	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 101: Basics in Education	3	3	1(T)	2	5	20	80	------	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 101 Work Education (Agriculture Practice)-I / WEEE 101: Work Education (Electricity & Electronics)-I	2	2	1(P)	2	4	10	40	----	50
Total	**27**	**Total Marks of Semester I**									**650**

Table2. Semester II Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC1(II) Hindi-II/ English-II	3	3	1(T)	0	5	20	80	------	100
2	4	AEC2(II) Information and Communication Technology (ICT) in Education-II	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
Any One from Language Group											
3	4	ENG 102 / HIN 102 : English / Hindi	3	3	1(T)	2	5	20	80	----	100
Any Two from Core Subject Group											
4	4	GEO 102 Geography	3	3	1(P)	2	5	20	60	20	100
5	4	HIS 102//POL 102/ ECO 102 History/ Political Science / Economics	3	3	1(T)	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 102: Childhood and Growing up	3	3	1(T)	2	5	20	80	------	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 102 Work Education (Agriculture Practice)-I / WEEE 102: Work Education (Electricity & Electronics)-II	2	2	1(P)	2	4	10	--	40	50
Total	**27**	**Total Marks of Semester II**									**650**

Table3. Semester III Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCEE 201: Environmental Education & Sustainable Development	3	3	1(T)	0	5	20	80	------	100
Group C: Core Course											
Any One from Language Group											
2	4	ENG 201 / HIN 201 : English / Hindi	3	3	1(T)	2	5	20	80	----	100
Any Two from Core Subject Group											
3	4	GEO 201 Geography	3	3	1(P)	2	5	20	60	20	100
4	4	HIS 201//POL 201/ ECO 201 History/ Political Science or Economics	3	3	1(T)	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
5	4	PESS 201: Schooling, Socialization and Identity	3	3	1(T)	2	5	20	80	------	100
6	2	EPYH 201: Yoga, Health and Well being	1	1	1(P)	2	3	10	40	-------	50
7	2	EFWC 201: Working with Community	0	0	1(P)	---	2 weeks	--	--	50	50
Group G: Choice Based Courses (CBC)											
8	4	**(Choose any one from following)**									
1) CBCPH-I-201: Physics: Renewable Energy Sources Electronics)-II 2) CBCPH-II-201: Physics: Nano Science 3) CBCCH-I-201: Chemistry: Green Chemistry 4) CBCZO-I-201: Zoology: Biodiversity 5) CBCBO-I-201: Botany: Biodiversity 6)CBCGE-201: Geography: Basics of Geographical Information			3	3	1(P)	2	5	20	60	20	100

System- GIS										
7) CBCMT-I-201: Mathematics: Discrete Mathematics 8) CBCED-I-201: Education: Guidance & Counselling in School 9) CBCED-II-201: Education: Peace Oriented Value Education 10) CBCLH-201: Language: रचनात्मक लेखन अवम अनुवाद 11) CBCLE-201: Language: Language Literature & Education 12) CBCHS-201: History: Heritage & Tourism 13) CBCPS-201: Political Science: Democracy at Work 14) CBCEC-201: Economics: Recent Trends & Practices in Economics			3	3	1(T)	2	5	20	80	----	
Total	**28**	**Total Marks of Semester III**								**700**

Table 4. Semester IV Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/ Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCIR 202 : Indian Constitution and Human Rights	3	3	1(T)	0	5	20	80	------	100
Group C: Core Course											
Any One from Language Group											
2	4	ENG 202 / HIN 202 : English / Hindi	3	3	1(T)	2	5	20	80	----	100
Any Two from Core Subject Group											
3	4	GEO 102 Geography	3	3	1(P)	2	5	20	60	20	100
4	4	HIS 202/ /POL 202/ ECO 202 History/ Political Science or Economics	3	3	1(P)	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
5	4	PEIS 202: Inclusive Schooling	3	3	1(T)	2	5	20	80	------	100
6	4	PELT 202: Learning and Teaching	3	3	1(T)	2	5	20	80	------	100
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
7	4	CPSKC 202: Knowledge and Curriculum	3	2	1(T)	2	5	20	80	-----	100
Total	**28**	**Total Marks of Semester IV**									**700**

Table-5. Semester V Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group C: Core Course											
Any One from Language Group											
1	4	ENG 301 / HIN 301 : English / Hindi	3	3	1	2	5	20	80	----	100
Any Two from Core Subject Group											
2	4	GEO 301 Geography	3	3	1	2	5	20	60	20	100
3	4	HIS 301/ POL301/ECO 301: History/ Political science or Economics	3	3	1	2	5	20	80	----	100
Group E: Professional Education Courses (PEC) - II: Enhancing Professional Capacities (EPC)											
4	2	EPCAA 301: Arts and Aesthetic Education	1	1	1(P)	2	3	10	---	40	50
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
5	4	CPSE 301/ CPSH 301/ CPSU 301: Pedagogy of Language (English/ Hindi)	3	2	1(T)	2	5	20	80	-----	100
6	4	CPSSS 301: Pedagogy of Social Science	3	2	1(T)	2	5	20	80	-----	100
7	4	CPSLA 301: Learning Assessment	3	2	1(T)	2	5	20	80	-----	100
Total	**26**	**Total Marks of Semester V**									**650**

Table-6. Semester VI Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group C: Core Course											
Any One from Language Group											
1	4	ENG 302 / HIN 302 : English / Hindi	3	3	1	2	5	20	80	--	100
Any Two from Core Subject Group											
2	4	GEO 302: Geography	3	3	1	2	5	20	60	20	100
3	4	HIS 302/ POL 302/ ECO 302: History/ Political science or Economics	3	3	1	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
4	4	CPSE 302/ CPSH 302: Pedagogy of Language (English/ Hindi)	3	2	1(T)	2	5	20	80	-----	100
5	4	CPSSS 301: Pedagogy of Social Science	3	2	1(T)	2	5	20	80	-----	100
Group E: Professional Education Courses (PEC) - IV: Engagement with Field (EF)											
6	4	EFSE 302: School Exposure and related Activities	0	0	4(P)	----	04 weeks	---	---	100	100
Total	**24**	**Total Marks of Semester V**									**600**

Table-7. Semester VII Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE)											
Any One from Language Group											
1	4	ENG 302 / HIN 302 : English / Hindi	3	3	1	2	5	20	80	--	100
Any Two from Core Subject Group											
2	4	GEO 302: Geography	3	3	1	2	5	20	60	20	100
3	4	HIS 302/ POL 302/ ECO 302: History/ Political science or Economics	3	3	1	2	5	20	80	---	100
Group E: Professional Education Courses (PEC) - IV: Engagement with Field (EF)											
4	14	EFSE 302: School Internship	0	0	14(P)	----	14 weeks	---	---	300	300
Total	**23**	Total Marks of Semester VII									**600**

Table-8. Semester VIII Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P) / Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE)#											
Any One from Language Group											
1	4	ENG 402 / HIN 402 : English / Hindi	3	3	1	2	5	20	80	--	100
Any Two from Core Subject Group											
2	4	GEO 402: Geography	3	3	1	2	5	20	60	20	100
3	4	HIS 402/ POL 402/ ECO 302: History/ Political science or Economics	3	3	1	2	5	20	80	---	100
4	6	DSE 402: One Project	0	0	6(P)	--	--	---	---	100	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
5	4	PEVE 402: Vision of Education in India-Issues and Concerns	3	3	1(T)	2	5	20	80	----	100
Group E: Professional Education Courses (PEC) - II: Enhancing Professional Capacities (EPC)											
6	2	EPCPE 402: Peace Oriented Value Education	1	1	1(T)	2	3	10	40	---	50
7	2	EPCGI 402: Gender Issues in Education	1	1	1(T)	2	3	10	40	---	50
Total	**29**	**Total Marks of Semester VIII**									**600**

Table 9: Semester-wise breakup of credit in B.A. and B.Ed components

S. No.	Semester	B.A.. Content Part	B.Ed. Education Part	Total Credits	Total Marks
1	**I**	20	7	27	650
2	**II**	20	7	27	650
3	**III**	20	8	28	700
4	**IV**	16	12	28	600
5	**V**	12	14	26	700
6	**VI**	12	12	24	600
7	**VII**	9	14	23	600
8	**VIII**	21	8	29	600
	Total	**130**	**82**	**212**	**5100**

Table 10: PANORMA OF EIGHT SEMESTERS B.A. B.ED. PROGRAMME UNDER CBCS

S.N.	COURSE	SEMESTER-WISE CREDITS/WEEK								Total Credits	Contact hrs. per week per student	Total Marks
		I (L+T+P)	II (L+T+P)	III (L+T+P)	IV (L+T+P)	V (L+T+P)	VI (L+T+P)	VII (L+T+P)	VIII (L+T+P)			
Group A: Ability Enhancement Compulsory Courses (AECC)												
1	Language Skills in Hindi / English - I & II	3+1+0	3+1+0							8	6+4=10	200
2	ICT in Education	3+0+1	3+0+1							8	6+4 = 10	200
Group B: Generic Courses (GC)												
3	Environmental Education & Sustainable Development			3+1+0						4	3+2=5	100
4	Indian Constitution and Human Rights				3+1+0					4	3+2=5	100
Group C: Core Courses (CC)												
5	Chemistry	3+0+1	3+0+1	3+0+1	3+0+1	3+0+1	3+0+1			24	18+12 = 30	600
6	Mathematics / Zoology	3+1+0 / 3+0+1	3+1+0 / 3+0+1	3+1+0 / 3+0+1	3+1+0 / 3+0+1	3+1+0 / 3+0+1	3+1+0 / 3+0+1			24	18+12 = 30	600
7	Physics / Botany	3+0+1	3+0+1	3+0+1	3+0+1	3+0+1	3+0+1			24	18+12 = 30	600
Group D: Discipline Specific Elective (DSE)												
8	Mathematics / Zoology							2+1+0 / 2+0+1	4+1+0 / 4+0+1	8	6 + 4 =10	200
9	Chemistry							2+0+1	4+0+1	8	6 + 4 =10	200
10	Physics /							2+0+1	4+0+1	8	6 + 4 =	200

	Botany										10	
11	One Project in Physics / Chemistry / Mathematics / Botany / Zoology						6			6	-	100
Group E: Professional Education Courses (PEC) I: Perspectives in Education (PE)												
12	Basics in Education	3+1+0								4	3+2 = 5	100
13	Childhood and Growing up		3+1+0							4	3+2 = 5	100
14	Schooling, Socialization and Identity			3+1+0						4	3+2 = 5	100
15	Inclusive Schooling				3+1+0					4	3+2 = 5	100
16	Learning and Teaching				3+1+0					4	3+2 = 5	100
17	Vision of Education in India- Issues and Concerns								3+1+0	4	3+2 = 5	100
Group E: Professional Education Courses (PEC) II: Enhancing Professional Capacities (EPC)												
18	*Yoga, Health and Well being			1+0+1						2	1+2 = 3	50
19	*Arts and Aesthetic Education					1+0+1				2	1+2 = 3	50
20	*Peace Oriented Value Education								1+1+0	2	1+2 = 3	50
	Gender										1+2 = 3	

21	Issues in Education								1+0+1	2		50
Group E: Professional Education Courses (PEC) III: Curriculum and Pedagogic Studies (CPS)												
22	Pedagogy of Physical Science					3+1+0	3+1+0			8	6+4 = 10	200
23	Pedagogy of Mathematics / Pedagogy of Biological Science					3+1+0	3+1+0			8	6+4 = 10	200
24	Knowledge and Curriculum				3+1+0					4	3+2 = 5	100
25	Learning Assessment					3+1+0				4	3+2 = 5	100
Group E: Professional Education Courses (PEC) IV: Engagement with Field (EF)												
26	*School Exposure and Multicultural Placement						0+0+4			4	Four Weeks	100
27	*School Internship							0+0+14		14	Fourteen Weeks	300
28	*Working With Community			0+0+2						2	Two Weeks	50
Group F: Skill Enhancement Course (SEC)												
29	*Work Education (Agriculture Practice / Electricity & Electronics) – I & II	2+0+1	2+0+1							6	4+4 = 8	100
Group G: Choice Based Courses (CBC) (Any one)												

30	**Chemistry Physics Zoology Botany Geography/ Mathematics Education Language History Political Sc Economics**			**3+1+0 / 3+0+1**						**4**	**3+2 = 5**	**100**
		27	**27**	**28**	**28**	**26**	**24**	**23**	**29**	**212**	**235 + 20 Weeks**	**5150**
Note: 1 credit for lecture requires 1 hour/week and 1 credit for tutorial or practical requires 2 hours/week.												

Semester I

B. A. B. Ed. (CBCS) Semester- I

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (HINDI)-I

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions wils carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction Mode :
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT :

Unit I: History of Language and Literature-1

Hindi Bhasha aur Sahitya ka Itihas [Aarmbha se Lekar 1857 Tak]

Unit II: Short Story-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kahani Ka Vikas

1. Chandradhar Sharma Guleri- Usne Kaha Tha
2. Jayshankar Prasad- Puraskar
3. Premchand- Panch Parmeshwar
4. Jainendra- Ek Raat

Unit III: Short Story-2 [Post-Independence Literature]

Swatantrayottar Hindi Kahani Ka Vikas

1. Mohan Rakesh- Uski Roti
2. Kamleshwar- Dilli Mein ek Maut
3. Phanishwar Nath Renu- Teesari Kasam
4. Bhism Sahani- Cheef ki Dawat

Unit IV: Communication skill:

Group Discussion [Samooh Charcha]

Introduction – Definition – Characteristics – Types of Discussion –Round table, Symposium, Lecture forum etc. – Relevance of Group Discussion – Exercises.

Reference:

1. Hindi Sahitya Ka Itihas: Ramchandra Shukla Rajkamal Prakashan,Delhi
2. Hindi Sahitya Ka Itihas: Dr Nagendra, Mayoor Paperbacks, Delhi
3. Hindi Sahitya Ki Bhoomika: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
4. Hindi Sahitya Ka Adikaal: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
5. Hindi Sahitya Ka Udbhav Aur Vikas:Hajari Prasad Divedi Rajkamal Prakashan,Delhi
6. Hindi Sahitya Ka Ateet: Viswanath Prasad Mishra, Rajkamal Prakashan,Delhi
7. Bhakti Aandolan Aur Bhaktikavya: Shivkumar Mishra,Lokbharti Prakashan, Delhi
8. Bhakti Aandolan aur Surdaska Kavya: Maneger Panday, Vani Prakashan, Delhi
9. Bhakti Ke Aayam: Dr P Jayraaman, Vani Prakashan, Delhi
10. Bhartiya Bhakti Sahitya: Dr Rajmal Bora, Vani Prakashan, Delhi
11. Bhaktikavya ka Samajdarshan: Dr Premshankar, Vani Prakashan, Delhi
12. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
13. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
14. Hindi Kahani- Antarang Pahchan: Dr Ramdars Mishra, Vani Prakashan, Delhi
15. Hindi Kahani-Sanrachana aur Samvedana: Dr Rachna Saah, Vani Prakashan, Delhi
16. Galp Ka Yatharth-Kathaloochan ke Aayam: Suvas Kumar, Vani Prakashan, Delhi
17. Hindi Ka Gadyaparva: Namvar Singh, Rajkamal Prakashan,Delhi
18. Sahitya ki Pahchan: Namvar Singh, Rajkamal Prakashan,Delhi
19. Katha Vivechan aur Gadyashilp: Ramvilas Sharma, Vani Prakashan, Delhi
20. Kahani Anubhav aur Abhivyakti: Rajendra Yadav, Vani Prakashan, Delhi

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (ENGLISH) –I

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:
Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENTS

Unit I: Descriptive Grammar

1. Tenses:

a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.

b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous

Unit II: Skills in Communication

1. Negotiating a point of view – learning to talk persuasively so as to get across one's perspective.
2. Debating on an issue – agreeing / disagreeing.

Unit III: Study and Reference Skills

Note making; Note- taking; Summary writing.
Comprehension Skills
Extracts from literary, scientific and educational journals.

Unit IV: Skills of Communication

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application.
Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Suggested Activities:

- Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.
- Students introduce themselves though using symbols/ metaphors.
- Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

· Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
· Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
· Hornby,A.S.(2001).Oxford Advanced Learner's Dictionary, OUP
· Thomsan,A.J. & Martinet.(2002).A Practical English Grammar.OUP

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester I
AEC2(I): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-I

Time: 3 Hours Max. Marks: 100
Credits- 4 (Theory: 60, Internal: 20, Practical :20)

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the course:
On completion of the course the students will be able to:

- Appreciate the historical development of various educational media.
- Identify and demonstrate an understanding of the main components of the computer hardware in use.
- Differentiate various operating system and explain main functions of the system and application software environment.
- Use a word processor, spread sheet, drawing and presentation software to produce various teaching learning resources for educational use.
- Use internet technologies efficiently to access remote information, communicate and collaborate with others.
- Model collaborative knowledge construction using various web 2.0 tools and technologies.
- Understand the social, economic, security and ethical issues associated with the use of ICT.

COURSE CONTENTS

Unit I: Learning and Technology

- How technology enhance learning: basic theories of communication, system theory and learning theory
- Historical account of the development of various educational media (audio, video, print, storage, display, projection)
- Communication process and role of technology in communication
- Information and Communication Technology: Meaning, nature and advantages

- Media literacy and digital literacy – need and importance
- Digital divide and enhancing access
- National ICT policies, curriculum, schemes and programmes
- Cyber security: privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe and ethical practices

Unit II: Fundamentals of Information and Communication Technology

- Computer hardware fundamentals (anatomy, input devices, output devices, storage devices, display devices)
- Computer Network-LAN, WAN. Internet – concept and architecture ; Locating internet resources – browsing, navigating, searching, selecting, evaluating, saving and bookmarking
- Licenses – software license, document license, fare use and piracy
- File formats and conversion, utility tools
- Cloud computing: meaning, types, and advantages

Unit III:Computer Software

- Digitalization, software –meaning and types
- Source and binary code. Proprietary software, Open Source software, shareware and freeware- concept, philosophy, types, and advantages.
- Operating systems –meaning, types –Windows, Linux, Macintosh – Navigating the desktop, control panel, file manager, explorer, and accessories
- Software as Service – Online software tools and applications and their educational use
- Managing the ICT infrastructure: software installation, troubleshooting of hardware, seeking and providing help, storage and backup, updating and upgrading software

Unit IV:Application Software

- Application software- meaning and types
- Word processing, spreadsheet, presentation: Features and educational applications (Unicode)
- Drawing tools – diagrams, concept maps, timelines, flow charts:educational applications of these tools
- Web 2.0 technology and tools: meaning characteristics and types
- Social networking and social book marking – educational applications
- Blog and micro blog – reflective journaling and other educational applications
- Wiki – collaborative authoring and projects
- Instant messaging and its educational applications
- Online forums/discussion groups and chats: educational applications
- Social media sharing – video, presentations, audio (podcasts), graphics, and text
- Web 2.0 tools for creating, sharing, collaborating, and networking

Sessional Activities:

- Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices

- Practicing word processing using Indian language software
- Practice in installing various system and application software
- Using word processor, spread sheet, and presentation software to produce various teaching learning resources and sharing it online
- Locating internet resources – navigating, searching, selecting, saving and evaluating (use standard internet evaluation criteria)
- Creating social bookmarking account and creating social bookmarking of internet resources using any social bookmarking tools (diigo,delicious,stumbleupon)
- Creating digital concept maps, flow charts, timelines for a particular content using online and offline tools
- Creating account in teachertube/slideshare and sharing your video/presentation. View and comment on others contributions
- Creating account in wikispace/wikipedia/mediawiki and adding/editing content
- Developing an educational blog in www.blogger.com, www.wordpress.com, or www.edublog.com
- Review of national ICT policy and curriculum

Suggested Readings

1. Andrew A Kling(2010). Web 2.0 (Technology 360). Lucent Books: New Delhi
2. Andrew M. St. Laurent. (2004). Understanding Open Source and Free Software Licensing. Oreilly: Cambridge
3. Bharihok Deepak. (2000). Fundamentals of Information Technology. Pentagon Press: New Delhi
4. Crumlish Christian (1999). The Internet No Experience Required. BPB Publications: New Delhi
5. Evant, M: The International Encyclopedia of Educational Technology.
6. Gwen Solomon, Lynne Schrum. (2014). Web 2.0 How-to for Educators, Second Edition. ISTE
7. James, K.L. (2003). The Internet: A User's Guide. Prentice Hall of India Pvt. Ltd: New Delhi
8. Jean-Eric Pelet (2014). E-Learning 2.0 Technologies and Web Applications in Higher Education (Advances in Higher Education and Professional Development (Ahepd)). Idea Group: U.S.
9. Mishra, S. (Ed.) (2009). STRIDE Hand Book 08: E-learning. IGNOU: New Delhi.Available at http://webserver.ignou.ac.in/institute/STRIDE_Hb8_webCD/STRIDE_Hb8_index.html
10. Sarkar, S.K. & Gupta, A.K.(1998). Elements of Computer Science. S. Chand & Company: New Delhi

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ENG 101 Introduction to English Literature

Time: 3 Hours Max. Marks: 100

Credits- 4 (Theory: 80, Internal: 20)

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Have an understanding of historical development of English literature
- Make themselves aware of various literary genres and figures of speech
- Make themselves familiar with various schools of thought and literary movements

Unit	Content
Unit I Elements of Literature	➢ Meaning of Literature ➢ Literature and Language ➢ Literature, Society and Culture ➢ Literature and Education ➢ Ordinary vs. Literary Language ➢ Literature and Figurative Language
Unit II History of English Literature I	➢ Old English (or Anglo-Saxon) Period and Middle English Period ➢ The Renaissance (Elizabethan Age, Jacobean Age, Caroline Age, Commonwealth Period or Puritan Interregnum) ➢ The Neoclassical Period (The Restoration, The Augustan Age or Age of Pope, The Age of Sensibility or Age of Johnson)
Unit III History of English Literature II	➢ The Romantic Period ➢ The Victorian Period (The Pre-Raphaelites, Aestheticism and Decadence) ➢ The Edwardian Period
Unit IV History of English Literature III	➢ The Georgian Period ➢ The Modern Period ➢ Postmodern Period

Suggested Readings

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

Unit I

- Prasad, B. *A Background to the Study of English Literature*. MacMillan. 1999.
- Rainsford, Dominic. *Studying Literature in English: An Introduction*. Routledge. 2014.
- Scholes. R et al. (Ed.). *The Elements of Literature*. OUP. 2005.
- Mays, Kelly J. *The Norton Introduction to Literature*. W. W. Norton & Company. 2017.
- Hudson, W.H. *An Introduction to the Study of Literature*. Maple Press. 2012.
- Showalter, Elaine. *Teaching Literature*. Wiley-Blackwell. 2002.
- Yadav, Saryug. *Language, Literature and Education*. Academic Excellence. 2008.

Unit II

- Simpson, Paul. *Language through Literature: An Introduction*. Routledge. 2003.
- Barnet, Sylvan. *An Introduction to Literature Fiction, Poetry, and Drama*. 15th Ed. Pearson Longman. 2008.
- Bennett, Andrew and Nicholas Royle. *An Introduction to Literature, Criticism and Theory*. Pearson Longman. 2004.

- Mays, Kelly J. *The Norton Introduction to Literature*. W. W. Norton & Company. 2017.

- Abrams, M. H. and Geoffrey Galt Harpham. *A Glossary of Literary Terms*. 11th Ed. Cengage Learning India Private Limited. 2015.
- Cuddon, J. A. and M. A. R. Habib. *The Penguin Dictionary of Literary Terms and Literary Theory*. 5th Ed. Penguin. 2015.
- Gray, Martin. *A Dictionary of Literary Terms (York Handbooks)*. 2nd Ed. Longman. 1992.
- Rees, J.A. *English Literature: An Introduction for Foreign Readers*. Macmillan. 1974.
- Fowler, Roger. *A Dictionary of Modern Critical Terms*. Routledge. 1987.
- Wolfreys, Julian. *The English Literature Companion*. Palgrave. 2010.

Unit III

- Thornley, G.C. and Gwyneth Roberts. *An Outline of English Literature*. Pearson India. 2011.
- Birch, Dinah. *The Oxford Companion to English Literature*. 7th Ed. OUP. 2009.
- Carter, Ronald et al. *The Routledge History of Literature in English: Britain and Ireland*. 2nd Ed. Routledge. 2011.
- Chowdhury, Aditi et al. *A History of English Literature: Traversing the Centuries*. Orient BlackSwan. 2014.
- Hudson, W. H. *An Outline History of English Literature*. Maple Press. 2012.
- Ifor Evans. *A Short History of English Literature*. Penguin. 2015.
- Choudhury, B. *English Social and Cultural History: An Introductory Guide and Glossary*. Prentice Hall India Learning Private Limited. 2005.

Unit IV

- Trevelyan, G. M. *Illustrated History of England*. Longman. 1973.

- Alexander, Michael. *A History of English Literature*. Palgrave. 3rd Ed. 2013.
- Bate, Jonathan. *English Literature: A Very Short Introduction*. OUP. 2010.
- Daiches, David. *A Critical History of English Literature* Vol.1 & 2. Supernova Publishers. 2012.
- Toyne, Anthony. *An English Reader's History of England*. OUP. 2006.
- Trevelyan, G. M. *English Social History*. Penguin. 1987.
- Blamers, Harry. *A Short History of English Literature*. Routledge. 1984.

HIN 101: Hindi

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

पृष्ठभूमिः भाषा कौशल का अभिप्राय कौशलों के उस समूह से है जो किसी भी प्रकार के विचार और भाव सम्प्रेषण के लिए अनिवार्य हैं। भाषा कौशल सभी प्रकार के अधिगम और शिक्षण प्रक्रिया के लिए पूर्वपेक्षित आवश्यकता है। अतः भाषा और भाषा कौशल का अर्जन, सभी शैक्षिक–व्यावहारिक कौशलों में महत्वपूर्ण है। भाषा कौशल के अंतर्गत विभिन्न परिवेशों और परिस्थितियों में विभिन्न उददेश्यों हेतु भाषा का समुचित प्रयोग सम्मिलित है। प्रस्तुत पाठ्यक्रम का उददेश्य इन्हीं आवश्यकताओं के अनुरूप विद्यार्थियों (प्रशिक्षु–शिक्षक) के भाषाई कौशल का विकास और भाषा ज्ञान का परिवर्धन करना है।

उद्देश्यःप्रस्तुत पाठ्यक्रम के द्वारा विद्यार्थी:

- भाषा के माध्यम से अपने सम्प्रेषण कौशल का विकास कर सकेंगे|
- भाषा प्रयोग के ज्ञान में अभिवृद्धि कर सकेंगे|
- विभिन्न भाषाई कौशलों का विकास कर सकेंगे|
- भाषा से सम्बंधित विभिन्न अन्य कौशलों का विकास कर सकेंगे|
- विद्यार्थियों को भाषा की प्रकृति संरचना एवं भूमिका से अवगत कराना।
- विद्यार्थियों में सम्प्रेषण की दक्षताओं का विकास करना
- विद्यार्थियों में भाषा की प्राथमिक बुनियादी दक्षताओं का विकास (सुनना, बोलना, पढ़ना, लिखना)
- विद्यार्थियों में सूचना एवं संचार प्रौद्योगिकी (आई सी टी) की अवधाारणा एवं भाषा के माध्यम से आत्म विकास की योग्यता उत्पन्न करना।

इकाई 1भाषायी कौषल एवं विकास

- आधारभूत भाषायी कौशल(सुनना, बोलना, पढ़ना, लिखना)
- लिखित एवं मौखिक भाषा की भूमिका, बोली, स्वीकृत (विकासशील) भाषायें।

इकाई 2मौखिकसम्प्रेषण में हिंदी भाषा व्याकरण

- हिंदी भाषा की ध्वनि व्यवस्था एवं लिपि।
- सम्प्रेषण में ध्वनि एवं लिपि का महत्व

इकाई 3संप्रेषण दक्षताओं का संवर्धन

- संप्रेषण की अवधारणा,
- संप्रेषण के प्रकार (मौखिक एवं सांकेतिक)
- संप्रेषण में शारीरिक हाव भाव की भूमिका (आंगिक चेष्टाएँ)
- प्रभावी संप्रेषण के तत्व, संप्रेषण के अवरोध, संप्रेषण में उच्चारण एवं विराम चिह्नों की भूमिका।

इकाई 4संचार तकनीकी,भाषा एवं आत्म विकास

- संचार तकनीकी(अवधारणा, प्रकृति, प्रकार, कार्य एवं संभावनाएँ)
- भाषाई कौशल विकास में सूचना एवं संचार तकनीकीकी भूमिका
- ई–मेल लेखन, बायोडाटा लेखन, समूह विमर्ष एवं प्रस्तुतीकरण
- सामाजिक संवेदना एवं जागरूकता के विकास में भाषा एवं सोशल मीडियाकी भूमिका
- व्यक्तित्व एवं आत्मविकास के विकास में भाषा एवं संचार माध्यमों की भूमिका।

सहायक पुस्तकें -

1. हिंदी शिक्षण का आधार पत्र (पोजिशन पेपर) एन.सी.ई.आर.टी. प्रकाशन
2. भारतीय आर्य भाषाओं का इतिहास –डॉ. जगदीश प्रसाद दीक्षित, अपोलो प्रकाशन, जयपुर
3. हिन्दी भाषा का ऐतिहासिक व्याकरण – डॉ. माताबदल जायसवाल
4. नागरी लिपि और उसकी समस्याएं – डॉ. नरेश सिंह मंथन पब्लिकेशन रोडतक
5. देवनागरी लिपि – डॉ. शिव शंकर प्रसाद
6. सामान्य भाषा विज्ञान– अम्बा प्रसाद सुमन
7. भाषा का समाज शास्त्र – डॉ राजेन्द्र प्रसाद सिंह, राजकमल प्रकाशन, दिल्ली
8. हिंदी व्याकरण एवं रचना : भानावत एवं जोशी
9. अभिव्यक्ति एवं माध्यम, एन.सी.ई.आर.टी. प्रकाशन
10. हिंदी शिक्षण – रमन बिहारी लाल

GEO 101: Principles of Geography

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical :20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

1. *To explain the distinct characteristics of geography as a discipline.*
2. *To explain the earth as a physical entity as well as a home of human beings.*
3. *To understand the earth as constituted by diverse regions.*

Unit 1: Meaning, nature and scope of geography; Approaches to geography; Fundamental concepts: space, location, spatial distribution, areal association, spatial interaction (movement), place and spatial change.

Unit 2: Origin of the earth; Size, shape and movement of the earth; Internal structure of the earth; Major land forms and water bodies; Physical processes: endogenetic (earthquakes and volcanic eruptions)and exogenetic (weathering and erosion).

Unit 3: Distribution and growth of world population; Principles of human adaptation and adjustment; Human modifications of the earth, Meaning and types of rural and urban settlements.

Unit 4: Regions: meaning and types; Regionalization; Natural, cultural and geographical regions of the world.

Reading List

1 Bergman, 2007: *An Introduction to Geography*, Pearson
2 Blij, Harm J., Muller, Peter O and Nijman, Jan 2012: Geography: Realms, Regions and Concepts, 5th edition, Wiley
3 Bonnett A., 2008: *What is Geography?* Sage Publications.
4 Broek, Jahn O. M. and Webb, John W. 1978: A Geography of Mankind,

McGraw-Hill
5 Hagget, Peter, 2001: *Geography: A Global Synthesis*, Prentice Hall
6 Leong, Goh Cheng 1974: Certificate Physical and Human Geography, Oxford University Press.
7 Christopherson, Robert W., 2011: Geosystems: *An Introduction to Physical Geography, 8th* Ed., Macmillan Publishing Company
8 Singh, S 2009: *Bhautik Bhugol ka Swaroop*, Prayag Pustak, Allahabad (Hindi)
9 Selby, M.J., 2005: *Earth's Changing Surface,* Indian Edition, OUP
10 Canby, Y Thomas, 1994: *Our Changing Earth*, MapQuest.com
11 Rubenstein, James M. and Bacon, Robert S. (1990): *The Cultural Landscape: An Introduction to Human Geography*. New Delhi: Prentice-Hall of India Private limited.
12 Rubenstein, James M. 2012: *Contemporary Human Geography*. New Delhi: PHI Learning Private limited.
13 Knowles, R. and Wareing, J. 1986: *Economic and Social Geography Made Simple*. New Delhi: Rupa and Co.
14 Fielding, Gordon J. 1974: *Geography as a Social Science.* New York: Harper and Row, Publishers
15 Dikshit, R. D. 1994: *The Art and Science of Geography.* Integrated Readings*. ed.* New Delhi: Prentice-Hall of India Private limited.
16 Gregory, Derek et. al. 2009: The Dictionary of Human Geography. eds. Oxford: Wiley-Blackwell.
17 Husain, Majid 2010: *Human Geography*. Jaipur: Rawat Publications.

Practicals

Map Reading and Interpretation

Total credit: 1 ***Contact hours: 2 per week***

Map: Meaning, principles of map design and types of maps Graphical construction of Linear, Diagonal and Comparative scales Interpretation of topographical sheet

Practical Record: Students will be required to prepare a practical file consisting of all exercises in the paper. **Assessment Modalities:** The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 30 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 3 out of 4 exercise) 15 Marks
  - Record File 10 Marks
  - Viva 05 Marks

Reading List

1- Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.

2- Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi. 3- Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.

4- Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.

5- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.

6- Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot, Allahabad

7- Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher**.**

HIS 101 Evolution of Indian Culture and Thought

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- know about the glorious past of our country
- know about the thoughts embedded in *Bharteeya* culture and civilization
- appreciate the art and aesthetics

of Indian culture The paper will be divided into four (4) Units

	Content
Unit I	➢ Name of Country: Aryavarta, Jambudweepa, Bharat, India ➢ Indian Culture: salient features, Vedic Culture and Civilization: States, Society, Economic and Religion ➢ Varnashram system, ➢ Shodash Sanskars: Purusharthas
Unit II	➢ Impact of Ramayan and Mahabharat of Indian society ➢ Cultural importance of Puranas ➢ Contribution of Jainism and Buddhism to Indian culture. ➢ Vaishnavism, Shaivism and Shaktism ➢ Development of Science in ancient Bharat up to Guptas
Unit III	➢ Development of Art and Architecture: Maurayns, Post Mauryans (Mathura and Gandhara schools of Art) and Guptas ➢ Art and Architecture in South India: Pallavas and Cholas ➢ Art and Architecture: Sultanat and Mughal Period: Major Buildings, Sculpture , Painting
Unit IV	➢ Six systems of Indian Philosophy ➢ Bhakti cult and Sufism ➢ Main Centres of Ancient Indian Education ➢ Greater India: Expansion of Indian culture abroad

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods; Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials. Students be given to prepare a model *Aryavarta*, *Jambudweepa* and present Bharat.

Suggested Readings

- Rizvi, Saiyid Athar Abbas. *The Wonder That Was India. a Survey of the History and Culture of the Indian Sub- Continent from the Coming of the Muslims to the British Conquest, 1200-1700*. Picador India, 2005.
- Pant, Rajinikant. *Ancient Civilization in Science and Technology.* Rajasthan Hindi Granth Academy
- Sharma,copper Brij Kishore. *History of India(1750-1950).*Rajasthan Hindi Granth Academy
- Sharma, Krishangopal and Hukum Chand Jain.*India's political and Cultural history of India*. Rajasthan Hindi Granth Academy. Edition Fifth
- Gupta,Copper Shivkumar. *Foundations of Indian Culture*. Rajasthan Hindi Granth Academy
- Srivastava, A.L. *Mediaval Culture*. Shiva Lal Agarwala & Co.(P) Ltd.1964
- Majumdar, R.C. *Ancient India*. Bhartiya Vidya Bhavan. Bombay.
- Eraly ,Abraham. *The First Spring Part 1 life in the Golden Age of India.* Penguin India
- Eraly ,Abraham. *The First Spring Part 2 Culture in the Golden Age of India.* Penguin India
- Majumdar, R.C. *History and Culture of Indian People,(relevent vol..).* Bhartiya Vidya Bhavan. Bomby
- Chattopadhaya, D. P. *indian Philosophy*
- Agraval, V. S. *Indian Art. Vol.I*

POL 101 :FOUNDATIONS OF POLITICAL THEORY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATIONFOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Understand the nature and scope of Political Theory.
- Distinguish between the traditional and modern perspectives of Political Theory.
- To understand some basic concepts of Political Theory.
- Analyse state, its Component, Various theories of its origin and their bearing upon the nature of State
- Understand and analyses various systems of governance.
- Acquaint themselves with various aspects and agents involved in the political process. The paper will be divided into four (4) Units

Course Content

Unit I

Political Theory :Meaning, Nature and Scope,its Normative and Empirical perspectives, Behaviouralism and Post- Behaviouralism.

Unit II

State**:** Meaning and its Elements, Theories of origin of State,
Social Contract and evolutionary Sovereignty.

Unit III

Concepts**:** Power (Laswell), Authority (Max Weber), Legitimacy , Political system (Easton), Political Development (Lucian Pye).

Unit IV

Forms of Government :Democracy and Dictatorship, Parliamentary and Presidential systems, Unitary and Federal systems.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any,
may be resolved during tutorials.

Suggested Readings

- G.A.Almond: Comparative Politics Today: A world view, 7th end, New York, London.
- Sir, Barker, Principles of Social and Political theory
- ..Barry, Introduction to Modern Political Theory, London, Macmillan, 1995.
- A Brochl, Political theory: The foundations of Twentieth Century Political Thought, Bombay, The Times of India Press, 1965.
- D. Easton, the Political System: An Inquiry into the state of Political Science, New York, Wiley 1953.

ECO 101: Micro Economics

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Define and understand the various terms & basic concept of Economics.
- Describe meaning, nature and scope of Economics.
- Explain the theoretical and practical advantage of the study of Economics.
- Take into account different theories of Economics – like consumer behaviour, production, cost, market structure, etc.
- Analyze determination of equilibrium price and quantity of a commodity in individual firm and Industry under perfect competition, monopoly, monopolistic competition and oligopoly.

To explain the behavior of the economic agents in terms of factor pricing like rent, wage, interest and profit in distribution.

Unit I

Meaning, Nature, Scope, Methodology and Fundamentals of Economics

- Definitions of Economics,
- Nature of economics- as an arts or science,
- Methods of Economic Analysis: verbal argument or method of logical deduction- inductive and deductive logic; mathematical and geometrical method.
- Basic Concepts of Economics: *Human wants* - characteristics and types of wants; wealth, welfare, scarcity and growth;
- Genesis of economic activities – wants and satisfaction;
- Division of basic units of economic activities - consumption, production, exchange, distribution and public finance.
- Goods & Services - types of goods. Value & Prices– value-in-use & value-in-exchange.
- Importance and Uses of Microeconomics,
- Economic Problems: Scarcity and Choice,
- Scope of Economic Theory and

- Economic Problems
  - Problems of Allocation of Resources, Production, Distribution of National Product,

Economic Efficiency, Problem of Full Employment of Resources, Problem of Economic Growth and Scarcity, Problem of Affluence, Positive Economics and Normative Economics,

UNIT-II

(a) Theory of Demand and Consumer Behaviour

- Significance of Demand Function, Individual Demand, Law of Demand , Reasons for the Law of Demand, Slope of the Demand Curve, Market Demand Function, Factors determining Demand, Expansion and contraction of demand curve, Elasticity of demand - Price, Income and Cross Elasticities.
- Utility Analysis: Marginal Utility, Measurement of utility. Wealth - characteristics, capital, money, income and welfare.
- Cardinal and ordinal approach to demand – Law of diminishing marginal utility, Consumer's Equilibrium, Principle of Equi-marginal Utility, Derivation of the Demand Curve, Critical Evaluation of Marshall's Cardinal Utility Analysis.
- Indifference Curve Analysis. Indifference Curve and Indifference Map, Marginal Rate of Substitution, Budget Line and Budget Space, Consumer's Equilibrium (Hicks & Slutsky), Giffen, goods, Compensating Variation in Income, Equivalent Variation in Income, Consumer's Surplus (Marshall and Hicks).

Theory of Supply, Production and Cost

- Factors of Production; Law of Supply; Factors affecting Supply; Production Function - short period and long period; Law of Variable Proportion, Returns to Scale,
- Isoquant -Least cost combinations of inputs: Choice of Inputs: Output Maximisation subject to cost constraint, Expansion path, Changes in factor prices; Factor substitution. The Expansion path of a Linear Homogeneous Production Function
- Concept of Cost: Total, average, marginal; Opportunity cost; Short run and Long run Costs – Internal and External Economies and Diseconomies and Cost Curves, Derivation of cost function from production function.
  Production Possibility Curve: Shift in Production Possibility Curve

UNIT-III

Theory of Revenue and Market Structure

- Concept of Revenue – TR, AR, MR, relationship between AR & MR.
- Meaning and classification of market structure; Objectives and Equilibrium condition of firm.
- Perfect competition- Characteristics, short run and long run equilibrium of the firm and industry; Determination of equilibrium price and output under perfect competition, Derivation of supply curve.
- Monopoly- characteristics, equilibrium price and output determination; Price discrimination,
- Monopolistic Competition- its characteristics, equilibrium price and output determination under monopolistic competition.
- Oligopoly - Characteristics, price and output, determination under Oligopoly.

Unit IV
Theory of Distribution and Wage determination

- Concept of productivity, Marginal productivity theory of distribution, Theory of distribution in imperfect product and factor market; Concept of Marginal Physical Product(MPP), Value of Marginal Product(VMP) and Marginal Revenue Product(MRP), Factor pricing under perfect competition and monopoly, Adding-up theorem.

- Theory of wage: Determination of wages under perfect competition and imperfect competition; Collective bargaining and Trade Union, Wage differential.

- Rent- Recardian theory of rents, Modern theory of rent; Scarcity rent; Differential rent and Quasi-rent.
- Internal- Classical theory of interest; Keynes liquidity preference theory of interest;
- Profit – Schumpeterian theory of innovation and F.H. Knight's Risk & Uncertainty Theory of Profit.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. Ahuja, H.L (1995), Advance Economics Theory(Microeconomic Analysis), Eight Edition, S. Chand & Company Ltd, Nam Nagar, New Delhi-110055
2. Baumal, W.J(1982) Economic Theory and Operation analysis, Prentice Hall of India, New Delhi
3. D.N. Dwivedi(2016), Microeconomics, Theory & Application, Third Edition, Vikash Publishing House, Pvt Ltd.
4. Jhingan, M.L(2010), Advance Economic Theory, 12th Edition, Vrinda Publications(p) Ltd.
5. Koutsoyiannis, A (1979), Modern Micro Economics, Mac Millon Press, London.
6. Kreps, David M(1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
7. Seth, M.L(1989), Principle of Economics(Micro and Macro Economics), Twenty Fourth Edition, Laxminarayan Agarwal, Educational Publishers, Hospital Road, Agra-3
8. Varian, H(2000) Microeconomic Analysis, W.W. Norton , New York.
9. Allen, R.G.D(1974), Mathematical Analysis for Economists, Mac Millan Press and ELBS London
10. Baumal, W.J (1984) Economic theory and Operational Analysis, Englrewood Cliffs, New Jersey

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester I
PEBE 101: BASICS IN EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On the completion of course, the student teacher will be able to:

- Understand and analyze educational concepts, their premises and contexts that are unique to education.
- Understand the nature and purpose of education with reference to school knowledge.
- Learn to avail opportunity for interactive and reflective modes of learning.
- Understand the concepts of teacher and learner's autonomy.
- Become aware of importance to values and value formation process in education.

COURSE CONTENTS

Unit I: Education: Nature, Purpose and Process

- Meaning, Nature, Purpose and Importance of Education: Education as a purpose of development (individual, social and harmonious).
- Education as an intentional (intellectual and self- critical) and unintentional.
- Agencies of education: Family, Society and Institute.
- Processes and Modes of Education: Education is a natural and social process. Education as an ability to question.and imagine alternatives. Education in schools and its linkage with outside school experience.

Unit II: Knowledge and Knowing

- Concept, Meaning and Nature of Knowledge and Knowing.
- Differentiate between information, knowledge, belief and truth.
- Knowing Process: Different ways of knowing, Knowledge construction, Process of Construction of Knowledge. Relative roles of knower and known in knowledge transmission and construction, Limitations of knowing, role of culture in knowing.
- Facets of knowledge: Different facets of knowledge and relationship, such as: local and universal, concrete and abstract, theoretical and practical, contextual and textual, school and out of school with an emphasis on understanding special attributes of school knowledge.
- Reflection on knowledge in the form of curriculum, syllabus and textbooks.

Unit III: Autonomy of Teacher and Learner

- Autonomy of teacher- why, what and to what extent. Difference between autonomy and freedom. Teacher's autonomy and its importance in enriching learning environment. Relationship between autonomy and accountability. Hindering factors that affect teacher's autonomy.
- Autonomy of learner- why, what and to what extent, Restrains on learners in schools. Learning without burden, Joyful, collaborative and cooperative learning. Individual autonomy and collective responsibility of teacher and learner.

Unit IV: Education and Values

- Concept and nature of values- Relative and absolute. Education with reference to human rights and values. Values prevalent in Indian Constitution and society. Education is a normative endeavor.
- Process of value formations in schools and out of schools and its impact on learners' value perspective. Role of education in transmission of values in society. School system to nurture a culture of peace.

Modes of Learning Engagement:

- The Course is visualized to be conducted through group discussion, self-study and reflection.
- The study of themes in each unit will be done through a range of activities such as: initiation of the dialogue within the group, organizing study groups, organizing discussion in small groups, or planning for short presentations.

- The sub-themes organized as units of the course, can be discussed by student teachers (using their own experiences and common-sense understanding, to begin with).
- Teacher educators will be present and participate in the plenary discussions as 'facilitators'.

Practicum / Tutorials:

Some activities for practicum are listed below.

- Individual self-study of a text / article, with theme questions in mind
- Group study of a text / article on a given theme
- Observational studies and activities: it may be worthwhile to carry out observations in the field, record what is observed and use the information while discussing with either teacher educator or peers.
- Observation with a purpose to reflect on knowledge preservation, transmission / construction and generation in oral, written, and technological traditions.
- Observation of schools, teachers, student activities in a school context.
- The student- teachers will maintain a portfolio of observations and notes on discussions; these will be submitted periodically to the faculty for appraisal and feedback.

Suggested Readings:

1. Agrawal, A. (1995). Dismantling the Divide between Indigenous and Scientific Knowledge: Development and Change. 26:413-39
2. Ant Weiler, C. (1998). Low Knowledge and Local Knowing: An Anthropological Analysis of Contested "Cultural Products" in the Context of Development. Anthropos. 93:46-94.
3. Chomsky, N. (1986). Knowledge of Language. New York. Prager.
4. Datta, D.M. (1972). Six ways of Knowing. Calcultta. Calcutta University Press,
5. Dewey, John (1997). Experience and Education, Touchstone, New York.
6. Krishna Murthy, J. (1947). On Education, New Delhi. Orient Longman.
7. Kumar Krishna (1996). Learning From Conflict, New Delhi: Orient Longman.
8. Peters, R.S. (1967). The Concept of Education, UK: Routledge.
9. Margaret, K.T. (1999). The open Classroom, New Delhi. Orient Longman.
10. Prema Clarke (2001). Teaching & Learning: The Culture of pedagogy, New Delhi: Sage Publication.
11. Steven H. Cahn. (1970). The Philosophical Foundation of Education, New York. Harper & Row Publishers.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)
Semester I
WEAP 101: WORK EDUCATION (AGRICULTURE PRACTICE)-I

Time: 1.5 Hours | Max. Marks: 50
Credits- 4 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.
- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Modes of Learning Engagement: Hands on experiences, Activity based learning, Experimentation, Interactive engagement, Group work, Peer learning, Project work.

COURSE CONTENTS

Unit I:

Agriculture: Meaning, definition, scope, history, branches and objectives.

Unit II:

Soil Science: Definition of pedology, soil management, soil erosion, soil conservation practices; structure of soil, soil profile; soil fertility and productivity, essential plant nutrients. Fertilizers and manures including bio-fertilizers.Identification of manures and fertilizers.

Unit III:

Irrigation: Definition, method of irrigation, systems of irrigation, drainage, irrigation pattern of India.

Horticulture: Definition, branches of horticulture, layout of orchards, propagation by seeds and by vegetative means; Pot filling technique; Planning, planting and maintaining lawn; Practice related to landscaping.

Unit IV:

Agricultural practices: Preparation of land, selection of seeds, watering, thinning, hoeing and weeding, harvesting of crop, identification of important agricultural tools, trees and crop plants. Minor project preparation on agriculture.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).
4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

PRACTICAL

Practicum: All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Bajra
- Maize
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester I

WEEE 101: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-I

Time: 1.5 Hours Max. Marks: 50

Credits- 4 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: on completion of the course, the students will be able to-

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.
- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Modes of Learning Engagement:

Constructivist Approach: Hands on Experience, Activity used Learning, Experimentation Interactive Engagement, Group work, Peer Learning, Project Work

COURSE CONTENTS

Unit I:

Symbols, Tools and Soldering: Precautions used for making any electrical connection, Identification of conductors & insulators. Symbols for electrical components, knowledge of electrical accessories and their rating.

Tools used for making any electrical connection, their sizes and use.

Hand soldering, Soldering alloy, soldering flux and de-soldering pump. Practice of hand soldering.

Unit II:

Wires, Wirings and connections of lamps: Different types of wire, use of SWG, Different types of wiring such as: Batten wiring, CTS wiring, casing capping wiring, Cleat and conduit wiring. Their advantage and disadvantage on each other. Series and parallel connections of lamps (up to four lamps). Staircase wiring of one, two and three lamps, Go-down wiring, connection for fan.

Unit III:

Electrical Components and Appliances: Color coding in resistor and Capacitor, use of resistor and capacitor in electrical appliances,

Understanding the working of electrical appliances: Electric iron, room heater, Immersion heater, geyser, Electric bell, emergency light

Unit IV:

Electronic Components and Their Use: Semiconductor materials, Semiconductor diode, Diode testing, Zener diode, LED, Photo diode, Solar cell, Rectification by diodes, Voltage multiplication by diodes.

Suggested Readings:

1. Electrician - I Year- Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician - II Year- Trade Theory Published by national Instructional Media Institute Chennai re-print 2007
3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007
4. N.N. Bhargava, D.C Kulshrestha and S.C Gupta, Basic Electronics and Liner Circuits. Tata Mc. Graw Hills Ltd. New Delhi(2000)
5. B.L. Theraja, Basic Electronics, S.Chand New Delhi, (2005)

Practical

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects / Models based on the following **(Only Suggestive)**-

1. Clap switch
2. IR Remote switch (fan, tube light)
3. Remote operated musical bell
4. Alarm for luggage security
5. Mobile cell-phone charger using cell
6. Power supply failure alarm
7. Blown fuse indicator
8. Rectifier
9. Voltage Multiplier
10. Transistor Amplifier

Semester II
B. A. B. Ed. (CBCS) Semester- II
GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester II
AEC1(II): LANGUAGE SKILLS (HINDI)

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalise grammar rules so as to facilitate fluency in speech and writing .
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode :
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENTS

Unit I: History of Language and Literature-2

Aadhunik Hindi Sahitya ka Itihas [1857 Se Lekar Ab Tak]

Unit II : Modern Poetry-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kavita Ka Vikas

1. Maithilisaran Gupt- Nar Ho Na Nirash Karo Man ko
2. Jayshankar Prasad- Himadri Tung Sring Se Prabudh Sudhha Bharti
3. Suryakant Tripathi Nirala- Joohi ki Kali
4. Sumitranandan Pant- Drut Jharo Jagat Ke Jirn Patra
5. Mahadevi Verma-MaiNeer Bhari Dhukh Ki Badli,

Unit III : Modern Poetry-2 [Post-Independence Literature]

Swatantrayottar Hindi Kavita Ka Vikas

1. Gajanan Madhav Muktibodh- Bhool Galti,
2. Kedarnath Agrawal- Chandra Gahna Se Lautati Ber
3. Raghveer Sahay- Aapki Hansi
4. Nagarjun- Aakal Aur Uske Bad
5. Kedarnath Singh- Aakal Me Saras

Unit IV : Communication skills Conversation [Varta]:

Characteristics – Definition – Styles of conversation – Higher order skills-Telephonic conversation, Role Play, – Models, etc. – Exercises.

References:

1. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
2. Hindi Sahitya ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Dr Nagendra , Mayoor Paperbacks, Delhi
4. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
5. Hindi Sahitya Ka Dusara Itihas: Bacchan Singh, Vani Prakashan, Delhi
6. Aadhunik Hindi Sahitya ka Itihas: Bacchan Singh, Lokbharti Prakashan, Delhi
7. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
8. Hindi Sahitya ka Sanchhipt Itihas:Viswanath Tirpathi, Orient Longman, Delhi
9. Sawtantrayotar Hindi Sahitya Ka Itihas: Dr Laxmisagar Vasney, Delhi
10. Hindi Sahitya Aur Samvedana Ka Vikas: Ramswaroop Chaturvedi, Lokbharti Prakashan
11. Bhasha, Yugbodh aur Kavita: Dr Ramvilas Sharma, Vani Prakashan, Delhi
12. Kavita ka Vartmaan: Dr P Ravi, Vani Prakashan, Delhi
13. Hindi Kvaya ka Itihas: Ramswaroop Chaturvedi, Lokbharti Prakashan, Delhi
14. Kavita ki Zameen aur Zameen ki Kavita: Namvar Singh, Rajkamal Prakashan, Delhi
15. Nayee Kavita aur Astitvawad: Ramvilas Sharma, Rajkamal Prakashan,Delhi
16. Chhayavad: Namvar Singh, Rajkamal Prakashan, Delhi
17. Kavita ke Naye Pratiman: Namvar Singh Raajkamal Prakashan, Delhi
18. Hindi Kavita ka Atit aur Vartmaan: Maneger Panday, Vani Prakashan, Delhi
19. Hindi Kavita Ki Tisari Dhara: Mukesh Manas, Swaraj Prakashan, Delhi
20. Effective Communication Skills, by Omkar N Kour
21. Prayojanmoolak Hindi- Madhav Sontakke, Rajkamal Prakashan Samooh, Delhi
22. Prayojanmoolak Hindi ki Nayee Bhoomika- Kailash Nath Panday, Rajkamal Prakashan Samooh, Delhi
23. Prayojanmoolak Hindi: Sidhant aur Prayog- Dangal Jhalte, Vani Prakashan, Delhi
24. http://www.hindisamay.com

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester II

AEC1(II): LANGUAGE SKILLS (ENGLISH)-II

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives :

Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENTS

Unit I: Descriptive Grammar

Function of Auxiliaries; Modals; Question form
Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Development of Language Competence

To be based on the use of multiple texts which address issues of multiculturalism, gender, racism and texts which relate with current issues and contemporary trends. Short stories, comic strips, cartoons and animations (both print and non-print media) to be used. Speeches of famous persons, diaries, travelogues can also be used.

Unit III: Writing for Functional Purposes

Letter-writing (Professional / Personal)

Unit III: Creative Skills in Writing

Writing dialogues, poems and essays

Unit IV: Basic Phonetics

Sounds of English language, intonation and transcription using IPA.

References:
1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA

2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2 nd Ed. New Harbinger Publications.
5. Merrriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.
6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
7. Graves,D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.:Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester II
AEC2(II): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-II

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.
iv) All questions will carry equal marks.

Objectives of the course: On completion of the course the students will be able to:

- Explain the process and stages of instructional design.
- Design anddevelopteчhnologyintegratedlearningexperiencesusing ICT tools.
- Explain the different pedagogical approaches of ICT integration in education.
- Develop skills in using various e-learning tools and technologies.
- Plan, develop, and use multimedia based learning content using open source authoring software.
- Create and use Open Educational Resources under different CC licenses.
- Use various online and offline ICT tools for assessment.
- Appreciate the scope of ICT for improving the personal productivity and professional competencies.
- Explain the emerging trends in information and communication technology.

Course Content:

Unit I: Instructional Design and E-content

- Instructional Design – concept, principles, models and stages of instructional design.
- Basic Understanding of Audio-Visual Studio
- Basic Photography Aesthetics
- Types of Camera and Microphones
- Multi Camera Setup
- Various Formats of Video and Audio
- Shot Division/ Types of Shot Sizes and their impact on narrative/ continuity
- Genres in Video Communication
- Steps in the Video Production
- Multimedia tools- Audio editing, video editing, screen casting, graphic editing, and basics of animation, and creating interactive media.
- Designing, developing and using Massive Open Online Courses (MOOCs).

Unit II: ICT and Pedagogy

- Approaches to integrating ICT in teaching and learning.
- Techno pedagogical content knowledge (TPCK).E-learning: concept, types, characteristics, advantages and limitations. E-learning tools and technologies, Learning Management Systems (LMS).
- Flipped classrooms: meaning and possibilities.
- Web quest and virtual field trips: concept, process, and use in the classroom.Subject specific ICT tools for creating and facilitating learning.Designing technology integrated authentic learning designs and experiences.
- ICI integrated Unit plan – Web 2.0 for creating constructivist learning environment.

- Assistive technology for special needs and inclusion: tools and processes, ICT and Universal design for Learning (UDL).
- ICT for Assessment: Online and offline assessment tools – rubrics, e-portfolio, survey tools, puzzle makers, test generators, reflective journal, question bank.

Unit III: Designing and Developing E-Content

- Learning theories – implications for instructional design
- E-learning courseware (e-content) design
- Identifying and organizing course content: need analysis(learner, content, task), learning objectives, course sequence.
- Designing instructional media, evaluation, and delivery strategies.
- Creating interactive content – story board, courseware outline, interactivity and interface.
- Courseware delivery and evaluation.
- Reusable learning objects (RLO)– meaning, types and characteristics, RLO repositories, metadata and standards.
- E-content authoring tools- open source and proprietary alternatives.
- Open Educational Resources – Meaning and importance, various OER initiatives, creative common licensing.

Unit IV: ICT for Educational Management and Professional Development

- ICT for personal management: email, task, events, diary, networking.
- ICT for educational administration: scheduling, record keeping, student information, electronic grade book, connecting with parents and community, Library Automation.
- ICT for professional development: tools and opportunities.
- Electronic teaching portfolio- concept, types, tools, portfolio as a reflective tool for professional development.
- Self-directed professional development: role of ICT.
- Teacher networks and community of practice, web conferencing- tools and techniques.
- Technology and design based research and its pedagogical implications for professional development.
- Emerging Trends in ICT and its educational implications: augmented reality, 3D printing, learning analytics, digital games, artificial intelligence.

Sessional activities:

- LMS experience- hands on various features of LMS – the ICT course may be provided through LMS.
- Enrolling and completing some MOOC courses of interest.
- Creating resources for flipped classroom and practicing flipped learning in school.
- Evaluating OER resources. Creating and sharing OER materials- may be in NROER.
- Developing technology integrated unit/lesson plan and trying out this in the school.
- Hands on experience on subject specific software tools like geogebra.
- Evaluation of RLO repositories and creating RLO and uploading to repositories.
- A critical study of some e-learning courses and enrolling and completing some free e-learning courses.
- Developing a multimedia e-content for a topic using eXe Learning.

- Creating screen cast video of a lesson.
- Creating a podcast using audacity and sharing it on podcasting site.
- Shooting, editing, producing and sharing of videos segment on any educational topic.
- Creating a simple 2D animation using pencil or Tupi.
- Creating and editing various graphics.
- Planning and creating digital rubrics for any topic.
- Organize web conferencing using Skype.
- Review of ICT labs (plans and equipments/resources) in school from internet.
- Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation.
- Developing an electronic assessment portfolio.
- Developing an electronic teaching portfolio.
- Readings on emerging ICT trends in education.
- Using FOSS tools for timetabling, grade sheet.

Suggested Readings:

1. Athanassios Jimoyiannis (Editor) (2011). Research on e-Learning and ICT in Education. Springer: USA
2. Costantino, P.M., DeLorenzo,M.N., Kobrinski,E.J. (2006).Developing a professional teaching portfolio: a guide for success. Pearson
3. Christopher Moersch(2009). Beyond Hardware-Using Existing Technology to promote Higher-Level thinking. Viva Books: New Delhi.
4. David Moursund (2009).Project Based Learning- Using Information Technology- Second Edition. Viva Books: New Delhi.
5. Howard Pitler, Elizabeth R. Hubbell, and Matt Kuhn.(2012)Using Technology with Classroom Instruction That Works, 2nd Edition. ASCD:Denver
6. Liz Arney (2015)Go Blended!: A Handbook for Blending Technology in Schools
7. M. D. Roblyer, Aaron H. Doering (2012). Integrating Educational Technology into Teaching (6th Edition)
8. Mohit K (2003). Design and implementation of Web-enabled Teaching Tools : IRM Press, UK.
9. Pradeep Kumar (2011). Web Resources in Pedagogy . Apple Academics: Oakville.
10. Sonny Magana, Robert J. Marzano (2013).Enhancing the Art & Science of Teaching With Technology (Classroom Strategies)

ENG 102: English Poetry

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:
- Acquaint with certain specimens of poems of representative poets from different literary periods.
- Develop their analytical and imaginative powers through reading poetry.
- Derive pleasure out of their reading

of poetry. The paper will be divided into four (4) Units.

Unit	Content
Unit I	➢ Shakespeare : Shall I Compare Thee to a Summer's Day ➢ John Donne : The Sun Rising ➢ John Milton : On this Blindness ➢ John Dryden: Shadwell ➢ William Blake: The Tiger
Unit II	➢ William Wordsworth: The Daffodils ➢ John Keats: Ode to Nightingale ➢ Shelley: Ode to the West Wind ➢ Matthew Arnold: Dover Beach ➢ Lord Alfred Tennyson: Tears, Idle Tears
Unit III	➢ Robert Browning: My Last Duchess ➢ T.S. Eliot: The Hollow Men ➢ Wilfred Owen: Strange Meeting ➢ W.B. Yeats: Sailing to Byzantium ➢ W.H. Auden: The Unknown Citizen
Unit IV	➢ Literary Terms: Simile, Metaphor, Alliteration, Poetic License, Pun, Refrain, Sonnet, Elegy, Ode, Allegory, Lyric, Ballad, Blank Verse, Epic, Free Verse, Heroic Couplet. ➢ Schools of Poetry: Elizabethan Poetry, Metaphysical Poetry, Classical Poetry, Graveyard Poetry, Romantic Poetry, Pre-Raphaelite Poetry, Victorian, Modern and Contemporary English Poetry

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

Unit I

- Sinha, A. K. *A Students' Companion to English Poetry*. Bharati Bhawan (P&D). 2017.
- Green, David. (Ed.). *The Winged World*: *An Anthology of Poems*. Macmillan. 2009.
- Palgrave, F.T. & John Press.*Palgrave's Golden Treasury*. OUP. 2002.
- Sethna, K.D. *Sri Aurobindo on Shakespeare*. Sri Aurobindo Ashram. 2008.
- Grazia, M. De and S. Wells (Ed.). *The Cambridge Companion to Shakespeare*. 2nd Ed. CUP. 2010.
- Guibbory, Achsah (Ed.). *The Cambridge Companion to John Donne*. CUP. 2006.
- Danielson, Dennis (Ed.). *The Cambridge Companion to Milton*. 2nd Ed. CUP. 1999.
- Zwicker, Steven N. (Ed.). *The Cambridge Companion to John Dryden*. CUP. 2004
- Yadav, Saryug. *Challenges of Teaching English Language and Literature in the Age of Globalisation*. Lakshi Publishers. 2011.

Unit II

- Narayan, S.A. (Ed.). *The Joy of Reading Literature: Selected Prose and Poetry*. Orient Longman.2008.
- Sitter, John. *The Cambridge Companion to Eighteenth-Century Poetry*. CUP. 2001.
- Eaves, Morris. *The Cambridge Companion to William Blake*. CUP. 2010.
- Gill, Stephen. *The Cambridge Companion to Wordsworth*. CUP. 2003.
- Curran, Stuart et al. (Ed.). *The Cambridge Companion to British Romanticism*. CUP. 2010.
- Wolfson, Susan J. *The Cambridge Companion to Keats*. CUP. 2001.
- Morton, Timothy. *The Cambridge Companion to Shelley*. CUP. 2006.
- Aurobindo, Sri. *The Future Poetry*. Sri Aurobindo Ashram Publication. 2017.

Unit III

- Rawson, Claude. *The Cambridge Companion to English Poets*. CUP. 2011.
- Bristow, Joseph. *The Cambridge Companion to Victorian Poetry*. CUP. 2000.
- Drew, Elizabeth A. *Poetry: A Modern Guide to Its Understanding and Enjoyment*. W. W. Norton & Company. 1959.
- Brooks, Cleanth. *Modern Poetry and the Tradition*. The University of North Carolina Press, 1939.
- Ferguson, Margaret. *The Norton Anthology of Poetry*. W. W. Norton & Company. 2005.

Unit IV

- Moody, A. David. *The Cambridge Companion to T. S. Eliot*. CUP. 1990.
- Southam, B.C. *A Guide to the Selected Poems of T.S. Eliot*. Faber & Faber. 1998.
- Corcoran, Neil. *The Cambridge Companion to Twentieth-Century English Poetry*. CUP. 2007.
- Das, Santanu. *The Cambridge Companion to the Poetry of the First World War*. CUP. 2013.
- Howes, Marjorie. *The Cambridge Companion to W. B. Yeats*. CUP. 2006.
- Stan, Smith. *The Cambridge Companion to W. H. Auden*. CUP. 2009.
- Hulse, Michael and Simon Rae. *The 20th Century in Poetry*. Pegasus. 2013.

HIN 102: Hindi

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

उद्देष्य–

1. विद्यार्थी मध्यकाल की प्रमुख काव्यधाराओं के साथ उस काल के रचनाकारों की प्रमुख शैलियों को समझ सकेगा।

इकाई 1

पठनीय कविताओं की सूची

- **कबीर**

1. दुलहनी गावहु —— पुरिष एक अविनासी
2. बहुत दिनन में —— दीन्हा
3. संतों भाई आई —— भया तम खीना
4. पाँडे कौन कुमति ——रामल्यौ लाई।
5. हम न मरै ——सुख सागर पावा

- **जायसी**

1. नागमती चितउर पथ हेरा —— विरह काल मोहि दीन्हा
2. पिउवियोग अस बाउर —— पाँख जरा गाभागि
3. चढा असाढ गगन —— हम सुख भूला सर्व
4. सावन बरस मेह —— नो माहि पाँव न पाँखण

- **2. संतवाणी**

कवि – नामदेव

1. हरि नाँव हीरा —— उतरे पारा
2. धृग ते बकता —— राम ही जाने
3. जो लग राम नामै —— भवजल तरिये
4. ऐसे जग थे दास —— नामदेव दासा

रैदास

1. अब कैसे छूटे —— ऐसी भक्ति करे रैदास
2. उँचे मंदिर शाल —— राम कहीं छूट्यो
3. किहि विधि अब —— माँहि आज
4. कही मन राम नाम —— तें न बिसार

- **नानक**

भक्ति मार्ग

1. मनरे प्रभु की ——उतारहि पारा

योग मार्ग

1. मिलि जल जलहिं खटाना
2. अब राखहु दास —— भाट की लाज
3. सावण आइया हे सखी—— बढ़ाई देह

➢ **दादू दयाल**

1. नीके राम कहत —— यह मारग संकरा
2. अजहुँन निकसे —— जैसे चंद चकोर
3. सजनी रजनी घटती —— सकल सिरोमणी राइ
4. हमरे तुम्ह डी —— सब जंजाल

➢ **रज्जब**

मन की प्यास

1. मन की प्यास—— राम भजन करि भाई
2. संतों मगन भया —— धणी का चेरा
3. ऐसो गुरू संसार —— दर्शन पासा

इकाई 2

1. सूरदास **2. तुलसीदास**

सूरदास

➢ **वात्सल्य**

1. जसोदा हरि पालने—— नंद भामिनी पावै
2. मैया मैं तो चंद —— सुमंगल गैहौं

➢ **गोपी प्रेम**

1. बूझत स्याम —— राधिका मोरी

➢ **विरह वर्णन**

1. बिनु गोपाल —— छुंजैं
2. निरगुन कौन देस —— मतिनासी

तुलसी

रामचरित मानस : वाटिका प्रसंग

1. देखन बागु —— मृगी सभीत
2. कंकन किंकिनि—— समय अनुहारि
3. धरि धीरज एक—— प्रीति न थोरि।

विनय पत्रिका

1. जो पै कृपा —— काहु न डरै
2. रामचंद । रघनायक—— भवसिंध तरे।

इकाई 3

➢ **मीरा**

1. मन रे परस —— अगम तारण तरण
2. बसो मेरे नैनन —— भगत बछल गोपाल
3. आली री मोरे—— लोग कहे बिगड़ी
4. मैं तो साँवरे —— भगत रसीला जाँची
5. माई री मैं तो—— पूरब जनम को कोल

➢ **रसखान**

सुजान रसखान

1. प्रान वही —— मन भायो
2. बैन वही —— रस खानी
3. मानुष —— कदंब की डारन
4. या लकुटी —— ऊपर वारौ
5. सेस, गनेस, महेस—— नाच नचावै

इकाई 4

(क) काव्य शास्त्र
(काव्य के गुण, दोष और शब्द शक्तियाँ)
(ख) छन्द अलंकार
छंद : दोहा सोरठा चौपाई कुंडलियाँ।
अलंकार : अनुप्रास यमक श्लेष उपमा।

संदर्भ ग्रंथ

1. प्राचीन काव्य — संपादक डॉ. सत्यनारायण शर्मा
2. प्राचीन काव्य धारा —संपादक डॉ. गजेन्द्र मोहन अल्का पब्लिकेशंस अजमेर
3.हिंदी साहित्य का इतिहास — डॉ. नगेन्द्र
4.रीति काव्य की भूमिका —डॉ. नगेन्द्र

GEO-102: Geomorphology

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.
iv) All questions will carry equal marks.

Objectives:

1. *To understand the physical evolution of the planet earth though geological times*
2. *To appraise concepts and theories essential for understanding forms and processes of the earth*
3. *To understand the physical features and processes shaping the characteristics of the earth*

Course Content

Unit I

Geological time scale; Fundamentalconcepts: uniformitarianism, evolution and dynamic equilibrium; Isostacy; Continental Drift Theory; Theory of Plate Tectonics.

Unit II

Geomorphic Processes: Weathering, Erosion and Mass-wasting: Impacts on landforms; Cycle of erosion and slope evolution (W.M. Davis and Walther Penck).

Unit III

Influence of lithology and structure on landforms; Folded and faulted structures; River channels — form and pattern;

Unit IV

Geomorphic agents, processes and resultant features— fluvial, aeolian, glacial, marine and karst.

Reading List

- Bloom A. L., 2003: *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice- Hall of India, New Delhi.
- Bridges E. M., 1990: *World Geomorphology*, Cambridge University Press, Cambridge. Christopherson, Robert W., 2011: Geosystems: *An Introduction to Physical Geography,* 8 Ed., Macmillan Publishing Company
- Kale V. S. and Gupta A., 2001: *Introduction to Geomorphology*, Orient Longman, Hyderabad. Knighton A. D., 1984: *Fluvial Forms and Processes*, Edward Arnold Publishers, London.
- Richards K. S., 1982: *Rivers: Form and Processes in Alluvial Channels*, Methuen, London. Selby, M.J., (2005), *Earth's Changing Surface,* Indian Edition, OUP
- Skinner, Brian J. and Stephen C. Porter (2000), *The Dynamic Earth: An Introduction to Physical Geology,* 4th Edition, John Wiley and Sons
- Thornbury W. D., 1968: *Principles of Geomorphology*, Wiley.
- Wooldridge W. S. and Morgan R. S., 1959: *An Outline of Geomorphology: The Physical Basis of Geography*, Longmans.
- Gautam, A (2010): *Bhautik Bhugol*, Rastogi Punlications, Meerut

Practicals

Instrumental Survey

Total credit: 1 ***Contact hours: 2 per week***

Survey of a small area by Chain Tape and Plane Table methods Calculation of height of an object by Abney Level

Practical Record:Students will be required to prepare a practical file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 30 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 3 out of 4 exercise) 15 Marks
  - Record File 10 Marks
  - Viva 05 Marks

Reading List

1. Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.
2. Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
3. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
4. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
5. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
6. Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot, Allahabad
7. Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher

HIS 102 : Modern World History (Renaissance to 1945 A.D.)

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions carry equal marks

Objectives: The students will be able to:

- It is intended to let the students have a panoramic view of modern history of the world since Renaissance and Reformation.
- This will complete the study of the Morden world history.
- The candidate will have a bird's eye view of the whole history of the Morden world.
- This will prepare him for an interplay between the micro and macro. The paper will be divided into four (4) Units.

Unit	Content
Unit I	➢ Beginning of New Era: Renaissance and Reformation ➢ Industrial Revolution: Causes, Conse0quences, ➢ Emergence of New classes. ➢ American War of Independence: Nature and causes, Events of struggle and significance.
Unit II	➢ French Revolution: Causes, main events and its impact. ➢ France under Napoleon Bonaparte and Vienna Settlement ➢ Unification of Italy and Germany ➢ Foreign Policy of Bismarck: His Diplomacy and Policy of Secret Alliances
Unit III	➢ Eastern question with special reference to Crimean war and Berlin settlement. ➢ Colonial expansion of European powers in Asia, Africa and Latin America ➢ First World war: Causes and Results, Paris Settlement and League of Nations.
Unit IV	➢ Causes and consequences of Bolshevik Revolution, Economic and Social reconstruction of Russia. ➢ World Economic Depression (1924-30) Cultural Revolution in China. Rise of Japan as an imperial power. ➢ Rise of Nazism and Fascism ➢ Second World War: Causes and Results and Formation of UNO and its achievements

Tutorials/Practicum : Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials. Students may be given to draw the paintings of Renaissance period

Suggested Readings

- Thampi, Madhavi. *India and China in the Colonial World*. Orient Blackswan
- Jain and Mathur. *A History of Morden World (1500-2000). jain Prakashan Maandir. Jaipur*
- Raj, Hans. *History of Morden World - An Overview*. surjeet publications
- Collingwood, R.G. *The Idea of History*. surjeet publications
- Hayes, C. J. H. *Morden Europe up to 1870*. surjeet publications
- Langer. william. L. *An Encyclopaedia of World History*. surjeet publications
- Ketelby, C.D. *A short History of Morden Europe*. surjeet publications
- Raj, Hans. *Western world (Mid - 15th Century to World War II*). surjeet publications

POL 102: REPRESENTATIVE INDIAN POLITICAL THINKERS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions carry equal marks

Objectives: On completion of the course the students – Teacher will be able to:

- To understand the fundamentals of Indian view regarding state, society and man and also the ancient Indian view point regarding human virtues, individuals place in social order.
- To understand and appreciate major streams of social and religious reforms in India in the 19th century and also the interaction between religion and political awakening.
- To understand and appreciate different streams of nationalism in Indian political thinking.
- To understand the various aspects of Political thoughts of modern era and analyse political and social philosophy of Indian thinkers with specials reference to social justice and socialism.

Unit	Content
Unit I	Kautilya , Somdev Soori , Ziauddin Barani.
Unit II	Raja Ram Mohan Ray, Swami Dayanand Saraswati and Jyotiba Phule.
Unit III	Gopal Krishan Gokhale, Bal Gangadhar Tilak, M. K. Gandhi.
Unit IV	Jawaharlal Nehru, Bhim Rao Ambedkar, Ram Manohar Lohiya .
Transactional Modalities: Lecture/contact periods; Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations.	
Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.	

Suggested Readings

1 A.R. Appodorai; Indian Political Thinking.
2 A.R.Desai ; Social Background of Indian Nationalism
3 B.R.Purohit ; Development of Political thought, Rajasthan Hindi Granth Academy, Jaipur 2000 (In Hindi) 4 D.B.Mathur ; Gokahale : A Political Autobiography
5 Purshottam Nagar ; Indian Modern Social and Political Thought, Rajasthan Hindi Granth Academy, Jaipur 2000 (In Hindi)
6 V.R. Mehta; Foundations of Indian political Thought, Manohar Publishers and Distributors, New Delhi, 1999. 7 J. Bandhopadhyaya, Social and Political Thought of Gandhi, Bombay, Allied 1969.

ECO 102: INDIAN ECONOMY

KURUKSHETRA UNIVERSITY
B.A.B.Ed.- 2nd SEMESTER SYLLABI AS PER CBCS PATTERN

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions carry equal marks

Objectives: The students will be able to:

- Explain the various issues, problems and policies of Indian Economy
- Detail account of the development of Indian economy before, at the time and after Independence.
- Describe sectoral development and different components of Indian Economy.
- Understand the problems of population growth, unemployment, Inflation and measures to check Inflation.
- Critically explain the current economic problems and new economic reforms in India

Unit	Content
Unit I Structure of Indian Economy	➢ Basic feature of Indian Economy, Natural Resources- Land, Water and Forest; ➢ Human Resource- Broad demographic features- Population size, growth rate, sex composition, literacy, life expectancy, rural-urban migration, Occupational distribution, Causes and Problems of over-population, Population policy; ➢ The Problems of Poverty, Inequality, unemployment and inflation in India, Composition of GDP.

UNIT-II **(a) The Primary Sector** **(b) The Secondary Sector**	➢ Nature and importance, Trends in agricultural production and productivity, ➢ Factors determining the low productivity of agriculture, ➢ Land reforms, ➢ New agricultural strategy and green revolution, ➢ Rural credit, ➢ Agricultural marketing, ➢ Food Security and Public Distribution System (PDS). ➢ Role and pattern of growth of industrialization during plan periods in India; ➢ Industrial Policy- 1948, 1956 and 1991; ➢ MRTP Act; ➢ Role of Public sector & private sector enterprise and their performance, ➢ Problems of the growth of Small-scale and Large-scale industries, ➢ Privatization and Disinvestment debate, Industrial finance.
UNIT-III **The Tertiary Sector**	➢ Meaning and importance ofInfrastructural Development in India**,** ➢ **S**ocial and Economic infrastructural development in India; ➢ Special Economic Zone (SEZ), ➢ Agri-Export Zone (AEZ), ➢ Growth and Pattern of IT Industries, Outsourcing, ➢ Role of RBI in Financial sectors reforms, ➢ Role of State in Fiscal sector reforms, ➢ Role of foreign trade in Indian economy, ➢ Money & capital market in India, ➢ working of SEBI in India, EXIM Policy, ➢ Exchange rate policy, ➢ The progress of trade reform in India.
Unit IV **Planning and Economic Reforms**	➢ Indian economy on the eve of independence, ➢ Planning in India-its objectives, strategies, achievement and failure; ➢ New Economic Reforms- Liberalisation, Privatisation and Globalisation, ➢ WTO and its impact on different sectors of the Indian economy, ➢ FDI & MNCs in India,
Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.	

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)

KURUKSHETRA UNIVERSITY
B.A.B.Ed.- 2nd SEMESTER SYLLABI AS PER CBCS PATTERN

I: Perspectives in Education (PE)
Semester II
PECG 102: CHILDHOOD AND GROWING UP

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions carry equal marks

Objectives of the Course: On the completion of course, the student teacher will be able to:

- Situate individual development in a socio-cultural context.
- Develop an understanding about the impact/influence of socio-cultural context in shaping human development, especially with respect to the Indian context.
- Acquire theoretical perspectives and develop an understanding of dimensions and stages of human development and developmental tasks.
- Understand a range of cognitive skills and affective processes in human learners.
- Become aware of different contexts of learning and situate schools as a special environment for learning.
- Reflect on their own implicit understanding of the nature and kinds of learning.
- Gain an understanding of different theoretical perspectives on learning with a focus on cognitive views of learning as well as social– constructivist theories.
- Explore the possibilities of an understanding of processes in human cognition and meaning–making them as basis for designing learning environments and experiences at school.
- Appreciate the critical role of learner's based on differences and contexts in making meanings, and hence draw out implications for schools and teachers.

Course Contents

Unit I: Learner as a Developing Individual and individual differences among learners

- Developmental Influences: Development as a resultant of interactions between individual potential (innate, acquired) and external environment (physical, socio-cultural, economic and technological).
- Nature and nurture, continuity and discontinuity and growth and maturation issues.
- The understanding of cognitive and affective processes influencing the development of the learner and their applications in classroom teaching.

- Dimensions of differences in psychological attributes—cognitive abilities, interest, aptitude, creativity, personality, values.
- Understanding learners from multiple intelligence perspective with a focus on Gardner's theory of multipleintelligence. Differences in learners based on predominant 'learning styles'.

Unit II: Development and Learning

- Meaning and principles of development, relationship between development and learning.
- Dimensions of individual development: physical, cognitive, language, emotional, social and moral, their interrelationships and implications for teachers (relevant ideas of Piaget, Erikson and Kohlberg).
- Stages of development—developmental tasks with focus on processes growth and development across various stages from infancy to post adolescence (special emphasis on concerns of adolescence).

Unit III: Theoretical Perspectives on Learning

- Perspectives on human learning: Behaviourist (conditioning paradigm in brief), Cognitivist and Social Cognitivist (Bandura), Information-Processing view, Humanist, Social-Constructivist Social Cognitive Learning (drawing selectively on the ideas of Skinner, Piaget, Rogers, Vygotsky).
  (i) Concepts and principles of each perspective and their applicability in different learning situations
  (ii) Relevance and applicability of various theories of learning for different kinds of learning situations
  (iii) Role of learner in various learning situations, as seen in different theoretical perspectives
  (iv) Role of teacher in teaching- learning situations: a) transmitter of knowledge, b) model, c) facilitator, d) negotiator, e) co- learner. (The focus is on building understanding of different psychological perspectives of learning and helping student teachers to learn to apply them in different learning situations).

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':
  (i) Experiential learning and reflection
  (ii) Social mediation
  (iii) Cognitive negotiability
  (iv) Situated learning and cognitive apprenticeship
  (v) Meta-cognition.
- Creating facilitative learning environment.

- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Modes of Learning Engagement: Modes of learning engagement will include:

- Reflective Written Assignments
- Lecture-cum-discussion
- Study of selected readings and discussions around overviews
- Anecdotes, experiential and reflective writings.
- Audio-visual clips of learning situations and interactions, analysis and discussion in small groups as well as large group
- Group presentations of key themes and concepts
- Exemplars of 'constructivist' learning situations, Case studies, their analysis and discussion
- Close observation of learners (students) in learning situations at school, as well as in other contexts; making field notes
- Interpretation, analysis and discussion of observations
- Assignments based on the above

Practicum / Tutorials:

- Reflective Written Assignments
- Field observation notes
- Analysis of a learning situation and case study, using theoretical perspectives
- Administration of any one standardized tests (Intelligence/aptitude/attitude/creativity) and preparation of psychological assessment report.
- Prepare a critical report on implications of any one theory for learning – Piaget, Erickson and Bandura.
- Select a child with learning problem (refer 5.5) and carry out academic assessment in any one subject, identify the remedial measures and prepare a report.
- Preparation of learners' profile based on cognitive and non-cognitive characteristics to depict inter and intra individual differences.
- Project work

Suggested Readings:

1. Ambron, S.R. (1981). Child Development. New York. Holt Rinehart & Winston.
2. Atkinson, Richard C. et.al. (1983). Introduction to Psychology. New York. Harcourt Brace Johanovich Inc.
3. Benjafield, J.G. (1992). Cognition. Prentice Hall, Englewood Cliffs.

4. Blackie, J. (1971). How Children Learn in J.C. Stone and F.W. Schneider (eds.) New York. Readings in the Foundations of Education, Vol II, Cromwell.
5. Brown, J.S., Collins, A and Dugrid, P (1989). Situated Cognition and the Culture of Learning, Educational Researcher: 32-42.
6. Dececco. (1970). Italy. Psychology & Learning and Instruction Educational Psychology Prentice.
7. Flavell, J.H. (1963). The Developmental Psychology of Jean Piaget, New York. Van No strand.
8. Gange, R. M. (1985). The Conditions of Learning and Theory of Instruction (4th edition). New York. Holt, Rinehart and Winston.
9. Gardner, H. (1999). The disciplined mind what all students should understand. New York. Simon & Schuster.
10. Gardner, Howard (1989). Frames of Mind. New York. The Theory of Multiple Intelligences, Basic Books.
11. Gardner, Howard (1991). The Unschooled Mind. New York. Basic Books.
12. Hurlock, E.B. (1964). Child Development. New York. Mcgraw Hill Book Co.
13. Phillippe Aives. (1962). Centuries of Childhood. A Sociology of Family Life. New York. Knops.
14. Wolfolk (1987). Educational Psychology. Prentice Hall Eaglewood Cliff.
15. Srivastava, A.K. (1998). Child Development. The Indian Perspective. New Delhi. NCERT.
16. Sibia, A. (2006). Life at Mirambika. New Delhi. NCERT.
17. Chauhan S. S. (2002). Advanced Education Psychology. Delhi. Vikas Publication.
18. Woolfolk, A.E. (2009). Educational Psychology (11th Edition) (My Education Lab Series) Prentice Hall.
19. Wertsch, J.V. (1985). Vygotsky and the Social Formation of Mind. Harvard University Press.
20. Chauhan, S.S. (1990). Advanced Educational Psychology. New Delhi. Vikas Publication House.
21. Sharma R.A. (1996). Fundamentals of Educational Psychology. Meerut. Lal Book Depot.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)
Semester II
WEAP 102: WORK EDUCATION (AGRICULTURE PRACTICE)-II

Time: 1.5 Hours Max. Marks: 50

Credits- 3 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.
iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.
- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Course Contents

Unit I: Identification

- Seeds of common crops.
- Seeds of common vegetables.
- Important weeds.
- Manures commonly used.
- Fertilizers commonly used.

Unit II: Seeds and Seedlings

- Characteristics of a good seed for sowing.
- Calculation of germination percentage of seeds.
- Planting seeds and transplanting seedling.
- Raising seedlings in a nursery
- Study about green-house.

Unit III: Ornamental gardening

- Identification of different summer flowers.
- Identification of different winter flowers.
- Identification of common hedge and creeper plants.
- Preparation and maintenance of rockeries and borders.
- Preparation and maintenance of borders through hedge and flower plantation.

Horticulture Practices

- Agro forestry and related concepts
- Potting and repotting practices.
- Practices related to production of important flowering plants.
- Collection of different types of seeds.
- Preparation of a project.

Unit IV: General Field practices

- Earthing.
- Planting.
- Hoeing.
- Weeding.
- Watering of plants.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).
4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Mustard
- Gram
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)
Semester II
WEEE 102: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-II

Time: 1.5 Hours Max. Marks: 50
Credits- 3 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.
iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.
- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Constructivist Approach: Hands on Experiences, Activity based Learning, Experimentation, and Interactive engagement. Group Work, Peer Learning, Project Work.

Course Contents

Unit I: Lamps

Understanding the working of CFL tubes, Incandescent lamp, arc lamp, sodium vapor lamp, neon lamp, fluorescent lamp, use of choke and starter

Unit II: Transformer

Construction of Transformers, recognition of primary and secondary winding, knowledge of step-up and step-down transformer, use of transformers.

Unit III: Electrical Appliances

Understanding the working of Electrical appliances such as Refrigerator, Air conditioners etc, making Resistance and Capacitance boxes, use of testing board and extension boards for laboratory.

Unit IV: Transistor

Recognition of emitter, base and collector in a transistor, characteristics of transistor, transistor action, Amplification by transistor, Basic idea of integrated circuits, FET – recognition of drain, source and gate terminals, FET and its characteristics, testing of transistor and FET, LCD.

Suggested Readings:

1. Electrician – I Year Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician – II Year – Trade Theory Published by national Instructional Media Institute Chennai re-print-2007

3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects/Models based on the following **(Only Suggestive)**-

1. Alarm for luggage security
2. Mobile cell-phone charger using cell
3. Power supply failure alarm
4. Blown fuse indicator
5. IR Remote switch (fan, tube light)
6. Remote operated musical bell
7. Voltage Multiplier

B. A. B. Ed. (CBCS) Semester- III
GROUP B: GENERIC COURSE (GC)
GCEE 201: ENVIRONMENTAL EDUCATION & SUSTAINABLE DEVELOPMENT

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course

The Course 'Environmental Education' aims to orient student-teachers to analyze and understand environment concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

Course Contents

Unit I: Importance and Scope of Environment

Importance need and scope of Environmental Conservation and Regeneration, Structure and functions of different ecosystems, India as a mega biodiversity nation, Role of individual in conservation of natural resources: water, energy and food, Equitable uses of resources for sustainable livelihoods, Environmental legislation: awareness and issues involved in enforcement.

Unit II: Natural Resources

Community participation in natural resource management- water, forests. Deforestation in the context of tribal life, Sustainable land use management, Traditional knowledge and biodiversity conservation, Developmental projects including Government initiatives and their impact on biodiversity conservation.

Unit III: Practices in Environment Management

Consumerism and waste generation and its management, Environmental degradation and its impact on the health of people, Organic farming, Agricultural waste: their impact and management, Rain water harvesting and water resource management, Biomedical waste management.

Unit IV: Sustainable Environment in Global World

Environmental conservation in the globalised world, Alternative sources of energy, Impact of natural disaster/man-made disaster on environment, Biological control for sustainable agriculture, Heat production and greenhouse gas emission, Impact of industry/mining/transport on environment, Sustainable use of forest produces.

Modes of Learning Engagement:

- Case studies and success stories (involve local material).
- Problem solving and enquiry methods
- Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
- Setting up of Eco-clubs.
- Conducting a seminar and developing a seminar document
- Project work and writing of project report
- Discussion of activities pertaining to two different classes and subjects.
- Activities on infusion of appropriate concerns.

Practicum:

- The students on completion of each topic of Unit-I will submit a small assignment in the form of an activity. This may include observation of importance of relevant season, preparation of bulletin board material, wall games, crossword puzzles, worksheet etc.
- The class can also form an environment club. The activity has to be on some local specific issue pertaining to the native place of the students.
- From the wide range of topics suggested in Units, the student will be assigned one topic. The student will develop a seminar document, which will be submitted after the seminar.

Suggested Readings:

1. NCERT (1981) Environmental Education at School Level. New Delhi. NCERT.
2. Odum, E.P (1971). Fundamental Ecology. London. W.B. Saunders Company.
3. Palmer, Joy A. (1998). Environmental education in the 21st Century. London. Routledge.
4. Sharma R. C and Tan, Marle C (Eds.) (1990). Resource Book in Environmental education for school lectures. Bangkok. UNESCO.
5. Sharma, R.C. (1981). 'Environmental Education. New Delhi. Metropolitan Publishers.
6. gfj'kpUn;kl ¼2001½- i;koj.kf'k{kk] ubZ fnYyh-
7. lDlukgfjekgu ¼2003½- i;koj.k v/;;u] Jhxxkuxj- vxokyklfgR; lnuA
8. indtJhokLro ¼1998½- ^i;koj.kf'k{kk*- Hkkikiky- e/;izn'kfgUnhxFkvdknehA
9. lDluk ,-ch- ¼1998½- i;koj.kf'k{kk- ubZfnYyh- vk;qcqdfMikA
10. UNESCO (1990). Sourcebook in Environmental Education for School Teachers. Bangkok.
11. CEE (1995). Joy of learning handbook of environmental education activities. Vol.I-3 to 5.—Ahmedabad. Centre for Environment Education,
12. CEE (1996) Joy of learning. Handbook of environmental education activities. Vol.II-6 to 8.-- Ahmedabad: Centre for Environment Education
13. Pandya (1999). Mamata, Guide to green material: experiences and learning in developing effective environmental education material. Ahmedbad. Centre for Environment Education,
14. Sharma, R. C. (1981). Environmental Education. Delhi. Metropolitan.
15. Reddy, K. Purushotham. (2007). Environmental education. New Delhi. Neel kamal Publications Pvt. Ltd.
16. NCERT (2009). Project book in Environmental Education for class VII, VII, IX and X. New Delhi. NCERT.
17. NCERT (2011). Teachers' Handbook on Environmental Education for the higher secondary stage. New Delhi.

ENG 201 English Drama

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:
- Acquaint with certain specimens of English drama and their types from different ages.
- Develop their analytical and imaginative powers through readings in drama and their skills in dialogue development through their readings in drama.

Course Contents	
Unit I	Cristopher Marlow: Dr. Faustus Shakespeare: As You Like It
Unit II	William Congreve: The Way of the World
Unit III	G.B. Shaw: Arms and the Man
Unit IV	a. Tragedy, Comedy, Plot, Soliloquy, Three Unities, Tragic Comedy, Farce, Conflict, Climax, Catharsis, Poetic justice, Chorus, Comic Relief, Closet Drama b. Mystery, Miracle and morality plays, the intrudes, Elizabethan drama, heroic tragedy, comedy of manners, problem plays, poetic drama, absurd plays, contemporary English drama
Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.	

Readings Unit I

- Sinha,A. K. *A Students' Companion to English Drama*. Bharati Bhawan (P&D). 2017.
- Braunmuller, A. R. (Ed.). *Macbeth (The New Cambridge Shakespeare)*. CUP. 1997.
- Bradley, A.C. *Shakespearean Tragedy*.4th Ed. Palgrave Macmillan. 2006.
- McEachern, Claire. *The Cambridge Companion to Shakespearean Tragedy*. CUP. 2013.

Unit II

- Hattaway, Michael (Ed.). *As You Like It (The New Cambridge Shakespeare)*. CUP. 2009.
- Leggatt, Alexander.*The Cambridge Companion to Shakespearean Comedy*. CUP. 2006.

Unit III

- Chakrabarti, Shrishendu (Ed.). *The Way of The World*. Orient BlackSwan. 2007.
- Dobre, Bonamy. *Restoration Comedy 1660-1720*. OUP. 1962.
- Fisk, Deborah Payne. *The Cambridge Companion to English Restoration Theatre*. CUP. 2006.

Unit IV

- Ward, A. C. (Ed.). *Arms and the Man*. Orient BlackSwan. 2011.

Innes, Christopher. *The Cambridge Companion to George Bernard Shaw*. CUP. 2006

HIN 201 HINDI

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Course Contents

इकाई 1:

रचनात्मक लेखन परिभाषा, परिचय, उपयोगिता रचनात्मक लेखन के विविध रूप – कविता, कहानी उपन्यास, नाटक, एकांकी

इकाई 2:

❖ अनुवाद एवं रचनात्मक लेखन
- अनुवाद का अर्थ, स्वरूप और महत्व
- अनुवाद : इतिहास और परंपरा
- अनुवाद के तत्व – स्रोत भाषा, लक्ष्य भाषा, संप्रेषण कोशगत अर्थ, अनुवाद सामग्री भावार्थ
- अनुवाद के स्वरूप – शाब्दिक अनुवाद, भावानुवाद छायानुवाद, सारानुवाद।

इकाई 3:

❖ अनुवाद प्रक्रिया : आयाम एवं प्रमुख पक्ष

❖ अनुवाद प्रक्रिया के विभिन्न चरण

	प्रमुख पक्ष
रचना का चयन	(अ) रचनाकार
पठन	(ब) अनुवादकर्ता
विश्लेषण	(स) पाठक
भाषिक अंतरण	
पुनरीक्षण	
संशोधित भाषातंरण	

इकाई 4:

❖ अनुवाद एवं रचनात्मक लेखन : सम्यक मूल्यांकन
- अनुवाद कार्य की आवश्यकता एवं महत्व
- बौद्धिक – सांस्कृतिक आदान–प्रदान में अनुवाद कार्य की भूमिका

संदर्भ पुस्तकें

1 अनुवाद विज्ञान –सिद्धांत और अनुप्रयोग हिन्दी माध्यम कार्यान्वयन निदेशालय
2 भारतीय भाषाएँ एवं हिन्दी अनुवाद : समस्या समाधान डॉ. कैलाशचंद भाटिया (गूगल पुस्तक)
3 रचनात्मक लेखन – संपादक प्रो रमेश गौतम भारतीय ज्ञानपीठ दिल्ली
4 अनुवाद : अवधारणा एवं अनुप्रयोग सं. डॉ. चन्द्रभान रावत नेशनल पब्लिशिंग हाउस, दिल्ली

CCG-201: Economic Geography

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

1. *To explain the meaning and concepts of economic geography*
2. *To understand the economic organization of space*
3. *To explain the spatial organization of the economic activities*

Course Contents

Unit I

Meaning and approaches of Economic; Concepts and classification of economic activities; Resource- concept and classification; Spatial organization of economic activities; Economic organization of space

Unit II

Agricultural typologies with special reference to subsistence and commercial agriculture; Forestry, Fishing and Mining; Factors affecting location and distribution of primary economic activities with special reference to agricultural land use; J. H. von ThÜnen's model of agricultural land use.

Unit III

Types of industries; Factors influencing location of Industries with special reference to iron ore, cotton textiles and sugar; Alfred Weber's theory of industrial location

Unit IV

Concepts of distance, accessibility and connectivity; Edward Ulman's model of spatial interaction; Competition and complementarity between various modes of transportation; International trade theories

Suggested Readings

1- Alexander J. W., 1963: *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2- Coe N. M., Kelly P. F. and Yeung H. W., 2007: *Economic Geography: A*

Contemporary Introduction, Wiley-Blackwell.
3- Hodder B. W. and Lee Roger, 1974: *Economic Geography*, Taylor and Francis.
4- Combes P., Mayer T. and Thisse J. F., 2008: *Economic Geography: The Integration of Regions and Nations*, Princeton University Press.
5- Wheeler J. O., 1998: *Economic Geography*,
Wiley. 6- Durand L., 1961: *Economic Geography*,
Crowell.
7- Bagchi-Sen S. and Smith H. L., 2006: *Economic Geography: Past, Present and Future*, Taylor and Francis.
8- Willington D. E., 2008: *Economic Geography*, Husband Press.
9- Clark, Gordon L.; Feldman, M.P. and Gertler, M.S., eds. 2000: The *Oxford Handbook of Economic Geography*, Oxford University Press, Oxford and New York.

CCG-201: PRACTICAL

Collection, Representation and Analysis of Geographical Data

Total credit: 1 Contact hours: 2 per week

Techniques of data collection – field observation and interview schedule Techniques of data representation – graphs, diagrams and maps
Techniques of data analysis - mean, mode, median, deviation, dispersion and co-efficient of correlation
Practical Record:Students will be taken to a nearby village for a week for socio-economic survey. They will write a detailed field report by graphically representing and statistically analysing field data.
Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 30 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 2 out of 3 exercise) 10 Marks
  - Survey Report 10 Marks
  - Record File 05 Marks
  - Viva 05 Marks

Suggested Readings

- Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.
- Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
- Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
- Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot, Allahabad Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher.

HIS 201 Indian History (Earliest Times to 1200 A.D.)

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

Iv All questions will carry equal marks.

Objectives: The students will be able to:

- To provide the knowledge of the sources of the period.
- The students shall be able to know the legacies of the early history of India.
- The study of this Semester shall provide the know how the origin of republics and the system of republican administration.
- To give the knowledge of the rich administrative traditions of ancient India
- The students' shall come in touch with the pride of ancient Indian society and polity.
- This Semester shall provide the knowledge of the spread of Indian culture in the other countries.
- The student will be informed about the South Indian History

Unit	Course Contents
Unit I	➢ Sources of ancient Indian History –Literary, Archaeological, Numismatical and Epigraphical. ➢ Influence of Geography on Indian History, ➢ Geographical divisions of India. ➢ Sindhu –Saraswati civilisation – origin, extent, First Urbanisation: urban planning, economy and Trade.
Unit II	➢ Post Mauryan society and polity : Shungas, satvahanas and Kushanas, ➢ Sangam Age – Chiefdoms, literature, society and economy. ➢ Gupta dynasty – Chandragupta I, Samudragupta, Chandragupta administration, Land revenue system, Economy and society ➢ Gupta administration, Land revenue system, Economy and society

Unit III	➢ Mahajanpadas: Administrative system of Republics, The age of second urbanisation ➢ Rise of Magadha Empire ➢ The Age of Mauryas – Chandragupta: extent of his empire and administration. ➢ Ashoka – his concept of Dhamma.
Unit IV	➢ Political, Social, religious and economic life during the reign of Harsha Vardhana ➢ Rise of Rajputs; origin and consolidation: Chauhans, Gurjar Prathiars, Parmars, Guhils ➢ South India - Pallavas, Chalukyas, RashtraKutas, Cholas: society and polity ➢ Tripartite struggle
Tutorials/Practicum: Sources of ancient Indian History –Literary, Archaeological, Numismatical and Epigraphical. Influence of Geography on Indian History, Geographical divisions of India. Sindhu –Saraswati civilisation – origin, extent, First Urbanisation: urban planning, economy and Trade.	

Suggested Readings

- Luniya, B. N. *Evolution of Indian Culture*. Agra
- Raychoudhary, S.C. *Social, Cultural and Economic History of India*: Ancient Times. Surjeet Publications
- Sharma, Krishangopal . Hukum Chand Jain . *India's political and Cultural history of India*, Rajasthan Hindi Granth Academy. Edition Fifth
- Gupta,Copper Shivkumar,*Foundations of Indian Culture*, Rajasthan Hindi Granth Academy
- Eraly ,Abraham , *The First Spring The Golden Age of India,* Penguin India
- Eraly ,Abraham, *The First Spring Part 1 life in the Golden Age of India,* Penguin India
- Eraly ,Abraham ,*The First Spring Part 2 Culture in the Golden Age of India,* Penguin India
- Rizvi ,S.A.A.,*The Wonder That was India Volume II,* Picador India
- Basham ,A.L., *The Wonder That was India,*
- Smith, V.A. *Early History of India* : Oxford
- Roychowdhry, H.C. *Political History of Ancient India*
- Agarwal, D.P. *History and Culture of Indian people*
- Sharma, Dasharat. *Early Chauhan Dynasties, Vol. I and II*

POL 201: COMPARATIVE GOVERNMENT AND POLITICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Acquire knowledge about the constitutional systems of UK, USA, and Switzerland.
- Understand the composition, functions and position of legislature's executives and judicieries in different countries.
- Understand the different patterns of relationship among the Executive, Legislature and Judiciary prevailing in different kinds of political systems.
- Acquaint themselves with various aspects and agencies of political process in different systems.

Unit	Course Contents
Unit I	Comparative politics: Meaning, scope and nature. Types of comparison (Vertical-Horizontal), Types of Constitutions, Constitutionalism.
Unit II	Socio-economic bases and salient features of the Constitutions of United kingdom, United states of America and Switzerland .Federal system of the U.S.A. and Switzerland. Political parties in the U.S.A., United kingdom and Switzerland
Unit III	Executive: Composition and Functions, British King and the Crown. British Prime Minister and Cabinet, the President of the USA, Plural Executive of Switzerland.
Unit IV	Legislature: Composition and Powers of the British Parliament, USA's Congress, Swiss Federal Assembly. Judiciary : Judicial system of UK, USA's Supreme Court and Federal Tribunal of Switzerland.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any,
may be resolved during tutorials.

Suggested Readings

1. Kamrava Mehran : Understanding Comparative politics, Prentice hall of India Pvt.Ltd.,New Delhi 2000 Charles,
2. Beared: American Government and Politics. H. C. Huiton: An Introduction to Chinese Politics. London, David and Charles, 1973.
3. H.J.Laskhi : American Democracy : A commentary and An Interpretation, London Unwin 1984.
4. Leys, Politics in Britain: An Introduction, London, Heinemann, 1983

ECO 201: MACRO ECONOMICS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Define Macroeconomics and understand the emergence of Macroeconomics.
- Distinguished between the microeconomics and macroeconomics.
- Explain the nature and scope of macroeconomics analysis.
- Explain the role of equilibrium in economics analysis.
- Discuss the concept of static, dynamic and comparative static; stock & flow in economic analysis.
- Describe the structure and working of four sectors of macro economy.
- Explain the circular flow of income and expenditure in closed and open economy.
- Explain the equilibrium level of output and employment in the economy.
- Discuss the concept of multiplier and accelerator in the economy.
- Explain the various theory of interest- classical, loanable, liquidity and IS & LM model.
- Explain the nature of fluctuation of economic activities or business activities in the economy.

Unit	Course Contents
UNIT-I Meaning, Nature and Scope of Macroeconomics	➢ Meaning and emergence of Macroeconomics, ➢ Nature and Scope of Macroeconomics; ➢ Basic concepts of Macroeconomics- Role of equilibrium in economic analysis, Distinguish between Micro and Macro Economics, Static, Dynamic and Comparative static, ➢ Structure and working of four sectors of Macro economy, ➢ Circular flow of income and expenditure in 2-sector, 3-sector and 4- sector model, ➢ Concept of GDP and National Income; ➢ Methods for measurement of National Income and related aggregates; ➢ Nominal and Real income; ➢ Difficulties in calculating national income; ➢ Role of GNP measure in economic welfare.

UNIT-II **(a) Income Determination : Output and Employment** **(b) Theories of Interest**	➢ Concept of aggregate demand; aggregate supply function, ➢ Derivation of aggregate supply curve; ➢ Classical theory of income and employment- Say's law of market; Keynesian theory of income and employment- the principle of deficiency of effective demand; ➢ Keynes' fundamental psychological laws of consumption function, ➢ factors determining consumption function; saving function, investment function, the concept of multiplier. ➢ Capital and Investment, Marginal efficiency of capital and investment, the concept of accelerator. ➢ Classical theory of interest- Abstinence and waiting; ➢ Neo-classical theory of interest- Loanable fund theory; ➢ Keynes Liquidity preference theory of interest, ➢ Neo-Keynesian theory- IS & LM Model
UNIT-III Balance of Payment	➢ Concept and component of Balance of Payment; ➢ Distinguish between Balance of Payment and Balance of Trade; ➢ consequence or Causes of disequilibrium in the Balance of Payment; ➢ Various measures to correct imbalance in Balance of payment; ➢ Implication of Foreign trade multiplier; ➢ Concept of appreciation and depreciation of currency and its effect on foreign trade.
Unit IV Business Cycles	➢ Meaning, Nature and Characteristics of trade cycles; Theories of business cycle: over-saving, under consumption theory, innovation theory, Hawtray's monetary theory, Haykes' over- investment theory, Keynes view on trade cycle; ➢ Samuelson-Hicks multiplier-accelerator interaction model, ➢ Control of Business cycle through relative efficacy of monetary and fiscal policies

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

✓ Ackley, G(1978), Macroeconomics : Theory and Policy, Macmillan, New York
✓ Branson W.A(1989), Macroeconomic Theory anf Policy, Harper and Ror, New York

- ✓ Dornbush, R and F. Stanley(1997), Macroeconomics, Mc Graw Hill, Inc. New York.
- ✓ Edey, M and A.L. Peacock(1997), National Income and Social Accounts, Hutchinson University Library, London
- ✓ Gordon, R and S.G Harris(1998), Macroeconomics, Addison Wesley.
- ✓ Hall, R.E and J.B Taylor(1986), Macroeconomics, W.W. Norton, New York.
- ✓ Jha,R(1991),Contemporary Macroeconomic Theory & Policy, Wiley Eastern Ltd, New Delhi.
- ✓ Jhingan, M.L(2011), Macroeconomics Theory, 12th Edition, Vrinda Publications(P) Ltd.
- ✓ Mithani, D.M( ) , Macroeconomics,
- ✓ Romer, D.L(1996), Advance Macroeconomics, Mc Graw Hill Company, Ltd, New York.
- ✓ Ruggles, R and N Ruggles(1956) National Income Accounts and Income Analysis, Mc Graw Hill, New York.
- ✓ Seth, M.L( ), Macro Economics,
- ✓ Shapiro E(1996), Macroeconomic Analysis, Galgotia Publication, New Delhi

Vaish, M.C(2010), Macroeconomics Theory, Fourth Edition, Vikas Publishing House, Pvt Ltd.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester III
PESS 201: SCHOOLING, SOCIALIZATION AND IDENTITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of course, the student-teachers will be able to:

- Become aware of the processes of socialization at home and school that act as shaping factors in identity formation of the school going child (in Indian contexts)
- Reflect critically on factors that shape identity formation and influence sense of self of the growing 'student' as well as 'teacher' in school as well as out of school.
- Understand the processes that have shaped/continue to shape one's own sense of identity as 'student' and a 'person' located in multiple social contexts and roles
- Reflect on one's aspirations and possibilities in order to develop a growing sense of agency as a 'teacher', a 'professional', as well as a 'human being'.

Course Contents

Unit I: Socialization and Development of Self

- Understanding the nature and processes of socialization
- At home: family as a social institution; impact of parenting style/child rearing practices; transmission of parental expectations and values.
- In the community: neighbourhood, extended family, religious group and their socialization functions.
- At school: impact of entry to school; school as a social institution; value-formation in the context of schooling.

Unit II: Emergence of 'person' and 'identity' and Schooling for identity formation

- Understanding 'identity formation'; emergence of multiple identities in the formation of a person placed in various social and institutional contexts; the need for inner coherence; managing conflicting 'identities'.
- Determinants of identity formation in individuals and groups: such as caste, class, gender and religion.
- The influence of peer group, media messages, technology, and globalization on identity formation in contemporary Indian society.
- Schooling as a process of identity formation: ascribed, acquired and evolving.
- Potential role of school in developing national, secular and humanistic identities.

Unit III: Coping with social complexities: Role of education

- Expanding human activities and relations; decreasing unhealthy competition, uncertainty and insecurities and the resultant identity conflicts.
- Indian concept of 'vasudhaiva kutumbakam' and 'sarvadharm sambhava'.

Unit IV: Evolving a 'holistic identity' as a teacher

- Reflections on one's own aspirations and efforts in becoming a 'teacher'.
- Evolving an identity as a teacher, which is progressive and open to re-construction.
- Teachers' professional identity and Teachers' professional ethics.

Modes of Learning Engagement:

- Introductory lectures-cum-discussion, to introduce key themes of the course – socialization, identity formation, sociological notions and experiential sense of 'self' etc.
- Observations of schools and classrooms through the lens of course themes; interviews with teachers; making field notes.
- Group discussion and exploration, around selected readings and key questions.
- Viewing selected documentaries and film clippings.
- Writing critical reviews of readings and films viewed.
- Presentations of reviews.
- Reflective, autobiographical writing, towards self-understanding, on given topics.
- Journal writing, on course experiences (to be initiated with this course; to be continued through the year, with occasional sharing with a 'mentor').

Practicum / Tutorials:

- Visit to a school and studying the role of school in socialization of the child.
- Preparing notes on ways of managing conflicting identities with illustrations.
- Studying the school activities which enhance secular identity in children.
- Observing school processes that contribute to peaceful living of teachers and students.
- Describing ones' own process of socialization quoting some experiences.
- Presentations based on readings and film reviews.
- Reflective written assignments (towards critical awareness of issues, for self-understanding and formulating aspirations as a teacher.

- Journal writing.
- Notes from field observations/interviews and linking these with course themes.

Suggested Readings:

1. Pathak, Avijit (2002). Social Implications of Schooling. New Delhi. Rainbow Publishers.
2. Kumar Krishna (2004). What is Worth Teaching? 3rd edition, Orient Longman.
3. Krishnamurti, J. Education and the Significance of Life. KFI Publications.
4. Butler, J. (1990). Gender Trouble Feminism and the subversion of Identity. New York. Routledge.
5. Sharma, R&E. Annamalai. (2003). Indian Diaspora In Search of Identity. Mysore. CIIL.
6. Kumar,K. (2001). Prejudice and Pride School Histories of the Freedom Struggle. New Delhi. Viking/Penguin.
7. Amalendu Misra (2004). Identity and Religion Foundations of Anti-Islamism in India. New Delhi. Sage Publications.
8. Dipankar Gupta (Ed.) (2004). Caste in question Identity or Hierarchy. New Delhi. Sage Publications.
9. Kamala Ganesh & Usha Thakkar (Ed.) (2005). Culture and Making of Identity in India. New Delhi. Sage Publications.
10. Saraswati, T.S. (Ed.) (1999). Culture, Socialization and Human Development. Theory Research and Applications in India. New Delhi. Sage Publication.
11. Sen Amartya (2006). Identity and Violence. The Illusion of Destiny. New Delhi. Allen and Lane Penguin Books India Pvt. Ltd.
12. Shashi Tharoor (2007). The Elephant, the Tiger &The Cell phone. (Particularly part two of the book). New Delhi. Penguin Viking.
13. Srinivas M.N. (1986). Social Changes in Modern India. Bombay. Allied Publishers.
14. Vidyanathan, T.G. (1989). 'Authority and Identity in India', in 'Another India.' Dae dalus, Fall, 118 (H): 147-69.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester III
EPYH 201: YOGA, HEALTH AND WELL BEING

Time: 3 Hours Max. Marks: 50
Credits- 4 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 08 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Understand the importance of games, sports and yoga for development of holistic health.
- Know the status, identify health problems and be informed of remedial measures.
- Know about safety and first aid.
- Acquire the skills for physical fitness.
- Practice yogasanas, meditation and relaxation.
- Understand various policies and programmes related to health, physical education and yoga.

Course Contents

Unit I: Concept of Health, Body, First Aid

- Concept of health, importance, dimensions and determinants of health, health needs of children and adolescents including differently abled children.
- Understanding of the body system – skeleton, muscular, respiratory circulatory and digestive in relation to health.
- Common health problems and diseases- causes, prevention and cure, immunization and first aid.

Unit II: Food - habits, hygiene, diseases and their prevention, Safety, security and physical fitness

- Food and nutrition, food habits, nutrients and their functions.

- Preservation of food value during cooking, indigenous and modern ways of preserving food.
- Practices related to food hygiene, malnutrition, obesity, food and waterborne and deficiency diseases and prevention.
- Safety and security – disasters in and outside schools, ways of prevention.
- Safety from snake and dog bites, animal attacks, prevention and treatment.
- Physical fitness, strength, endurance and flexibility, its components, sports skills and self- defence activities.

Unit III: Athletics and Games

- Athletics – general physical fitness exercises.
- Games – lead up games, relays and major games.
- Rhythmic activities, gymnastics and their impact on health.

Unit IV: Yoga, Policies and Programmes for Health

- Yogic practices – importance of yoga, yogasanas and pranayamas
- Role of institutions in developing healthy individuals- family, school and sports
- Health services, policies and health and physical education related programmes, blood banks and role of media

Modes of Learning Engagement:

- Interactive discussions, group work, sharing experiences, organizing activities, analyzing topics on health related issues.
- Demonstrations, observations, field visits, preparing work books, maintaining diary, participating in school health checkup, practical classes of first aid, projects and assignments.
- Playing games and sports and performing Asanas and Pranayamas

Practicum / Tutorials:

- Rules regulations related to games, sports and yoga.
- Playing Volleyball, Basketball, Badminton and recreation games.
- Performing Suryanamaskara and selected yogasanas, mudras and pranayamas.
- Standing Asanas- Konasana, Trikonasana, Vrikshasana, Veerebhadrasana
- Sitting Asanas – Vajrasana, Gumukhasana, Navasana, Veerasana
- Lying on the stomach – Bhujangasana, Dhanurasana
- Body twisting asanas – Ardha Matsyendrasana, Vakrasana
- Back bending – Ushtrasana
- Mudras – Arham, Ananda Mudra
- Pranayama – Anuloma viloma, Bhramari

Suggested Readings:

1. Pande, P. K. (1988). Sports Medicine. Delhi. Khel Sahitya Kendra.
2. Larry G. Shaver. (1982). Essentials of Exercise Physiology. Delhi. Surjeet Publications.
3. Kanabur, Vyjayanthi V. (2007). Sports Nutrition the Scientific Facts. New Delhi. Kanishka Publishers.

4. Dheer. S. Kamal Radhika (2002). Organization and Administration of Physical Education. Friends Publications.
5. Chandler Timothy, Mohin Mike, Vamphew Wary (2007). Sports and Physical Education. London. Routledge Taylor Francis Group.
6. Verma, Veena (1999) Sports Psychology. Delhi. Sports Publication.
7. Prakash, Agam (1999) A Textbook of Health Education. Delhi. Sports Publication.
8. Uppla AK. (1996). Physical Fitness. New Delhi. Friends Publication.
9. Thani Lokesh (2003) Rules of Games and Sports. New Delhi. Sports Publication.
10. Sonkar Sathish. (1998). Methods, Measurement and Evaluation in Physical Education. Jaipur, Book Enclave.
11. NCERT, Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
12. Seetharam AR (1996) Yoga for Healthy Living. Mysore. Paramahamsa Yogashrama.
13. Ganguly, S.K., Bera, T.K., Gharote, M.L.(2003) Yoga in relation to Health related physical fitness and academic achievement of school boys. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
14. Gharote, M.L. (1976). Physical Fitness in relation to the practice of selected yogic exercises. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
15. Kulkarni,D.D. (1997).Yoga and Neurophychology. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
16. **'kekZ] vk- ih-] ¼2004½- ^[ky dh enkuk dh eki ,oa fuekZ.k dh fof/k ubZ fnYyh- [ky lkfgR; dUnzA**
17. **lkljh tk ehu] lijk pk#] ¼2004½- ^[ky fpfdRlk Kku dk'k ubZ fnYyh- LikVZl ifCyd'kUlA**
18. **[kku] ,jt vgen] oekZ] mek'kdj ¼1988½- ^QVcky^ iVuk- Hkkjrh Hkou ifCy'kl ,aM fMLVªhC;wVlA**

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester III
EFWC 201: WORKING WITH COMMUNITY

Time: 2 weeks Max. Marks: 50

Credits- 2 External Assessment: 50

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Acquaint themselves with the factors working in the society/community i.e. knowledge of social realities.
- Develop the dignity of labour among them.
- Arouse their interest in the social and economic reconstruction oj the country.
- Make themselves aware of the educational problems and needs of thi society.
- Enable themselves for preparing youth for sustainable development.
- Develop their personality through community service.

Methodology: The students will spend 2 weeks at a stretch during the academic year in the identified village. Separate activities will be undertaken every year out of the following or given by the Institute.

Suggested Activities:

1. Shramdaan and beautification
2. Study of educational scenario of a community. Reporting the profile of each Institution/NGO/social organization, which is directly or indirectly concerned with educational /literacy programme.
3. Micro planning exercises for assessing the educational status of the community.
4. Organization of “Nukad Natak” “Cultural Programmes”, “Rallies” etc. for motivating the villagers for sending their wards to schools.
5. School mapping exercises for assessing the educational need of the community.
6. Study of enrolment, stagnation and dropout problems.
7. Exploring the community resources and finding means and ways of using them for betterment of school.
8. Adopting a community and implementation of the Lab Area Concept in adopted community.
9. Survey of nearby community (adopted community) and assessing its educational needs, social needs etc.
10. Conducting awareness programmes in the community- like Environment conservation, tree plantation, watershed management, health programmes like vaccination, polio drop etc. AIDS awareness, electoral awareness, load safety, human rights, women rights etc.
11. Organization of Literacy programmes in the community

12. Cleanliness drives in the community and awareness about their needs.
13. Character building programmes
14. Developing healthy food habits among the community
15. Conducting Vocational training programmes for self- employment.
16. Promoting peace oriented values in the community.
17. Remedial teaching work for poor and needy in the community.
18. Action Research regarding local problems in consultation with the community.
19. Promoting peace oriented values in the community.
20. Conducting Adult Education programmes
21. Assistance and working with local community in actual relief work whenever needed.
22. Training of community in First Aid.
23. Helping the children with special needs.
24. Conducting Vocational training programmes for self- employment.

Modes of Learner Engagement:

Proposed activities of the programme will be organized keeping in view the budgetary provision and the time of duration along with the required available facilities at the time of organization of the programme.

Modes of Internal Assessment:

Internal assessment of Punctuality, Regularity, Discipline, Cooperation and Performing Arts will be done through observation of the students and viva- voce will be conducted on their experiences and written report prepared by the student teachers.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-I-201: PHYSICS: RENEWABLE ENERGY SOURCES

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe about the exploration of renewable energy systems and their effective tapping technologies.
- Discuss the source of energy in various renewable energy systems.
- Estimate the amount of energy in different types of renewable energy systems.
- Explain the feasibility of different types of energy sources.
- Apply the concepts learnt in new types of renewable energy.

Course Contents

Unit I: Solar Energy

Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment. Various Methods of using solar energy–Photothermal, Photovoltaic, Photosynthesis, Present &Future Scope of Solar energy. Hybrid wind energy systems-wind & diesel power, wind+ conventional grid, wind & Photovoltaic system etc.

Unit II: Wind Energy

Wind Energy: Basics &Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of wind turbine blade ,various aspects of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V&F and variable V&F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.

Unit III: Geothermal, Tide and Wave Energy

Availability of Geothermal Energy – size and Distribution, Recovery of Geothermal Energy, Various Types of Systems to use Geothermal Energy, Direct heat applications, Power Generation using Geothermal Heat, Sustainability of Geothermal Source, Status of Geothermal Technology ,Economics of Geothermal Energy.

Unit IV: Hydrogen Energy and Nuclear Energy

HydrogenProduction: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production.

Hydrogen Energy: Hydrogen as a renewable energy source, Sources of Hydrogen, Fuel for Vehicles.

Nuclear Energy: Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies–Fuel enrichment, Different Types of NuclearReactors, Nuclear Waste Disposal and Nuclear Fusion.

Suggested Readings:

1. L L Freris, Wind energy Conversion Systems (PrenticeHall, 1990).
2. D A Spera, Wind Turbine Technology: Fundamental concepts of wind turbine technology(ASMEPress,NY,1994).
3. G L Johnson, Wind Energy Systems(PrenticeHall,1985).
4. J F Manwell, J GMcGowanandA LRogers, Wind Energy Explained(John Wiley & SonsLtd., 2010)
5. N K Bansal, et al., Renewable Sources of Energy and Conversion Systems (Tata McGraw-Hill, 1990)
6. Kreith and Kreider, Solar Energy Handbook (McGraw Hill, 1982)
7. M A Green, SolarCells,(Prentice Hall, 1981)
8. T Ohta, Solar Hydrogen Energy Systems (Pergamon Press, 1979)
9. D Methis, Hydrogen Technology for Energy(Knowledge Pubns, 2007)

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-II-201: PHYSICS: NANO SCIENCE

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Nano Science.
- Know about synthesis and characterization of nano materials.
- Understand various applications of nano science.
- Establish multi-disciplinary links.

Unit I: Overview

Size effects and crystals, nanoscopic scale and quantum confinement, one dimensional, two dimensional and three dimensional nanostructured materials, quantum Dots, types of nanostructure and properties of nanomaterials: shell structures, metal oxides, semiconductors, composites, mechanical, physical, chemical properties, carbon age, new form of carbon (CNT to Graphene), influence of nano over micro/macro,effects of nano scale dimensions on various properties – structural, thermal, chemical, magnetic, optical and electronic properties, effect of nano scale dimensions on mechanical properties - vibration, bending, fracture, emergence and challenges of nanoscienceand nanotechnology.

UnitII: Synthesis of Nano materials

Top-down and bottom-up approaches, Mechanical alloying and Ball milling, Plasma synthesis, Sol-Gel Synthesis, Inert gas Condensation, Electro deposition and other techniques,chemical vapour deposition, physical vapour deposition, Laser ablation, pulsed laser deposition.

Unit III: Characterization tools

X-ray powder diffraction, Single crystal diffraction techniques, Thermogravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry, Electron Energy Loss Spectroscopy, High Resolution Imaging Techniques- Scanning Electron

Microscopy, Atomic Force Microscopy and Transmission Electron Microscopy,Optical characterization techniques- Raman spectroscopy and Ultra Violet-Visible (UV-Vis) spectroscopy

Unit IV: Applications

Functional materials, Biomedical applications, Molecular Electronics and Nanoelectronics, Nano coating, Nanomaterials for renewable energy, Nanobots, Molecular electronics and Nanoelectronics, Environment related application, Membrane based application, Polymer based application.

Suggested Readings:

1. W R Fahrner,Nanotechnology and Nanoelectronics, (Springer (India) Private Ltd., 2011).
2. MMadou, Fundamentals of Microfabrication, (CRC Press, New York, 1997).
3. N Taniguchi, Nano Technology, (Oxford University Press, New York, 2004).
4. W Ahmed and MJ Jackson, Emerging Nanotechnologies for Manufacturing, (Elsevier Inc.,2014).
5. C P Poole, F J Owens, Introduction to Nanotechnology, (John Wiley and Sons, 2004).
6. CN R Rao and A K Sood, Graphene synthesis, properties and Phenomena (Wiley VCH, 2010).
7. A Krueger, Carbon Materials and Nanotechnology (Wiley-VCH, 2010).

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCCH-I-201: CHEMISTRY: GREEN CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Green Chemistry.
- Know about green synthesis.
- Understand various applications of green materials.
- Understand Future trends in Green Chemistry.

Unit I:

Green Chemistry: History, need, and goals. Green chemistry and Sustainability.Dimensions of sustainability, Limitations/Obstacles in pursuit of the goals of Green Chemistry.Opportunities for the next generation of materials designers to create a safer future.

Unit II:

Examples of green synthesis/reaction:

Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, Traditional processes and green ones), Synthesis of Ibuprofen, Adipic acid etc and selected examples from US Presidential, Green Chemistry Challenge Award Winners.Basic principles of Green Chemistry and their illustrations with examples.Prevention of waste/by-products.Maximum incorporation of the materials used in the process into the final product (Atom Economy): Green metrics, Prevention/Minimization of hazardous/toxic products.Designing safer chemicals - different basic approaches, Selection of appropriate auxiliary substances (solvents, separation agents etc.), Energy requirements for reactions—use of microwave, ultrasonic energy, Selection of starting materials—use of renewable starting materials. Avoidance of unnecessary derivatization—careful use of blocking/protection groups.Use of

catalytic reagents (wherever possible) in preference to stoichiometric reagents. Designing biodegradable products.Prevention of chemical accidents. Strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.Development of accurate and reliable sensors and monitors for real time in process monitoring.

Unit III:

Examples of green synthesis/reaction: Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, (Traditional processes and green ones) Synthesis of Ibuprofen, Adipic acid etc. and selected examples from US Presidential Green Chemistry Challenge Award Winners.

Unit IV:

Future trends in Green Chemistry: Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; Non-covalent derivatization. Biomass conversion, emission control. Bio catalysis.

Text Books and Reference Books:

1. Green Chemistry: Theory and Practice. P.T. Anastas and J.C. Warner.Oxford University Press.
2. Green Chemistry: Introductory Text. M. Lancaster Royal Society of Chemistry (London).
3. Introduction to Green Chemistry. M.A. Ryan and M.Tinnesand, American Chemical Society (Washington).
4. Real world cases in Green Chemistry, M.C. Cann and M.E. Connelly. American Chemical Society (Washington).
5. Real world cases in Green Chemistry (Vol. 2) M.C. Cann and T.P.Umile. American Chemical Society (Washington)

PRACTICUM/ PROJECT WORK:

Candidate will be given a topic of project at the beginning of Semester III. The candidate is expected to collect pertinent literature and make a presentation based on the literature and the proposed plan of work at the end of Semester III.

Assignments will also be given based on different aspects of green chemistry.

A committee of faculty members of chemistry section will evaluate the projects and assignment.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCZO-I-201: ZOOLOGY: BIODIVERSITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Biodiversity.
- Understand the faunal Biodiversity.
- Understand the Duties of the central and the State Government, Biodiversity management committees in conservation.

Course Contents

Unit I: Biodiversity General Account

1. Introduction to Biodiversity (Elements and concept of biodiversity).
2. Types of Biodiversity
3. Climatic Zones or zoogeographic zones of India
4. Indian Biodiversity, Vegetational Zones, Zones of Faunal distribution
5. Major Biodiversity areas of the world and India
6. Biodiversity Hot Spots
7. National Parks and Sanctuaries of Rajasthan and their biodiversity

Unit II: Faunal Biodiversity

1. Mammalian morphology, Adaptations in various groups of mammals.
2. Behavior and social organization in mammals; social and mating systems; territories; communication.
3. Bird's morphology, Adaptations in various groups of birds, morphological and physiological adaptations.
4. Bird migration, breeding behavior, parental care.
5. Biology of major Indian amphibians, fresh water and marine turtles, crocodilians, lizards and snakes.

6. Identification and study of venomous snakes, action of their venom and first aid for snake bites.

Unit III: Conservation Biology

1. Introduction to conservation biology, values of biodiversity and conservation ethics.
2. Patterns and process of biodiversity, losses and threats to biodiversity.
3. Significance of ecological restoration in conservation.
4. Duties of the central and the State Government, Biodiversity management committees.
5. Red Data Book and its significance. Role of NGOs in conservation, International NGOs; UNEP, GEF, WCS, Bird Life International, Important NGOs in India& their contributions WWF, ATREE, BNHS, WTI, Kalpavriksha etc.
6. Important NGO movements, Chipko movement, Narmada BachavoAandholan, PaniPanchayats, Seed Movement etc.
7. Wildlife Protection Act, Biodiversity Act, Forest Act and other Rules and Acts for Biodiversity protection and conservation.

Unit IV: Tools and Techniques

1. Counting Methods or Population assessment (Total Count, Road Side Count, Waterhole Count, Nest Count, Camera trap Methods, Pugmark Census, Call Census, Radio tagging, Line transect, Quadrate Method, Mark-Recapture)
2. Sampling techniques and strategies (random, stratified and systematic).
3. Concept of species richness, evenness and diversity and their measures, Diversity indices.
4. Basic introduction of GPS and GIS

Suggested Readings:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Coexistence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences
5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

Practicals:

- Identification of mammalian fauna, avian fauna, herpeto-fauna
- Identification of Venomous and Non venomous snakes
- Demonstration of basic equipment needed in biodiversity studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)

- Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
- Demonstration of different field techniques for flora and fauna
- Visits to nearby Zoo, Museum, Forest, sea-shore, Nursery, Aquaria or any other relevant site must be arranged. The report of these visits will be submitted as part of the Practical work.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCBO-I-201: BOTANY: BIODIVERSITY

Time: 3 Hours | Max. Marks: 80
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the plant biodiversity and its significance in human lives
- Understand the threats to plant biodiversity
- Understand about biodiversity conservation.

Course Contents

Unit I: Biodiversity

Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Uses of plants.

Unit II: Biodiversity Management

Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss.

Management of Plant Biodiversity**:** Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit III: Biodiversity Conservation

Conservation of Biodiversity- ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit IV: Importance of Forestry

Role of plants in relation to Human Welfare; Importance of forestry in relation to medicine, timber, gums and resins.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and
   Practices.Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Sharma P.D., 2010 Ecology and Environment. Rastogi Publications, Meerut

Practicals:

- Visit to nearby botanical gardens, biological park. The report of this needs to be submitted.
- Study of aquatic biodiversity by visit to some pond or lake.
- Study of aquatic biodiversity by making temporary micropreparations of the phytoplanktons, algae etc.
- Herbarium sheets preparation.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCMT-I-201: MATHEMATICS: DISCRETE MATHEMATICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: At the end of the course students will be able to:

(i) Understand the concepts of Set Relation and function
(ii) Understand the concept of Graphs and planar graphs apply these in problem solving.
(iii) Explain the concept of Boolean algebra and lattices.

Course Contents

Unit I:

Set Relation and function, binary relations, equivalence relations and partitions, partial order relation and lattices chains and anti chains, pigeon hole principle, principle of inclusion and exclusion.

Unit II:

Computability and formal languages ordered sets languages, phase structure grammars types of grammars and languages permutations, combinations' and discrete probability

Unit III:

Graphs and planar graphs; basic terminology, multigraphs, weighted graphs paths and circuits travelling sales person problem, plannar graphs, trees.

Unit IV:

Boolean algebra: lattices, algebraic structures, duality, distributive and complemented lattices, boolean lattices, and boolean algebras, boolean functions as expressions.

Suggested Readings:

1. Elements of Discrete mathematics: C.L. Liu, McGraw Hill, International editions, 2008.

2. Graph Theory: NarsinghDeo, Prentice Hall of India, 2004.
3. Discrete Mathematics: N.L. Biggs, Oxford Science Publication, 1985.
4. Discrete Mathematics and its Applications: Kenneth H. Rosen, McGraw Hill, 1999.
5. Discrete Mathematics with Applications: T. Koshy, Academic Press, 2005.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-I-201: EDUCATION: GUIDANCE & COUNSELLING IN SCHOOL

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Develop an understanding of the concepts of guidance and counselling.
- Develop an understanding of educational, vocational and personal guidance.
- Acquaint the students with the testing devices and techniques of guidance.
- Develop an understanding of collection and dissemination of occupational guidance.
- Sensitize student-teachers to the problems faced by students in the contemporary world.
- Create an awareness of the working of guidance centers.
- Provide guidance &counseling for school level students.

Course Contents

Unit I: Concept of Guidance and Counseling

- Meaning, Nature & Functions of Guidance.
- Principles of Guidance.
- Need of Guidance at various stages of life.
- Types of Guidance:
  (i) Educational Guidance – Meaning and need at Secondary level.
  (ii) Vocational Guidance – Meaning and need at Secondary level.
  (iii) Personal Guidance – Meaning and need at Secondary level.

Unit II: Concept of Guidance and Counseling

- Meaning, Nature and Functions of Counseling
- Theories of Counseling:
  - Theory of Self (Rogers)

  - Rational Emotive Behavioural Therapy (Albert Ellis).
- Types of Counseling: Directive, Non directive, Eclectic.
- Process of Counseling (Initial disclosure, in depth exploration and commitment to action).

Unit III: Testing and Non- testing devices for the study of an Individual

- Tests: Aptitude, Attitude, Interest, Achievement, personality, IQ and Emotional, Mental ability, Intelligence etc.
- Techniques used in guidance: Questionnaire, Interview schedule, Case study, Diary and Autobiography.
- Professional efficacy and interest.

Unit IV: Contemporary issues and Skills in Guidance & Counselling

- Dealing with depression and academic stress (with regard to their identification and intervention). Guidance Implication in (Current Indian scenario, Education and Guidance: Democracy and Guidance, Individual Differences and Guidance, planning of Guidance cell in school.
- Skills in Counseling (Listening, Questioning, Responding, Communicating.
- Role of Teacher as a counselor and professional ethics associated with it.
- Career Counseling and Dissemination of Occupational Information.

Practicum / Tutorials:

- Organize a workshop in school on guidance for secondary level students.
- Group discussion among pupil teachers on types of guidance.
- Pupil Teacher should guide at least one school student in any area of guidance and prepare a report to this effect.
- Organize an orientation program for student teacher on skills in counseling (listening, questioning, communicating etc.)
- Organize a Counseling program for the student who is guided by teacher student in the area/type of Guidance.Student teacher would practice on Counseling skill (at least three Time duration with 5-7 Minute per skill)
- Apply “Professional Interest test” on secondary student on the basis of interprelation, and give professional guidance to the students.
- Prepare a case study of one student with special needs at school level and give suggestions for remedial measure, too.
- Make a flow chart on Job Analyze opportunities and present it in school among secondary students.
- Organize a programme on occupational detail Information (like area, agencies and future etc.) for school level
- Prepare a plan and establish a guidance and Counseling cell in school.
- Make a stress releasing strategy for school students and find out its effectiveness.

Suggested Readings:

1. Sharma, Shati Prabha. Career Guidance and Counselling: principles and techniques. Kanihka publisher. 2005

2. Sharma, RN & Sharma, Rachana. Guidance and Counselling in India. Atlantic Pub. & Distributors, New Delhi, 2004
3. Singh, Y.K. Guidance and Career Counselling. APH Publishing New Delhi. 2007
4. Nayak, AK. Guidance & Career Counselling. APH Publishing corp. 2007
4. Abraham, Jessy. Guidance & Counselling for Teacher Education. Sarup & sons. New Delhi. 2003
5. **vLFkkuk] fofiu] ijke'k ,o funsZ'ku- vxzoky izdk'ku] 2014**
6. **vLFkkuk] fofiu ,oa vLFkkuk fuf/k funsZ'ku vkj mi;ksx] vxzoky izdk'ku] 2013&14**
7. **HkVukxj] lqjs'k ,oa oek] jkeiky- ofrd lqpuk ,oa ofrd funsZ'ku] vxzoky izdk'ku 2012**
8. **t;ksfr] lhrkjke f'k{kk esa funsZ'ku ,oa ijke'k vxzoky izdk'ku 2014**
9. **mik/;k;] jke oYyHk ,oa t;ksfr]lhrkjke f'k{kk esa funsZ'ku ,oa ijke'k dh Hkwfedk vxzoky izdk'ku 2014**

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-II-201: EDUCATION: PEACE ORIENTED VALUE EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhha and logic.
- Understand the co-ordination with Indian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute values in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that make them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

Course Contents

Unit I: Understanding Education for Peace

- Meaning, aims, objectives of Peace and Peace Education.
- Need and Importance of Peace Education.
- Barriers: Psychological, Cultural, Political.
- Peace promoting values: compassion, cooperation and love.

- Empowerment of self through critical self- reflection.
- Reducing prejudices and nurturing ethical behaviour.

Unit II: Nature andsources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

Unit III: Values in religious scriptures

- Bhagwadgita- Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastya and Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran – Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

Unit IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacher as teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty towards self and society

Practicum / Tutorials:

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a school from the point of view of value education.
- Analysis of a text book of a school subject from the point of view of values hidden.
- Practice of role- play in two situations and preparation of report.
- Report on value conflict resolution in a situation.

Suggested Readings:

1. **voLFkh 'kf'k & ikphu Hkkjrh; lekt] fgUnh ek/;e dk;kZo;u fun'kZky;] fnYyh fo'ofo/kky;] fnYyh 1993**
2. **mo'kh] ljrh & ufrd f'k{kk ,oa ckyfodkl] iHkkr idk'ku] pkoMh ckt kj] fnYyh] 1979**
3. **dk.k ih-ch- & /ke'kkL=h dk bfrgkl] m-i- fgUnh lLFkku] fgUnh Hkou] egkRek xk/kh ekx] y[kuÅA**

4. **xqIrk uRFkwyky & ewY;ijd f'k{kk i)fr] t;d".k vxzoky] egkRek xka/kh ekxZ] vtesj 1989**
5. **xks;udk t;n;ky & egRoiw.kZ f'k{kk] xhrkizsl xksjs [kiqjA**
6. **ik.Ms; xksfoUnpUn & ewY; ehekalk & jktLFkku fgUnh xzUFk vdkneh] fryd uxj] t;iqj] 1973A**
7. **iz lgl c)s % thou ewY;] lq:fp lkfgR;] ds'kodqt] >.Ms okyku] ubZ fnYyh]**
8. **Hkkjrh /kekZohj & ekuo ewY; vkSj vkSj lkfgR;] Hkkjrh; KkuihB] dk'kh] 1972**
9. **ekuo lsok l?k] ofnkou & ekuork ds ewy fl)kUr 1981**
10. **feJ fo/kkfuokl & v/;kiu] Hkkjrh; nf"V] ,ulhVhbZ] ubZ fnYyh 1988**
11. **foey dqekj & ewY; ehekalk] jktdey izdk'ku] fnYyh**
12. Acharya Mahaprija : Towards Inner Harmony, New Delhi, B. Jain Publishers, 1999
13. Dutt, N.K. and Ruhela S.P. : Human Values and Education, Sterling Publishers Pvt. Ltd., New Delhi, 198
14. Gandhi K.L. : Value Education, Gyan Publishing House, New Delhi, 1993
15. Gupta, Nathu Lal : Value Education : Theory and Practice : Jaikrishan Agarwal,Mahatma Gandhi Road, Ajmer – 2000
16. I.A. Lolla : Value Certification : An advanced Handbook for trainers and Teachers, Calif, University Associate Press, Krischan Boum, Howard 1977
17. Prem Kripal : Value in Education, NCERT, New Delhi 1981
18. Rajput, J.S. (2001). Values in Education, New Delhi, Sterling Publishers, 2005
19. Rokeach M. : The Nature of Human Values, The Free Press , New York 1973
20. Sharma R.S. : The Monk who sold his Ferrari, Mumbai, Jaico Publishing House, 2003
21. Swami Ragunath Anand: Eternal Values for a Changing Society, BVB Bombay 1971.
22. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
25. Sheshadri, C., Khadere, M. A., & Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
28. Khan, Intakhab Alam (2007). Peace, Philosophy and Islam, Academic Excellence. Delhi- 31.

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCLH-201: LANGUAGE: jpukRed ys[ku ,ao vuqokn

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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  - **vuqokn dk vFkZ] Lo:lk vkSj egRo**
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  - **vuqokn ds rRo & lkfgR; Hkk"kk] y{; Hkk"kk] lai"k.k dk'kxr vFkZ] vuqokn lkexzh HkkokFkZ**
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- **vuqokn izfØ;k % vk;ke ,oa izeq[k i{k**
- **vuqokn izfØ;k ds fofHkUu pj.k** | **izeq[k i{k**

jpuk dk p;u	**¼v½ jpukdkj**
iBu	**¼c½ vuqokndrkZ**
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- **vuqokn ,oa jpukRed ys[ku % lE;d eqY;kadu**
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1. **vuqokn foKku &fl)kar vkSj vuqiz;ksx fgUnh ek/;e dk;kZUo;u funs'kky;**
2. **Hkkjrh; Hkk"kk,¡ ,oa fgUnh vuqokn % leL;k lek/kku Mk- dSyk'kpan HkkfV;k ¼xxy iLrd½**
3. **jpukRed ys[ku & lEiknd izks jes'k xkSre Hkkjrh; KkuihB fnYyh**
4. **vuqokn % vo/kkj.kk ,oa vuqiz;ksx l- Mk- pUnzHkkuq jkor u'kuy ifCyf'kax gkml] fnYyh**

CBCLE-201: LANGUAGE: LANGUAGE LITERATURE & EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint themselves with literary creations in other Indian language.
- Appreciate literary pieces from other languages of India.
- Understand the literary and cultural ethos of the country.

Unit I: Language, Society & Culture

- Language and Society
- Language and Culture
- Language and Identity
- Language and Gender

Unit II: Literature, Society & Culture

- Concept and Scope of Literature
- Literature and Society
- Importance of Literature for Society
- Impact of Literature on Society and Vice Versa

Unit III: Language and Education

- Language for Education
- Role of Language in Education
- Relationship between Language and Education
- Impact of Language on Education

Unit IV: Literature and Education

- Literature for Education
- Role of Literature in Education
- Relationship between Literature and Education
- Impact of Literature on Education

Suggested Readings:

1. Hall, G. *Literature in Language Education*. London: Palgrave Macmillan. 2005.
2. Aldama, Frederick Luis. *Why the Humanities Matter: A Commonsense Approach.* Austin: University of Texas Press. 2008.

3. Yadav, Saryug. *Language, Literature and Education*. New Delhi: Academic Excellence. 2008.
4. Mishra, A. K. *Literature, Culture and Language Education*. New Delhi: Lakshi Publishers. 2012.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCGE-201: GEOGRAPHY: BASICS OF GEOGRAPHICAL INFORMATION SYSTEM-GIS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- To introduce elementary concepts of GIS
- To explain main characteristics of geographical data
- To understand the application of GIS in solving problems of spatial nature.

Unit I:

Definition and components of GIS – hardware, software, data, people or 'liveware'; Structure of GIS

Unit II:

Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS;
Implications of earth's shape and datum in geo-referencing,

Unit III:

Digital representation of geographic data: Data structure, Spatial data model, Raster and Vector models;
GIS data standards: concepts and components; Digital Elevation Model (DEM).

Unit IV:

Recent trends in GIS; Mobile GIS; Global Position System; Integration of Remote sensing and GIS; GIS data base management systems; GIS information products; Applications of GIS.

Suggested Readings:

1. Burrough, P.A. and McDonnell, R. (1998): Principles of Geographic Information Systems. Oxford University Press, Oxford.

2. Chang, K.T. (2003): Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
3. Chauniyal, D. D. (2004): Remote Sensing and Geographic Information Systems, Sharda Pustak Bhawan, Allahabad. (in Hindi).
4. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
5. ESRI (1993): Understanding GIS. Redlands, USA
6. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
7. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
8. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
9. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
10. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.
11. Korte, G. M. (2002): The GIS Book. On Word Press: Thomson Learning, New York and Singapore.
12. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
13. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): Geographic Information Systems.
14. Principles, Techniques, Management, Applications. John Wiley and Sons, New York.
15. Martin, D. (1996): Geographic Information Systems: Socioeconomic Implications. Routledge, London.
16. Michael F. G. and Karan K. K. (ed.) (1990): Introduction to GIS. NCGIA, Santa Barbara, California.
17. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
18. ESRI (1993): Understanding GIS. Redlands, USA
19. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
20. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
21. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
22. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
23. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.

Practical: Basics of Geographical Information System

- Principles of GIS; Properties of EMR
- Geographical data: types and characteristics;
- Spherical and plane coordinate systems in GIS;
- Implications of earth's shape and datum in geo-referencing
- Preparation of choropleths maps

Practical Record File: Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination may carry:
  - Lab Work (Any 2 out of 3 exercise)
  - Record File
  - Viva

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCHS-201: HISTORY: HERITAGE & TOURISM

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- Understand the different facets of heritage, Tourism and their significance.
- Highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it.
- The implications of the rapidly changing interface between heritage and history will also be examined.
- The course will be strongly project- based on visits to Museum / Heritage Sites

Course Contents

Unit I:

- Heritage- Meaning and Significance,
- Types- Cultural Heritage, Natural Heritage, Living Heritage (Folk Art, Festivals, Living Styles etc.)
- Tangible and Intangible Heritage

Unit II:

- Heritage Organization / Structure: Forts, Palaces
- Museums, Natural Reserves.
- Role and Significance of Heritage in tourism, Heritage Tourism, Cultural Tourism and Eco Tourism

Unit III:

- Museum and the Cultural Heritage: India's Cultural Policy
- Policy of Government of Rajasthan
- General Principles and Societies role for maintenance of Rajasthan

Unit IV:

- World Heritage sites of India with special reference to Rajasthan
- Role of UNESCO in Heritage
- Guidelines of UNESCO

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials. Visit to Tourist site and Preparation of report (Practical).

Suggested Readings:

- **x<ohj- ekFkqj- i;Vu% n'kkofn'kk – fyVjsjh lfdy- t ;iqj**
- **lgk;] f'koLo:i- i;Vu fl/kkUr vkj çc/ku rFkk Hkkjr e i;Vu- ekrh yky cukjlh nkl**
- **lgk;] f'ko Lo:i- i;Vdk dk n'k Hkkjr- ekrh yky cukjlh nkl**
- Roy Chowdhury, Maduparna. Diplaying India's Heritage. Orient Blackswan
- David Lowenthal. The past :The Heritage Crusade and the Spoils of History.Cambridge,2010
- Layton R.P. Stone and J. Thomas. Destruction and conservation of cultural property, London :Rutledge,2001
- Lahiri N. Marshaling .The Past –Ancient India its Modern Histories, Ranikhet: Permanent Black.2012, Chapter 4 and 5
- S S Biswas. Protecting the cultural heritage (National Legislations and International Conventions). New Delhi : INTACH, 1999
- Agarwal O.P. Essentials of conservation and Museology, Delhi, 2006

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPS-201: POLITICAL SCIENCE: DEMOCRACY AT WORK

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – teacher will be able to:

- Acquire knowledge about the working of democracy in India.
- Understand the societal basis of democracy as providing opportunities to flourish diversity through civil liberties.
- Understand Democracy as Representative, Responsible and Participatory.
- Appreciate the Democratic process as not merely a rule of Majority but Tolerance to words dissent.
- Acquaint themselves with the dividends of Democracy in India.

Unit I:

Democratic society: Understanding of Diversities, Fundament Rights, Fundamental Duties, Mass Media, Political Parties, Pressure Groups.

Unit II:

Democratic Government: Universal Adult Franchise, Representation, Parliamentary Government, Federal system, Local government at Rural and Urban areas.

Unit III:

Democratic Process: Accommodation of Social, Economic and Cultural diversities, Rule of law, Independent Judiciary

Unit IV:

Redressal of Public Grievances, Right to Information, Right to Education, MGNREGA.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. D.D. Basu : An Introduction to the Constitution of India, New Delhi. Prentice Hall, 1994.
2. G. Austin : Working a Democratic Constitution the Indian Experience. Delhi, Oxford University Press, 2000.
3. R. C. Agarwal :Indian Government and Politics (India Political System) 5th ed. S.Chand and Co., New Delhi 2000
4. N.G. Jayal (ed.), Democracy in India, Delhi, Oxford University Press. 2001.
5. A.G.Noorani, Constitutional Questions in India : The President, Parliament and the States Delhi, Oxford University Press, 2000.
6. Payl, Flather : Recasting Indian Politics – Essays on a Working Democracy Palgsave 2002.
7. Niraja Gopal Jayal. Democratic Governance in India : Challenges of Poverty Development and identity. Sage Publications, New Delhi
8. S.N.Singh, Caste Tribe and Religion in Indian Politics, Sai, New Delhi, 2006
9. Mkl t;jke mik/;k; & Hkkjr dk lafo/kku] lUV'y yk ,tU lh] byxkckn] 2007
10. ch- ,y- QMh;k & Hkkjrh; 'kklu ,oa jktuhfr] lkfgR; Hkou ifCyd'kul] vkxjk] 2007
11. Mkl , ih voLFkh & Hkkjrh; 'kklu o jktuhfr] y{eh ukjk;.k vxoky] vkxjk 2006
12. ,l ,e lbn & Hkkjrh; jktuhfrd 0;oLFkk] lyHk idk'ku]y[kuÅ 2004

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCEC-201: ECONOMICS: RECENT TRENDS & PRACTICES IN ECONOMICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:
The objective of this course is the make the students aware of the fundamentals of economics and also the contemporary issues

Unit I: Educational Economics

- Review of Economic Principles
- Human Capital Theory
- Job Signalling
- Educational Production Functions
- The Market for Teachers
- Teacher Incentives
- Market Dimensions of Higher Education
- Student Aid Policy and Collegiate Outcomes
- Financial Issues in Higher Education

Unit II: Social Economics

- Discrimination, the market, statistical discrimination, minimum wage, gender
- Discrimination, exclusion
- Income inequality and poverty, causes of income inequality and poverty (inflation)
- Income distribution over time, the official poverty rate
- Unemployment, measurement, types and cost of unemployment, interpreting theunemployment rate, social security

Unit III: Entrepreneurship and development

- The critical roles played entrepreneurship in Innovation systems.
- The differences between industrial and agricultural start-ups?

- Role of government in fostering entrepreneurship

Unit IV: Technology and globalization

- The importance of foreign technology in national innovation systems.
- Role played by global value chains play in evolution of innovation systems.
- Contribution of Policy approaches by emerging economies to tap into global value chains.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*:

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. Cohn and Geske, The Economics of Education, Chapter 1.
2. Hirshleifer, Jack (1985). The Expanding Domain of Economics. The American Economic Review, 75(6): 53-68. http://catalog.flatworldknowledge.com/catalog/editions/rittenberg-principles-ofmicroeconomics-1-0
3. Cohn and Geske, The Economics of Education, Chapter 2-4.
4. Ashenfelter, O. and Krueger, A. (1994). Estimates of the Economic Return to Schooling From A New Sample of Twins. American Economic Review, 84(5): 1157-1173.
5. Acemoglu, D., Introduction to Modern Economic Growth, Princeton University Press, 2009
6. Spence, M. (1973). Job Market Signalling. Quarterly Journal of Economics, 87(3): 355-374.
7. Cohn and Geske, The Economics of Education, Chapter 9.
8. Bound, J., Hershbein, B., and Long, B. (2009). Playing the Admissions Game: Student Reactions to Increasing College Competition. Journal of Economic Perspectives, 23(4): 119-146.
9. Deming, D., Goldin C., and Katz, L. (2012). The For-Profit Postsecondary School Sector:Nimble Critters or Agile Predators? Journal of Economic Perspectives, 26(1): 139-164.
10. Avery, C. and Turner, S. (2012) "Student loans: Do College Students Borrow too Much - or Not Enough?" Journal of Economic Perspectives, 26(1): 165-192.
11. Cohn and Geske, The Economics of Education, Chapter 12.
12. Heller, D. (1997). Student Price Response in Higher Education: An Update to Leslie andBrinkman. Journal of Higher Education, 68(6): 624-659.
13. Fu, X., Pietrobelli, C. and Soete, L. 2011. "The Role of Foreign Technology and Indigenous Innovation in the Emerging Economies: Technological Change and Catching-up," World Development, Vol. 39 No. 7, pp. 1204-1212, http://www.sciencedirect.com.ezp-prod1.hul.harvard.edu/science/article/pii/S0305750X11000647

14. Pietrobelli, C. and Rabellotti, R. 2011. “Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?” World Development, Vol. 39, No. 7, pp. 1261-1269.
15. Mazzoleni, R. 2008. “Catching Up and Academic Institutions: A Comparative Study of Past National Experiences,” Journal of Development Studies, Vol. 44, No. 5, pp. 678-700.
16. Mok, K.H. 2012. “The Quest for Innovation and Entrepreneurship: The Changing Role of University in East Asia,” Globalisation, Societies & Education, Vol. 10, Vo. 3, pp. 317-335.
17. Borros, M. 1997. Technology policy and Economic Growth. [Online]. Available at: http://brie.berkeley.edu/publications/WP%2097.pdf
18. Mokyr, J. 2005. Long term Economic Growth and the History of Technology. [Online]. Departments of Economic and History, Northwestern University. Available at: http://faculty.wcas.northwestern.edu/~jmokyr/ AGHION1017new.pdf
19. Cortright, J. 2001. New growth theory: technology and learning. [Online]. Reviews of economic development literature and practice. No. 4. Available at: http://www.eda.gov/ImageCache/EDAPublic/ documents/pdfdocs/ 1g3lr_5f7_5fcortright_2epdf/ v1/1g3lr_5f7_5fcortright.pdf

Group B: Generic Course (GC)

GCIR 202: Indian Constitution and Human Rights

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of this course, the student teacher will be able to

- Know the importance, preamble and salient features of Indian Constitution
- Appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.
- Develop an understanding of the strength of the Union Government.
- Understand the functioning of the State Government for the unity and the strength of the Democracy.
- Know the importance of local self-Government and Panchayati Raj Institutions in India.
- Know the meaning, significance, the growing advocacy of Human Rights.

Course Contents

Unit I: Meaning and Importance of the Constitution

Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

Unit II: Fundamental Rights, Duties and Directive Principles

Fundamental Rights, Fundamental Duties, and the Directive Principles of the state policy of the Indian Constitution.

Unit III: Union, State and Local Self Governments

Union Government: Parliament, the President and Prime Minister: State Government: Governor and the Council of Minister: Judiciary: Functions and Powers: Panchayat Raj System.

Unit IV: Human Rights

Origin and Development of Human Rights, Growing Advocacy and Declining Trends of Human Rights, Rights of Scheduled Casts, Scheduled Tribes, Minorities, Children and Women, Human Rights Defenders, Human Rights Violation and Human Rights Organizations.

Suggested Readings:

1. M.V.Pylee, Indian Constitution, OUP, New Delhi

2. Granveille Austin, Indian Constitution, OUP, New Delhi
3. RajaniKotari, Politics in India, OUP, New Delhi
4. Johari, J C, Indian Government and Politics.
5. S R Maheswari, Local Governments in India (Latest Edition)
6. R K Arora and RajaniGoyal, Indian Public Aministration 1995.
7. C P Bhambri, Introduction to Indian Constitution.
8. Subash C Kashyap, The Working of Indian Constitution, NBT, New Delhi
9. Subash C Kashyap,Our Parliament, NBT, New Delhi
10. Granveille Austin, Functioning of the Indian Constitution, NBT, New Delhi.
11. Bipan Chandra, India after Independence. Roopa, New Delhi 2000.
12. Arjun Dev, Source Book on Human Rights, NCERT, New Delhi.
13. Human Rights in India: Theory and Practice, National Book Trust, 2001.

ENG 202 :English Prose and Fiction

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Develop their comprehension skills through reading various types of prose.
- Develop their reading habits and literary taste through some long specimens ofprose.

Unit	Content	
Unit I	➢ Francis Bacon	: Of studies
	➢ A.G. Gardiner	: On Saying Please
	➢ E.M. Forster	: Does Culture Matter?
	➢ Katherine Mansfield	: A Cup of Tea
	➢ William S. Maugham	: Mr. Know-All
	➢ Nadine Gordimer	: Once Upon a Time
Unit II	➢ Emily Bronte	: Wuthering Heights
Unit III	Thomas Hardy	: The Mayor of Casterbridge

Unit IV	a. Atmosphere, plot, characters, irony, point of view, setting, novella b. Picaresque novel, gothic novel, domestic novel, historic novel, science fiction, autobiographical, doctrinal novel, stream of consciousness novel, trends in contemporary English novel
Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.	

Suggested

Readings Unit I

- Sinha, Sushant. K. *English Essayists.* OUP.1978.
- Ward, A.C. *Twentieth Century Prose (1940-1960).* Longman. 1962.

Unit II

- Thakur, D. *Selected Short Stories*. Macmillan. 2008.
- Camus, Albert. *Exile and the Kingdom.* Vintage International. 2007. Pp. 67-86.

Unit III

- Sinha, A. K. *A Students' Companion to English Fiction.* Bharati Bhawan (P&D). 2017.
- Peck, John. *How to Study a Novel*. Palgrave Macmillan. 1995.
- Forster, E.M. *Aspects of the Novel*. Harvest Book. 1955.
- Bronte, Emily. *Wuthering Heights.* New Delhi: Penguin. 2015.

Unit IV

- Hardy, Thomas. *The Mayor of Casterbridge.* New Delhi: Penguin Books Ltd. 2012.
- Kramer, Dale. *The Cambridge Companion to Thomas Hardy*. Cambridge: CUP. 2006.
- *Williams, R. The English Novel from Dickens to Lawrence. The Hogarth Press 1987.*

Group C: Core Courses

HIN 202:निबंध, नाटक एवं एकांकी

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

उद्देश्य–

1. विद्यार्थी निबंधों के विविध प्रकारों को तथा उनकी विषेषताओं को समझ सकें और उनकी साहित्यिक समीक्षा कर सकें।
2. नाटक और एकांकी के तत्वों से परिचय प्राप्त कर उन तत्वों के आधार पर नाटक और एकांकी की समीक्षा कर सकें, साथ ही नाटक व एकांकी का अंतर भी समझ सकें।
3. दलित साहित्य एवं सभी विमर्श की अवधारणा से परिचित हो सकें।

इकाई 1

निबंध

1. साहित्य जन समूह के हृदय का विकास है – बालकृष्ण भट्ट
2. तुलसी के सामाजिक मूल्य – डॉ. रामविलास शर्मा
3. भारत एक है – रामधारी सिंह दिनकर
4. राष्ट्र का स्वरूप – वासुदेवशरण अग्रवाल
5. मानस की धर्म भूमि – रामचंद्र शुक्ल

इकाई 2

एकांकी–

1. नया पुराना – उपेन्द्रनाथ अष्क
2. दीपदान – रामकुमार वर्मा
3. भोर का तारा – जगदीष चंद्र माथुर
4. ईद और होली – सेठ गोविन्द दास

इकाई–3

नाटक–ध्रुवस्वामिनी

इकाई – 4

दलित साहित्य की अवधारणा, स्त्री विमर्श की अवधारणा, हिंदी साहित्य में इनका महत्व एवं योगदान।

संदर्भ ग्रंथ

1. एकांकी संग्रह – सं. डॉ. हेतु भारद्वाज
2. निबंध संग्रह सं. डॉ. हेतु भारद्वाज
3. ध्रुवस्वामिनी – जयशंकर प्रसाद
4. दलित साहित्य का सौंदर्यशास्त्र–– ओम प्रकाश वाल्मीकि
5. हिंदी निबंध का विकास – डॉ. ओंकार नाथ शर्मा अनुसंधान प्रकाशन कानपुर
6. हिंदी निबंध का इतिहास – ब्रहमदत्त शर्मा
7. प्रसाद के नाटकों का शास्त्रीय अध्ययन – डॉ0 जगन्नाथ प्रसाद शर्मा

GEO-202: Climatology and Hydrology

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Course Contents

Unit I

Atmosphere: composition and structure; Insolation and global energy budget; Distribution of atmospheric pressure; Winds - planetary, periodic and local.

Unit II

Atmospheric moisture – humidity, evaporation, condensation, precipitation; Hydrological cycle; Air mass and fronts - concepts, classification and properties; Cyclones - tropical and temperate

Unit III

Classification of climate (Koeppen and Thorntwaite); Atmospheric pollution; Climate change; Impact of climate change; Urban heat islands**.**

Unit IV

Surface configuration of ocean floor – continental self, continental slope, continental rise, abyssal plain, mid-oceanic ridge and oceanic trenches; Properties of oceanic waters- temperature, salinity; ocean currents and tides

Reading List

1- Anthes R. A., Panofsky H. A., Cahir J. J. and Rango A., 1978: *The Atmosphere*, Columbus.
2- Barry R. G. and Carleton A. M., 2001: *Synoptic and Dynamic Climatology*, Routledge, UK
3- Barry R. G. and Corley R. J., 1998: *Atmosphere, Weather and Climate*, Routledge, New York.
4- Batten L. J., 1979: *Fundamentals of Meteorology*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
5- Boucher K., 1975: *Global Climates*, Halstead Press, New York.
6- Critchfield H. J., 1987: *General Climatology*, Prentice-Hall of India, New Delhi
7- Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: *The Atmosphere: An Introduction to Meteorology*, Prentice-Hall, Englewood Cliffs, New Jersey.
8- Oliver J. E. and Hidore J. J., 2002: *Climatology: An Atmospheric Science*, Pearson Education, New Delhi.
9- Thompson D. R. and Perry A. (eds.), 1997: *Applied Climatology: Principles and Practice*, Routledge, USA and Canada.
10- Trewartha G. T. and Horne L. H., 1980: *An Introduction to Climate*, McGraw-Hill.
11- Gupta L S(2000): Jalvayu Vigyan, Hindi Madhyam Karyanvay Nidishalya, Delhi Vishwa Vidhyalaya, Delhi
12- Lal, D S (2006): *Jalvayu Vigyan*, Prayag Pustak Bhavan, Allahabad
13- Vatal, M (1986): *Bhautik Bhugol*, Central Book Depot, Allahabad
14- Singh, S (2009): *Jalvayu Vigyan*, Prayag Pustak Bhawan, Allahabad

GEO 202: PRACTICALS

Weather Maps

Total Credit: 1 ***Contact hours: 2 per week***

Elements of weather, Different instruments of recording weather data

Interpretation of weather maps

Preparation of rainfall dispersion diagram

Practical Record: Students will be required to prepare a practical file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 20 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 3 out of 4 exercise) 10 Marks
  - Record File 05 Marks
  - Viva 05 Marks

Reading List

1- Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.

2- Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi. 3- Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.

4- Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.

5- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers. 6- Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot, Allahabad

7- Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher.

HIS 202 History of Medieval India (1200 A.D. to 1707 A.D.)

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- To enlighten the students about the rich literary and archaeological heritage twelfth century onwards.
- To provide the knowledge about the Rajputs of north India and their achievements.
- This Semester will highlight the South Indian history and its contact with rest of India.
- To give the knowledge of Turkish conquests and Khilji administrative and economic reforms.
- The Semester will show how the Tughlaq rulers contributed to the state and society in India.
- This Semester will highlight the rise of regional powers in India in the 16th century.

Unit	Contents
Unit I	➢ Survey of the sources of Medieval Indian History ➢ Turkish Invasions and early Rajput resistance. ➢ Establishment of Delhi Sultanate (1206-1290) Qutb-ud-din Aibak, Iltutmish, Razia Sultana, Ghiasuddin Balban ➢ Economic Policy,Conflicts with Rajput powers: Ranthambhor, Chittor, Jalore with special reference to Alauddin Khilji.
Unit II	➢ Mohammad Bin Tughlaq – his plannings and failures ➢ Firoz Tughlaq – agrarian reforms and public welfare. ➢ Lodis and Saiyyads: Afgan Polity ➢ Expansion, Society and economy under Vijayanagar and Bahamani empires.
Unit III	➢ The problem of North Western frontier. The Mangol invasions and their impact. ➢ Administrative institutions of the Sultanate period, theory of kingship and land revenue system. ➢ Rise of Provincial Kingdom- Malwa, Gujrat, Bangal, Jaunpur and Mewar ➢ Decline of the Delhi sultanate
Unit IV	➢ Advent of Babar and the foundation of the Mughal Empire: Shershah Sur- Career and his Achievements ➢ Akbar - Conquests and his relations with Maharana Pratap Administration, Religious Policy, Aurangzeb: Deccan Policy, Decline of Mughal Empire - Causes and Impact ➢ Shivaji-- Conquests, Administration ➢ Society and Economy under the Mughals
Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials. Students may be given to prepare the Models the Battle fields of Tarian, Khanwa and Haldighati.	

Suggested Readings:

- Eraly, Abraham. *The Mughal World*. Penguin India. 2005.
- Eraly ,Abraham, *Last Spring The Lives and Times of Great Mughals*, Penguin India
- Rizvi ,S.A.A.,*The Wonder That was India Volume II*, Picador India

- Basham, Arthur Llewellyn. *The Wonder That Was India: A Survey of the Culture of the Indian Sub-Continent before the Coming of the Muslims.* New York: Grove, 1959
- Mehta , J.L. *Advanced Study in the History of Medieval India (3 Vol.)*
- Moreland, W. H.. *Agrarian System of Muslim India*, Orient Books , Delhi. 1997
- Habib, Irfan . (*Ed). Medieval - 1 (1200- 1750)* . Oxford University Press. 1997
- Morland , W.H. *From Akbar to Aurangzeb*
- John F Richards. *New Cambridge History of India - The Mughals*. McMilan . Delhi.2000
- Harmann, Kulke. *The State in India (1000-1700 AD*) . OUP. Delhi

POL 202: INDIAN POLITICALSYSTEM

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Acquire knowledge about the historical background of constitutional development in India.
- Understand the contribution of different streams of national movement in India.
- Acquaint themselves with salient features of the Indian Constitution.
- Appreciate philosophical postulates of the constitution on the basis of Preamble, Fundamental Rights and Duties and Directive Principles of state policy.
- Understand the composition, functioning, role and position of Parliament in India.
- Understand the pattern of relationship between the Executive and Legislature in India and also the composition, functions and role of the Executive.
- Acquaint themselves with the judicial system of the country and also the nature of the judicial review and its recent trends such as judicial activism.
- Acquire knowledge regarding the federal system of the country and governance at the state level.

Unit	Course Contents
Unit I	National Movement – Its strategy and evolution- Moderate, Extremist , Revolutionary and Gandhian streams. Major landmarks in the constitutional history of India with special reference to India Council Act 1909, Govt. of India Act 1919 , Govt. of India Act 1935, The Constituent Assembly .
Unit II	Preamble, Fundamental rights and Fundamental Duties. Directive Principles of state policy. Union Executive : The President, PrimeMinister and Council of Ministers.
Unit III	Parliament; Composition, power, position, working and pattern of relationship between the two Houses (Lok Sabha & Rajya Sabha), Supreme Court: Composition, functions, Judicial Review and Judicial Activism, Amenability of the Constitution
Unit IV	Federal system of India. Union-state relations, Powers and Role of Governor, Rural and urban local self government as third tier of Federalism. Issues of Electoral Reforms. Political parties ,pressure groups, Regionalism, Gender issues, Poverty and Caste.
Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.	

Suggested Readings

1. D.D. Basu : An Introduction to the Constitution of India, New Delhi. Prentice Hall, 1994.
2. G. Austin : Working a Democratic Constitution the Indian Experience. Delhi, Oxford University Press, 2000.
3. R. C. Agarwal : Indian Government and Politics (India Political System) 5th ed. S.Chand and Co., New Delhi 2000
4. N.G. Jayal (ed.), Democracy in India, Delhi, Oxford University Press. 2001.
5. A.G.Noorani, Constitutional Questions in India : The President, Parliament and the States Delhi, Oxford University Press, 2000.
6. Payl, Flather : Recasting Indian Politics – Essays on a Working Democracy Palgsave 2002.
7. Niraja Gopal Jayal. Democratic Governance in India : Challenges of Poverty Development and identity. Sage Publications, New Delhi
8. S.N.Singh, Caste Tribe and Religion in Indian Politics, Sai, New Delhi, 2006

ECO 202 :STATISTICAL METHODS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- To understand importance and limitation of statistical methods in Economic Analysis.
- To understand sources of data and technique of data collection, classification, organization, tabulation, presentation and interpretation.
- To analyse data by using various statistical methods like measure of central tendencies, dispersion, correlation, regression, index number, probability, theoretical distribution.
- To analyse the time series data and cross section data.

UNIT-I : Meaning, Nature and Scope of Statistics

- Definition of statistics importance and limitation, use of statistics;
- Basic concepts- Sample, Sample Vs Population,
- Methods of Sampling,
- Sampling & Non Sampling error,
- Sources of data,
- Tool & Techniques of data collection;
- Method of data collection- Organization of Data through classification & tabulation of data; Diagrammatical and graphical representation of data.

UNIT-II: Measurement of Central Tendencies and Dispersion and Correlation and Regression Analysis

- Meaning, objective and prerequisite of central tendencies; Measurement of central tendencies- Mean (Arithmetic, Geometric and harmonic mean), Median, Mode.
- Meaning, purpose and pre-requisite of dispersion; Measurement of dispersion (Absolute and relative) - range, quartile deviation, mean deviation, standard deviation, coefficient of variation.
- Bi-variate distribution,
- Karl Pearson's simple co-efficient of correlation,
- Spearmen's rank-correlation co-efficient, properties of correlation analysis;
- Relationship between the correlation and regression analysis;
- Linear regression analysis, Regression equation, least square method- properties of regression coefficient.

: Probability Distribution and Theory of Estimation
Index Number and Time Series Analysis

UNIT-III

- Definition, importance and concept of Probability;
- Rule of Probability- law of addition and multiplication; conditional probability;
- Mathematical expectation; Properties of Binomial, Poisson and Normal distributions;
- Concept of Estimation, Desirable properties of estimator;
- Formulation of statistical hypothesis- Null and alternative;
- Goodness of fit;
- Confidence interval and level of significance;
- Testing of Hypothesis- Z-test, t-test, F-test, chi-square test, use and limitation.

Unit IV :

- Concept and limitation of Index Number;
- Methods of constructing Index numbers- simple and weighted;
- Laspayer's and Fisher's Index numbers;
- Uses and problems in construction of index number.
- Utility of Time Series Analysis, Components of Time Series
  - Seialar Trend - Seasonal Variation
  - Cyclic variation - Irregular variation

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

- Allen, R.G.D., Methematical Analysis for Econimists, Macmillan Press, London.
- Gupta, S.C & Kapoor, V.K. (2000), Fundamental of Applied Statistics, Sultan Chand publisher, New Delhi.
- Gupta, S.C., Fundamentals of Statistics, Himalaya Publishing House.
- Gupta, S.P., Statistical Methods, Sultan Chand Publisher
- Patri Digambar & Patri D.N. (2012) Quantitative Methods for Economic Analysis

Group E: Professional Education Courses (PEC)

I: Perspectives in Education (PE) PEIS 202: Inclusive Schooling

Time: 3 Hours Max. Marks: 100 Credits- 4

Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives of the Course: On completion of the course, the Candidate will be able to:

- Demonstrate knowledge on different perspectives in the area of education of children with disabilities;
- Reformulate attitudes towards children with special needs;
- Identify needs of children with diversities;
- Plan need-based programmes for all children with varied abilities in the classroom;
- Use human and material resources in the classroom;
- Use specific strategies involving skills in teaching special needs children in inclusive school;
- Plan and execute appropriate learner-friendly evaluation procedures;
- Incorporate innovative practices to respond to education of children with special needs;
- Contribute to the formulation of policy; and
- Implement laws pertaining to education of children with special needs.

Course Contents

UNIT I: Paradigms in Education of Children with Special Needs

- Historical perspectives and contemporary trends.
- Defining Special Needs: ways of looking of Educational Difficulties -individual deficit view vs. curriculum view.
- Approaches of viewing disabilities: The charity model, the bio-centric model, the functional model and the human rights model.
- Concept of special education, integrated education and inclusive education.

Unit II: Legal and Policy Perspectives

- Recommendations of the Salamanca Statement and Framework of Action, 1994, Educational Provisions in the UNCRPD, 2006.
- Constitutional Provisions; Persons with Disabilities Act, 1995, (PWD Act); Rehabilitation Council of India Act, 1992, National Trust Act 1999 and RTE Act, 2009, Rights of Persons with Disability Act 2016, National Institutes.

- National Policy - Education of Students with Disabilities in the National Policy on Education, 1986, POA 1992.
- Integrated Education for PWD, Children (IEDC, 1974), Scheme for Inclusive Education for PWD (IEDC, 2000) and Education of Special Focus Groups under the Sarva Shiksha Abhiyan (SSA, 2000); Scheme of Inclusive Education for PWD at secondary School (IEDSS, 2009).

UNIT III: Inclusive practices in schools

- Visual impairment, Hearing impairment, Locomotor and Neuromuscular disorders, Mental Retardation, Specific learning disabilities.
- Concept and philosophy of inclusive education.
- Teaching competencies required for inclusive classroom.
- Peer tutoring, Cooperative learning, social learning, system approvals Multisensory teaching, reflective teaching.
- Supportive services required for meeting special needs in the classroom.
- Duty of educational institutions, appropriate governments and local authorities to provide, promote and facilitate inclusive education and towards creation of barrier-free environment for persons with disabilities.

UNIT IV:Assessment, teaching and development of supportive services for CWSN

- Concept and techniques of assessment.
- Identification and functional assessment of children with special needs.
- Implication of assessment for instructional planning and placement.
- Developing lesson plan and TLM for children with special needs.
- Involving community resources as source of support to Inclusive school.

Modes of Learning Engagement:

- The study materials must be presented to the trainees and discussions and reflections should be encouraged.
- The students should be exposed to good practices of dealing with special needs either through videos or through actual visits.
- It is important to engage the participants in a lot of cooperative group work so that they start valuing alternative points of view and significance of collaboration.
- The student trainees can also be asked to write their reflections on various topics.
- Presentation of case studies and discussion.

Interaction with children with disabilities studying in schools and spending quality time with

- them is of great help in changing attitudes and developing empathy.
- Projects on various topics can help the students to acquire in depth knowledge.
- Audio- Visual presentations and demonstrating various practices.

Practicum/ Tutorials

1. Reflective written assignments
2. Conducting seminar on chosen topics
3. Group reports
4. Field visit reports/ project report
5. Case studies on different disabilities

Suggested Readings:

1. Farrell, M. (2004). Special Educational Needs: A Resource for Practitioners. New Delhi. Sage Publications.
2. Hallahan & Kanffman J.M. (1984). Exceptional Children. Prentice Hall.

3. Hegarty S. & Mithu Alur (2002). Education and children with Special need. New Delhi. Sage Publication.
4. The Persons With Disability Act (1995). Ministry of Social Justice and Empowerment. Government of India, India, MSJE.
5. Chadha, A. (1999). A Handbook for Primary School Teacher of Children with learning Disabilities. New Delhi. Education Consultant of India Limited.
6. UNESCO (1994). The Solamanca Statement and Framework for Action on Special needs Education. Paris. UNESCO.
7. Koul,V.(1993). Early Childhood Education Programme. New Delhi. NCERT.
8. Muralidharan, R. (1990). Early Stimulation Activities for Young Children. New Delhi. NCERT.
9. Panda, K., C. (1990). Education of Exceptional Children. New Delhi. Vikas Publications.
10. Arora, K, Dave, P & Sinclair, S. (1987). Detection and prevention of mentally Handicapped. New Delhi. NCERT.
11. NCERT and UNESCO (2004). Inclusive Education: An Orientation package for Teacher Educators. Department of Education of Groups with special needs. NCERT and UNESCO.
12. NCERT and UNESCO (2000). Assessment of Needs for Inclusive Education. Report of the First Regional Workshop. NCERT and UNESCO.
13. Mani, M., N., G. (2001). Inclusive Education in Indian context. INRDC.
14. Banine, D (1988). Handicapped children in Developing countries: Assessment, Curriculum and Instruction - Edmonton (Alberta). University of Alberta.
15. Smith, D.D. (2002). Introduction to Special Education: Teaching in an age of challenge. Boston. Allyn and Bacon.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)

I: Perspectives in Education (PE)

PELT 202: Learning and Teaching

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: The Candidate will be able:

- To develop scientific attitude for the process of teaching & learning.
- To develop understanding about the relationship of cognitive, social and emotional development with learning process
- To provide an overall view on teaching & learning style and ideas to enhance these activities
- To introduce student – teachers with teaching skill, component and parameters of effective teaching
- To develop insight for perfect teaching by its overall perspectives in detail**.**

Unit I: Psychological Domains of Learning and Teaching

- Meaning and principles of development, relationship between development and learning.
- Meaning of cognition and its role in learning, socio-cultural factors influencing cognition and learning.
- Social development – Meaning, Importance, Social process and its effect on Teaching & Learning, theory of social construction(Bruner)
- Emotional development: - Meaning, Process, Need to Study its effect on Teaching and Learning Process.

Unit II: Effective Teaching and Learning

- Effective Teaching: Meaning, Component and Parameters of Effective Teaching, Identification of Teaching Skills, Principles of Teaching, Classroom instruction strategies, Teacher as a Learner, Modernising the classroom, Teacher behaviour and classroom climate (Flanders' interaction analysis system).
- Teaching for culturally diverse students, theory of culturally relevant pedagogy.
- Creative Teaching: Meaning, concept and ways of teaching creatively.
- Unlearning to learn
- Learning- Meaning, and characteristics, factors influencing learning, Types of learning (Insight, Constructivist and Social), Tradition and changes in view of the learning process a shift from teaching to learning.
- Principles of learning, Quality of learning.
- Role of teacher in teaching-learning situations: (a) Transmitter of knowledge (b) Teacher as a Role Model (c) Facilitator for Encouraging Children to Construct knowledge (Constructivist Approach) (d) Co-learner, concept mapping
- Classroom Instruction Strategies (General Introduction)
- Role of motivation in learning- Concept, Motivational Strategies to be used in classroom teaching.

Unit III: Learning Style and Teaching Style

- Diversity among learners and learning needs (with reference to special needs).
- Multilingual background: Concept, Multilingual background of children and its classroom implications.
- Learning Style: - concept, Types and importance in Teaching –Learning process, factors affecting learning style.
- Introduction of teaching Models: Concept attitude, advance organization and inquiry model.
- Teaching Style: - Concept, Types and effect on learners' learning process, factor affecting teaching Style.
- Teacher behaviour, effect of Verbal and Non-Verbal behaviour of Teacher on students' learning.
- Use of out of class experiences of children in classroom teaching, Organisational climate and teaching.

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':
- Experiential learning and reflection
- Social mediation
- Cognitive negotiability
- Situated learning and cognitive apprenticeship
- Meta-cognition.
- Creating facilitative learning environment.

- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Practicum/ Tutorials

1. Analysing the behaviour of your fellow student-teachers, find out how socio-cultural factors have influenced & shaped their learning.
2. Write a report about some best teachers in your past experiences & write some special features of their ways of teaching.
3. Conduct a case study of an individual (Educationally exceptional – Differently-abled).
4. Conduct and interview of 02 students of multilingual background and list the problems face by them in classroom conditions.
5. Trace out some of the odd Non-Verbal behaviour of any 05 fellow Candidate s.

Suggested Readings:

1. Pkkc ,l-ih] 2005]cky fodkl o eukfoKku dk eky rRo
2. Concept Publishing Company Private Ltd, Mhn Grden, Ne Delhi.
3. Hk"k.k 'kyUn] 2007&08] 'kf{kd rduhdh]vxoku ifCyd'ku] vkxjk&7
4. 'kekl Mk- vkj-,-] 2008] f'k{kk dk eukfoKku vk/kkj]bVju'kuy ifCyf'kx gkml]ejBA
5. dyJ"B ,l-ih-] 2007&08] 'kf{kd rduhdh dk eky vk/kkj] vxoky ifCyd'ku] vkxjk
6. vkojk; Mk- ,l- lh] 1999] f'k{kd rduhdh dk eky rRo] vk;l cqd fMik] djky ckx] ubZ fnYyh
7. 'kekl Mk- vkj-,-] f'k{k.k vf/kue e uohu izorZu 2005] vkj- yky cqd fMik] ejBA
8. 0;kl gfj'pUnz ,oa 'kekl vf/kxe vkj fodkl dk eukl kekftd vk/kkj] jkt LFkku fgUnh xzFk vdkneh t;iqj & 4
9. flag]jkeiky ,oa flag] uxUnz ¼2013½f'k{k.k ,oa vf/kxe dk eukl kekftd vk/kkj] vxoky icfyd'kUl] vkxjk
10. flag uxUnz ,oa lokuh v'kkd] ¼2013½ % vf/kxe dk eukfoKku] vxoky icfyd'kUl] vkxj
11. flag jkeiky ,oa lokuh v'kkd] ¼2013½ %'kf{kd rduhdh ,oa d{kk d{k izc/ku] vxoky ifCyd'kUl] vkxj
12. Shrama R. A., ARYA- 2008, mega trends in instructional technology, (Programmed instruction E-learning, local book depot, Meerut (up)
13. 'kekl] Mk- vkj-,- 2005] f'k{k.k vf/kxe e uohu izorZu] vkj-yky cqd fMik] ejBA
14. Siddiqui, Mujebul Hasan, 2009, teachings of teaching (classroom teaching). APH publishing, New Delhi.
15. Mathur, Dr. S.S, Mathur, Dr. Anju. 2007-2008 development of learner and teaching learning process, agrawal publication Agra.
16. Rao. V.K, Reddy, R.s.1992, learning and teaching commonwealth publishers, New Delhi.
17. Bhatnagar, Dr. A.B, Bhatnagar, Dr. Meehakshi, bhatnagar anurag, 2008, Development of learner and teaching learning process, R.lal book, depot, Meerut.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSKC 202: Knowledge and Curriculum

Time: 3 Hours — Max. Marks: 100
Credits- 4 — Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives of the Course

On the completion of course, the Candidate will be able to:

- Gain insight into the various forms of knowledge and disciplines and their implications to school subjects.
- Develop an understanding about how knowledge is organized into curriculum.
- Develop an understanding of the concept of curriculum, curriculum framework and the related concepts.
- Develop an understanding of the various foundations of curriculum planning.
- Acquaint the student with the existing approaches to curriculum design.
- Reflect on various trends in curriculum development.

Course Contents

Unit I: Concept of Curriculum

a) Meaning and nature of curriculum, need and importance of curriculum in schools.

b) Differentiating curriculum framework, curriculum and syllabus, their significance in school education.

c) Facets of curriculum- core curriculum, hidden curriculum, activity based curriculum, interdisciplinary curriculum, spiral curriculum and integrated curriculum.

d) Curriculum visualized at different levels: national level, state level, school level, class level and related issues.

Unit II: Curriculum Determinants and Considerations

a) Determinants of curriculum (philosophical, psychological, sociological, political).

b) Considerations in curriculum development: (at school level)

- Forms of knowledge and its characterization in different school subjects.
- Socio-cultural context of students –multi-cultural, multilingual aspects.
- Learner characteristics.
- Teachers' experiences and concerns.
- Critical issues: environmental concerns, gender differences, inclusiveness, value concerns and issues, social sensitivity.
- Curriculum and school subject knowledge selection process and purpose.

- Selection of school subject knowledge: criteria and agencies.
- Legitimization of knowledge selection: socio-cultural and politico-economic forces.
- Problematizaiton of school knowledge selection: debates to identify change and continuity:
- Constitutional ideals and national priorites.
- Global concerns.

Unit III: Curriculum Development

- Process of curriculum development

- Formulating aims and objectives.
- Criteria for selecting knowledge and representing knowledge in the form of different subjects.
- Organizing fundamental concepts and themes vertically across levels and integrating themes within (and across) different subject.
- Selection and organization of learning situations.

Unit IV: Curriculum Implementation and Evaluation

a) Role of state and national agencies in implementing curriculum.

b) Teachers' role in generating dynamic curricular experiences through-

- Flexible interpretation of curricular aims.
- Contextualization of learning.
- Varied learning experiences.
- Learning resources.
- Translating curricular objectives into instructional planning.

c) Need and evaluation of effective curriculum construction with reference to existing pedagogies and instructional approaches, teacher training, textbooks and instructional materials.

d) Approaches and criteria to curriculum evaluation and text-book analysis.

e) Role of mhrd, ncert and the states in curriculum reform.

Modes of Learning Engagement:

A set of readings need to be compiled, which includes those which clarify key concepts, trace the evolution of alternative conceptions of curriculum, contextualize the problem of curriculum, indicate ways of developing, implementing and reviewing curriculum. In addition, national curriculum documents and

relevant secondary school syllabi should also be made available.

The following modes of learning engagement are suggested:

- Introductory lectures on key themes and concepts
- Study and discussions on the process of curriculum development at various levels
- Study of the NCF 2005 as well as the earlier curriculum frameworks and a prescribed syllabus;
- Discussion on purpose of curriculum framework;
- Critical evaluation of the extent to which the curriculum framework is reflected in the syllabus (in small groups)
- Interactions with school teachers and principal about how they operationalize the prescribed curriculum into an action plan; how curriculum is evaluated and revised
- Observing the kinds of curricular experiences, a school provides apart from classroom teaching and discern their relevance vis a vis learner development; for this, interactions with teachers and students could be held
- Study of selected readings and presentations based on these

Practicum/ Tutorials:

1. Preparation of any topic from the course content and presenting in the classroom.
2. Analytical study of school- curriculum implementation.
3. Development of a unit test and its try out.
4. Evaluation of a school textbook.
5. Nature and level of participation in discussions.
6. Presentations based on readings.
7. Field notes on observations and interviews in schools, and linking these with concepts introduced.
8. Analysis of curriculum development/implementation processes within a school, based on field notes and observations.

Suggested Readings:

1. Bob moon and patricia murphy (ed). (1999). Curriculum in context. London. Paul chapman publishing.
2. Chryshochoos, n.e. (1998). Learner needs and syllabus design. M.a. Dissertation. England. School of english. University of durham.
3. D.j. Flinders and s.j. Thorton (eds). (1997). My pedagogic creed. New york. The curriculum studies reader, routledge.
4. G.w. Ford and lawrence pungo. (1964). The structure of knowledge and the curriculum. Chicago. Rand mcnally & company.
5. Groundland, n.e. (1981). Measurement and evaluation in teaching. New york. Macmillan.
6. Kelley, a.b. (1996). The curricular theory and practice. Us. Harper and row.
7. Kumar krishna. (1997). What is worth teaching. New delhi. Orient longman.
8. Taba, hilda. (1962). Curriculum development. Theory and practice. New york. Har court, brace and wald.
9. Tyler, r.w. (1949). Basic principles of curriculum and instruction. Chicago. University of chicago

3007

KURUKSHETRA UNIVERSITY
KURUKSHETRA

SYLLABUS

B.A.B.ED. 4-YEAR
INTEGRATED COURSE
(SEMESTER V-VIII)

Group C: Core Courses

Hindi 301 : vk/kqfud dkO;

उद्देष्य–विद्यार्थी आधुनिक कविता की प्रमुख काव्य धाराओं से परिचित हो सकेगा। वह अत्याधुनिक काव्य धाराओं की भाषा में आए परिवर्तन का ज्ञान प्राप्त कर सकेगा। उसको रस निष्पत्ति की जानकारी प्राप्त हो सकेगी तथा आधुनिक काल के कवियों की जानकारी के साथ उनके काव्य – ग्रंथों से वह अवगत हो सकेगा।

इकाई – 1

- ❖ मैथिलीशरण गुप्त – 1. उद्‌बोधन 2.वेदने तू भी भली बनी 3. मुझे फूल मत मारो 4.सखिवे मुझसे कहकर जाते
- ❖ जयशंकर प्रसाद– 1. जाग री2. मेरे नाविक3. पेशोला की प्रतिध्वनि

इकाई – 2

1. सुमित्रानंदन पंत – 1. प्रथम रश्मि 2. आँसू की बालिका 3. द्रुत झरो 4. भारत माता
2. सूर्यकांत त्रिपाठी 'निराला'– 1. ध्वनि 2. बादल राग 3. तोड़ती पत्थर

इकाई – 3

- ❖ महोदवी वर्मा
  1. मैं अनंत पथ में लिखती जो
  2. निशा को धो देता राकेश
  3. क्या पूजा क्या अर्चन रे
  4. कौन तुम मेरे हृदय में
- ❖ रामधारी सिंह दिनकर
  1. किसको नमन करूं में
  2. कुरुक्षेत्र
  3. **इकाई – 4**
- ❖ सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'
  1. कलगी बाजरे की
  2. सर्जना के क्षण
  3. चाँदनी जी लो
  4. नदी के द्वीप

lanHkZ xzaFk &

1- dfork ds u;s izfreku & MkW- ukeoj flag

2- fujkyk dh dkO; lk/kuk & MkW- jkefoykl 'kekZ

3- dkek;uh es adkO;] laLd`fr vkSj n'kZu & MkW- }kfjdk izlkn lDlsuk

4- u;h dfork & dkfar dqekj

5- u;h dfork% u;s /kjkry & MkW- gfjpj.k 'kekZ

6 ikB~; iqLrd & vk/kqfud fgnah dfork ds fofo/k vk;ke] lEiknd MkW- chuk 'kekZ] HkkX;ksn; idzk'ku] vtejs

ENG 301 General Linguistics and Structure of Modern English

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- To enable students to know about the nature of language
- To enable students to understand the relationship between language, culture and thought
- To make them understand general linguistics and branches of linguistics
- To familiarize students with the distinctive features of phonology and morphology

To enable students to understand the relationship between language, structure and meaning

Unit	Content
Unit I Nature of Language	➢ What is Language, Human language and Animal Communication ➢ Linguistics as scientific study of language ➢ Linguistic and Cultural relativity (Sapir-Whorf Hypothesis) ➢ Pidgin and creole, code switching and code mixing, language-dialect, registers, diglossia ➢ Language and Media
Unit II Phonology of English	➢ Phoneme, minimal pairs, distinctive features, form and meaning, syllable structure, assimilation, dissimilation rules, feature addition, segment deletion, and addition, ➢ Morphophonemics
Unit III Morphology of English	➢ Word class, Morpheme and its types: bound and free morpheme, ➢ Derivational morphology, ➢ compound stress pattern, ➢ Inflexional morphology, ➢ Meaning of compounds
Unit IV Syntax and Semantics of English	➢ Syntax: • Descriptive and prescriptive • Phrase structure rules • Transformational rules • Grammatical categories, grammaticality ➢ Semantics: • Semantic Features, • Ambiguity • Paraphrase, • Antonym and Synonyms

	• Names, Sense and Reference Thematic reference

Suggested Readings

Unit I

- Thakur, Damodar. *A Concise History of English*. Bharati Bhawan (P&D). 2017.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

- Roy, Chhanda. *A Students Companion to English Language*. Bharati Bhawan (P&D). 2017.
- Crystal, David. *The Stories of English*. Penguin. 2005.
- Crystal, David. *The English Language: A Guided Tour of the Language*. 2nd Ed. Penguin. 2002.
- Crystal, David (Ed.). *The Cambridge Encyclopedia of the English Language*. 2nd Ed. CUP. 2003.

Unit II

- Thakur, Damodar. *The Phonetics and Phonology of English: A Handbook*. Bharati Bhawan (P&D). 2017.
- Bansal, R.K. and J.B. Harrison. *Spoken English: A Manual of Speech and Phonetics*. Orient BlackSwan. 2013.
- Marks, Jonathan and Sylvie Donna. *English Pronunciation in Use Elementary*. CUP. 2017.
- Marks, Jonathan and Sylvie Donna. *English Pronunciation in Use Intermediate*. 2nd Ed. CUP. 2017.
- Hewings, Martin. *English Pronunciation in Use Advanced*. CUP. 2017

Unit III

- Thakur, Damodar. *Linguistics Simplified: Morphology*. Bharati Bhawan (P&D). 2017.
- McCarthy, Andrew Carstairs. *An Introduction to English Morphology*. 2nd Ed. Edinburgh University Press. 2018.
- Thakur, Damodar. *Linguistics Simplified: Syntax*. Bharati Bhawan (P&D). 2017.
- Miller, Jim. *An Introduction to English Syntax*. Edinburgh University Press. 2002.
- Verma, S.K. and N. Krishnaswamy. *Modern Linguistics: An Introduction*. OUP. 1997.
- Berry, Roger. *English Grammar: A Resource Book for Students*. Routledge. 2012.

Unit IV

- Fasold, Ralph W. and Jeff Connor-Linton. (Eds.) *An Introduction to Language and Linguistics*. 1st Ed. CUP. 2006.
- Meyerhoff, Miriam. *Introducing Sociolinguistics*. Routledge. 2006.
- Mesthrie, Rajend et al. *Introducing Sociolinguistics.* Edinburgh University Press. 2009.
- Crystal, David. *English as a global language*. 2nd Ed. CUP. 2003.

GEO 301: Biogeography and Pedology

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

1. *To understand the earth as habitat of diverse plants and animal life.*
2. *To understand the earth as a bio-physical entity*
3. *To understand the earth as constituted by diverse biotic processes*

Unit I

Plant ecology: habitat factors; adaptation, succession and climax; concept of plant species, family and genera; phyto-geographical regions;

Unit II

Terrestrial and marine fauna; dispersal and migration of animals; means and barriers Animal ecology and human ecology; Zoogeographical regions of the world

Unit III

Forms and functions of biomes: forest, grassland, desert, mountain and marine; Biodiversity; Forest and wild life management: Roles of National Parks, Sanctuaries and Biosphere Reserves in India.

Unit IV

Plant-water-soil relationship; Concept of soil profile; Processes of soil formation: laterisation, podsolization, calcification, salinization and alkalization; Soil classification; Soil of the world.

Reading lists

1- Dansereau, P. M., 1957: *Biogeography: An Ecological Perspective*,

Ronald Press.
2- *2*- Dennis M., 2009: *Here Be Dragons: How Study of Animal and Plant Distribution*
3- *Revolutionised Our View of Life and Earth*, Oxford University Press.
4- Eyre S. R. and Jones, G.R. (eds) 1966: *Geography as Human Ecology*, Edward Arnold, London.
5- Eyre S. R., 1963: *Vegetation and Soils: A World Picture*, Aldine Publishing, Chicago.
6- Lomolino M. V., Riddle B. R., Whittaker R., and Brown J. H., 2010: *Biogeography*, Sinauer Associates.
7- Mathur H. S., 1998: *Essentials of Biogeography*, Anuj Printers, Jaipur.
8- Millington A., Blumer M. and Schickhoff U., 2011: *Sage Handbook of Biogeography*, Sage.
9- Morand S. and Krasnov B., 2010: *The Biogeography of Host Parasite Interaction*, Oxford University Press.
10- Tivy J., 1977: *Biogeography: A Study of Plants in the Ecosphere*, Oliver & Boyd, Edinburg.

GEO 301: PRACTICALS
Field Training Techniques

Total credit : 1 ***Contact hours: 2 per week***

Meaning, significance and ethics of field trip in geographical studies Designing a field trip: pre-field visit, during the field and post field visits Field visit to either desert or mountainous environment.
Designing the Field Report – Statement of the problem, aims and objectives, methodology, representation, analysis, interpretation and writing of report.

Practical Record: Students will be trained in the techniques of field work by taking them to either desert or mountainous environment. Based on field observation and survey for two weeks (minimum 10 days), they will prepare and present the detailed field report.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 20 marks. Duration of examination will be 3 hours.
  - Field Report 10 Marks
  - Participation/Viva 10 Marks

Reading List

1- Stoddard R. H., 1982: *Field Techniques and Research Methods in Geography*, Kendall/Hunt.
2- Wolcott, H. 1995. The Art of Fieldwork. Alta Mira Press, Walnut Creek, CA.
3- Peattie, Roderick, 2007: *Mountain Geography: A Critique and Field Geography*, Read Books.
4- Gerber, Rod and Chuan, Goh Kim, 2000: Fieldwork in Geography: Reflections, Perspectives and Actions, Kluwer Academic Publisher
5- Best, Brin, 2011. The Geography Teachers's Handbook, Continuum

International Publishing Group.
6- Gerber R. and Lidstone J., 1988: *Developing Skills in Geographical Education*. (eds), International Geographical Union.
7- Tilbury D.and Williams M. 1997: *Teaching and Learning Geography*. (eds), Routledge.
8- Fien, J. Gerber R.and Wilson P., 1989: *The Geography Teacher's Guide to the Classroom*
(2nd edn) (eds), Macmillan.
9- Morris, Ronald, V., 2010: The Field trip Book: study travel experiences in Social Studies, Information Age Publishing , Inc.

HIS 301 History of Morden India (1707-1947 A.D)

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to

- The period under review marks a very crucial phase in the study of Indian History and attempts to answer questions which hither to have defined answer.
- This semester is give to knowledge of Early Peshwas and establishment of British rule from Bengal Onwards
- The students fully understand the Indian resentence against the British and awaking in India in various Fields.

Unit	Content
Unit I	➢ Early Peshwas, Third Battle of Panipat, Maratha confederation ➢ Maratha struggle against the British. ➢ Establishment of British rule in Bengal and consequent administrative changes. ➢ British Relations with Indian states: Mysore and Punjab
Unit II	➢ Growth of Legislature and Administrative Changes (Lord Warren Hesting to Lord Curzon) ➢ Indian resistance prior to 1857: Tribal Revolts, Indigo Revolt, Pabna Revolt , Deccan Revolt, Peasant Revolts ➢ Development of Modern Education, Press, Transport & Communication, Trade & Industry ➢ Struggle of 1857: Nature, Causes, Role of the Natives: Mangal Pandey, Bahadurshah, Tantia tope, Nana Saheb and Laxmi Bai, Significance
Unit III	➢ Imperial Policy of Lord Lytton-Vernacular Press Act, Delhi Durbar, Afghan Policy, Liberal Policy of Lord Ripon and his reforms ➢ Foundation of Indian National Congress Background, Concept of Safety Valve, Early Activities, Prominent Leaders, Foundation of Muslim League ➢ Moderates and Extremists: Their Ideologies, means and Activities - Surat Split 1907, ➢ Role of Dada Bhai Naoroji, M.G. Ranade, G.K. Gokhale, B.G. Tilak, Arvind Gosh and Lala Lajpat Ray.
Unit IV	➢ Lord Curzon and his Administrative Reforms, Partition of Bengal Social ➢ Change and Reform Movements, Caste Movements, Rise of Middle Classes, Women Status and Reform legislation. ➢ Agrarian Relations, the Land Lords tenants and the states, Rise of Morden Industries and Working Class ➢ Constitutional Development: Morley Minto Reform -1909, Government of India Act 1919 & 1935, Freedom of India Act 1947

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials. The learners may be given exercises to know various better fields and growth of Education, presss, means of Transport and Communication

Suggested Readings

- Sardesai, G.S. *New History of the Marathas vol. III*
- Tara chand. *History of Freedom Movement in India (4 vols.)*
- Agrawal, R.C*. Indian constitutional development and National Movement in India*
- Chandra, Bipan . *Nationalism and Colonialism in Morden India* (Delhi, Orient Longmen, 1981)
- Chandra, Bipan . *Rise and Growth of Economic Nationalism in India*. (Delhi. PPH, 1966)....., *Struggle for India's Independence*. New Delhi. 1989
- Tamlinson, B.R. *The Economy of Morden India,* Cambridge University Press
- Desai, A.R. *Social Background of Indian Nationalism*. Popular Prakashan . New Delhi
- Bandyopadhyay, Sekhar*. From Plassey to Partition and After*.Orient Blackswan
- Parobo, Parag D. *India's First Democratic Revolution*. Orient Blackswan
- Majumdar, R.C. *British Paramountcy and the Indian Renaissance. part I*
- Grover, B.L. *A New Look at the Morden Indian History*. New Delhi. 2000
- Fisher, M.H.(ed.). *politics of the British Annexation of India 1757 - 1857*. (Oxford in India Readings)
- Argov, Daniel. *Moderates and Extremists in India*
- Brown, Judith. *Gandhi's to power Indian Politics 1915 - 22.* (Cambridge University Press. 1972) Brown, Judith. *Gandhi and Civil Disobedience: The Mahatma in Indian Politics 1928- 34*. (Cambridge). 1977

POL 301: REPRESENTATIVE WESTERN POLITICAL THINKERS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Understand the fundamental contours of classical western political thoughts.
- Understand the basic features of medieval political thought, impact of reminiscence shift from medieval to modern era.

- Understand the social contract theory and appreciate its implications on the perception of state in terms of its purpose and role.
- Understand the fundamental terms of different schools of liberal and realistic streams of western political thoughts.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Unit	Contents
Unit I	Plato: Justice, Rule of Philosophy, Education, Communism. Aristotle: State, Constitution, Citizenship, Slavery, Revolution
Unit II	St. Augustine:Theory of Two Cities Thomas Acquinas: State, Law, Christianization of Aristotle Machiavelli: Nation State, State Craft, Religion and Morality.
Unit III	Thomas Hobbes: Contractual theory and Sovereignty John Locke: Contractual theory and Private Property J.J. Rousseau: Contractual theory and General Will
Unit IV	Jeremy Bentham: Utilitarianism, Law & Reforms J.S.Mill: Revision of Bentham's Utilitarianism, Liberty and Representative Government. Karl Marx: Dialectical & Historical materalism, Surplus value, Class Struggle, Revolution

Suggested Readings

1. Sir, E. Baker, Greek political Theory: Plato and his predecessors, New Delhi, B. L. Publications, 1964.
2. A.Ashcraft, Revolutionary Politics and Locko's Two Treatises of Govt.,
3. London, Allen and Unwin 1986.
4. K.C.Brown (ed.) the Cambridge History of Political Thought 1450-1700,
5. Cambridge, Cambridge University Press, 1991.
6. J.A. Dunning; History and Political Theories, New York, Macmillan, 1902.
7. H.J.Laski, Political thought from Locke to Bentham, Oxford, Oxford
8. University Press, 1920.
9. S.Mukherjee and S. Ramaswamy, A History of Political Thought : Plato to
10. Marx, New Delhi Prentice Hall, 1999.

ECO 301: MONEY, BANKING & INTERNATIONAL TRADE

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80,
Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Define the different concepts of money and banking and international trade.
- Describe the operation of money and banking and trade system in an economy
- Take in to account the optimal information of monetary theories and banking system and trade system.
- Make use of the theories of money, banking and international trade and its policies in India.
- Use the statistics to understand the economic problem related to the money**,** banking and international trade.

Unit	Content
UNIT-I **(a) Evolution and Functions of Money** **(b) Value of Money**	➢ Meaning, nature and definition of Money, ➢ Evolution of definition of Money, ➢ Difficulties in Barter system, ➢ Function of money, ➢ Classification of money, ➢ Characteristics of money, ➢ Role of money in different type of economy; ➢ Monetary standards- Metallic (working of Gold standard) and paper systems system of note issue; ➢ IMF- objectives and its monetary policy. ➢ Meaning of Value of money and its relationship with Price;

	Meaning, construction and limitation of Index Number; ➢ Quantity theory of Money- Fisher's Cash-Balance Approach and Cambridge Cash-Transaction Approach. Comparison of Fisherian approach with Cambridge approach. ➢ Definition of Money Supply, Determinants of Money Supply, High power money and Money multiplier, Measures of Money supply in India, Money supply and Liquidity;
UNIT-II **Inflation and Deflation**	➢ The concept of Inflation, ➢ Types of Inflation- Structural Inflation, open and suppressed inflation, ➢ Causes of Demand-pull and Cost-push inflation, Structural Inflation, ➢ Keynes Theory of Inflationary Gap, Effects of Inflation, Anti-inflationary measures, Concept of Stagflation, Disinflation Deflation and Reflation.
UNIT-III **Bank and Non-Bank Financial Intermediaries**	➢ Evolution, origin and growth of banking system in India, ➢ Meaning of Banks and its distinguished from Non-bank financial intermediaries, ➢ Type of Banks, Functions of commercial banks, ➢ The process of credit creation of commercial bank- its purpose and limitations; ➢ Balanced-sheet of Commercial Bank-Assets and Liabilities. ➢ Functions of Central Bank, ➢ Methods of Credit Control- Quantitative and Qualitative methods. ➢ Role and function of Reserve Bank of India in the Money market (organized and unorganized) in a developing economy.
Unit IV **International Trade and Exchange Rate**	➢ Meaning, definition and importance of International Trade, ➢ Theories of International Trade - Absolute cost advantage model of Adam Smith and Comparative cost advantage model of Ricardo. ➢ Concept of Foreign Exchange - fixed and flexible exchange rate; ➢ Determination of exchange rate- by Mint parity theory, Purchasing power parity theory.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

✓ Edminister, R.O.(1986), Financial Institutions, Market and Management, Mc Grow Hills, New York.

✓ Goldsmith, R.W.(1969), Financial Structure and Development, Yale, Londan

- ✓ Gupta, S.B ( ), Monetary Economics,
- ✓ Hanson, J.A and S. Kathuria (Eds) (1999) India- A Financial Sector for the Twenty First Century, Oxford University Press, New Delhi.
- ✓ Jhingan, M.L ( ) Money, Banking , International and Public Finance
- ✓ Krugman,P.R( ) , International Economics
- ✓ Mannur, H.G( ) International Economics,
- ✓ MIthani, D.M( ), Monetary Economics,
- ✓ Paul, RR( ), Money, Banking and International Trade,
- ✓ Robonson, R.I and D. Wringhtman(1981), Financial Markets, Mc Grow Hill, Landan.
- ✓ Sanvatore, D(1997), International Economics, Prentice Hall, Upper Saddle River, N.J. New York.
- ✓ Seth, M.L( ), Monetary Economics,
- ✓ Smith, P.F(1978), Money and Financial Intermediaries: The Theory and Structure of Financial System, Prentice Hall, Englewood-Cliffs, New Jersey.

CPSE 301: Pedagogy of English I

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80,
Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Understand the nature and function of language
- Understand various issues related to language
- Develop an understanding of approaches, methods and techniques of English language teaching

Develop their skills of English language teaching

Unit	Content
Unit I: Language: Basics	Language: Nature and Function Aspects of Language: Physiological, Psychological and Socio-cultural Varieties of Language: Dialect and Register, Standard and Non-Standard Bilingualism, Multilingualism as a Resource Language Learning: Acquisition vs. Learning Language Learning: Types and process: L1, L2 and FL Language and Learning: Language Across Curriculum
Unit II: Teaching of English in India	Role and Position of English language in India Challenges of teaching and learning English in India NCF -2005 (Language Education), Language Policy, Three-language Formula Objective of teaching English in India: Linguistic and Literary objective English as a subject, English as medium of instruction Braille and Sign languages
Unit III: Approaches, Methods and Techniques	What are Methods, Approaches and strategies in ELT Grammar-Translation, Direct and Bi-lingual/multilingual methods, Structural approach Communicative Approach, Silent Way, Suggestopedia, Total Physical Response Constructivist perspective Whole language approach, Humanistic approach Literature-based approach for language learning Eclectic approach, Integrated approach Independence and interdependence of language skills.

Unit IV: Elements of English Language Grammar in Context	What is Grammar in context English Language: Grammar and Usage Prescriptive vs. Descriptive Grammar Problem Areas of English Grammar I: Determiners, Tense, Auxiliaries, Modals Problem Areas of English Grammar II: Concord, Conditionals, Transformation

Language across the Curriculum Activities: As an integral part of teaching-learning process, relevant activities should be carried out to enhance and promote language skills (LSRW) and proficiency based on the rationale of Language Across Curriculum. The activities in this regard are language centred and, therefore, the focus of learning and teaching activities should be on language skills not necessarily on the content. The activities in this regard may be designed/improvised according to the context. Some of the exemplar activities may include:

- Presentation (Oral and Written) based on themes from the content area
- Debate on themes from the content area
- Panel discussion/Seminar/discussion etc
- Group discussion/group work
- Question –answer sessions
- Role play/dramatization
- Extempore speech/Elocution

Organization of reading/reflection activities beyond the textbooks

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Practicum:

1. Observation and recording of practical difficulties in the teaching of English at upper primary and secondary levels.
2. Preparing a small dictionary of the difficult words used in the upper primary and secondary textbooks.
3. Preparing different visual-aids for teaching.
4. Framing suitable exercise on a given topic/passage
5. Development of language games
6. Preparation of 20 test items (5 each on the LSRW skills)
7. Analysing errors committed by students.
8. Analysis and categorization of exercise on grammar as given in the prescribed textbook of the school.
9. A write-up on the problem faced by the school students in relation to the acquisition of the receptive (listening and reading) or productive (speaking and writing) skills in English
10. A write –up on the comparison between English and mother tongue/home language in terms of sounds and word- order.

Selection of materials for writing in English from the newspapers, comics, magazines, advertisement and preparation of an outline for teaching language items.

CPSH 301: Pedagogy of Hindi

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

पाठ्यक्रम के विशेष उद्देश्य:

- भाषा की अलग-अलग भूमिकाओं को जानना।
- भाषा के स्वरूप और व्यवस्था को समझना।
- भाषा सीखने के तरीके और प्रक्रिया को जानना और समझना।
- पाठ्यचर्या पाठ्यक्रम और पाठ्यपुस्तक का विश्लेषण कर कक्षा विशेष और बच्चों की समझ के अनुसार ढालना।
- भाषा और साहित्य के संबंध को जानना।
- हिंदी भाषा के विविध रूपों और अभिव्यक्तियों को जानना।
- भावों और विचारों की स्वतंत्र अभिव्यक्ति करना।
- भाषायी बारीकियों के प्रति संवेदनशील होना।
- विद्यार्थियों की सर्जनात्मक क्षमता को पहचानना।
- भाषा के मूल्यांकन की प्रक्रिया को जानना।

इकाई -I भाषा की प्रकृति

- भाषा, भाषा की प्रकृति, भाषा की विशेषताएँ, भाषा के प्रकार (मौखिक और लिखित) तथा कार्य।
- भाषा एक नियम संचालित तंत्र के रूप में।
- भाषा और लिंग, भाषा और सत्ता, भाषा और अस्मिता, भाषा और वर्ग (समाज)।
- माध्यम भाषा।

इकाई – II भाषा संप्राप्ति और अधिगम

- संप्राप्ति बनाम अधिगम।
- मातृभाषा।
- प्रथम भाषा, द्वितीय भाषा, तृतीय भाषा।
- भाषा और अधिगम।
- समस्त पाठ्यक्रम में भाषा का उपयोग।
- भाषा और साहित्य।
- हिंदी साहित्य की विविध विधाएँ (गद्य, पद्य, नाटक इत्यादि)।

इकाई – III भारत में हिंदी की स्थिति और भाषा शिक्षा नीति

- स्वतंत्रता से पहले और स्वतंत्रता के बाद हिंदी की भूमिका ज्ञान की भाषा के रूप में।
- हिंदी, प्रथम, द्वितीय और तृतीय भाषा के रूप में।
- हिंदी पढ़ने-पढ़ाने की चुनौतियाँ।
- त्रिभाषा सूत्र की विशेषताएँ।
- संविधान और शिक्षा समितियों की रिपोर्ट में भाषा- भाषाओं की स्थिति (धारा 343-350-351) कोठारी कमीशन (1964-66) राष्ट्रीय शिक्षा नीति (1986) पी। ओ। ए। (1992), राष्ट्रीय पाठ्यचर्चा (2005)।

इकाई – IV भाषायी दक्षताएँतथा भाषा शिक्षण की प्रचलित विधियाँ/प्रणालियाँ

- सुनना और बोलना: कहानी कथन, संवाद, बातचीत, भूमिका निर्वाह।
- पढ़ना: मुखर और मौन वाचन, व्यापक और गहन पठन पठन दोष और उनका निराकरण।
- लिखना: लिखने के चरण, सर्जनात्मक लेखन, औपचारिक और अनौपचारिक लेखन (कहानी, कविता, संवाद, डायरी, पत्र, रिपोर्ट, समाचार इत्यादि)।
- हिंदी देवनागरी लिपि का मानकीकरण।
- व्याकरण अनुवाद प्रणाली/विधि।
- प्रत्यक्ष प्रणाली, ढाँचागत प्रणाली।

संदर्भ पुस्तकें –

1	माध्यमिक विद्यालयों में हिंदी शिक्षण,	निरंजन	कुमार सिंह
2	हिंदी भाषा शिक्षण विधि	–	भाई योगेन्द्र जीत
3	हिंदी शिक्षण विधि	–	डॉ. वैद्यनाथ प्रसाद वर्मा
4	सुबोध हिंदी व्याकरण एवं रचना	–	भानावत एवं जोशी
5	भाषा विज्ञान	–	डॉ. भोलानाथ तिवारी
6	हिंदी व्याकरण	–	कामता प्रसाद गुरु

CPSSS 301: Pedagogy of Social Science I

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: After the completion of the course students will be able to:

- Develop an understanding of the nature and scope of social science and its relationship with natural and other sciences.
- Acquaint Candidate s with nature of different disciplines within and their interrelationship concerns with society.
- Acquaint Candidate s with different approaches to pedagogy of social sciences.
- Plan lessons based on different approaches to facilitate learning of social sciences.
- Realize their role as facilitator in enhancing social sciences learning in the real classroom situation.
- Understand assessment processes in social sciences.

Course Contents

Unit I: Social Science as an Integrating Area of Study: Context and Concern

- Meaning, Nature and Scope of Social Science. Need and Importance of Social Science, Relationship of social science with other sciences. Uniqueness of disciplines vis-a-vis interdisciplinary.
- The values inherent in social science: aesthetic, moral, utilitarian, intellectual and environmental.
- Linking child's natural curiosity with natural phenomena; spatial and temporal context; important social and economic issues and concerns.

Unit II: Approaches and Methods to Teaching Learning in Social Science

- Observation, project method, field trip, role-play, dramatization, problem solving,
- Exploratory, concept mapping, self-learning strategies, map based learning, thematic approach, Multimedia approach and Interdisciplinary approach.

Unit III: Pedagogical Planning in Social Science

- **Lesson Planning:** Meaning, Importance and Characteristics of Lesson Plan, Important points/steps of Lesson Plan.

- Writing teaching points, formulating objectives, selecting teaching learning materials, deciding the approach to teaching learning, writing lesson plan through creating learning situations.

Unit IV: Assessment for learning in Social Sciences-I

- Characteristics of Assessment in Social sciences; Typology of the questions based suited for examine/ assessing/ understanding different aspects of Social sciences.
- Development of objective based and different type of test items, short answers and essay type questions in social sciences.

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials.

Suggested Reading:

1. Fleming J. (1949). The Teaching of Social Studies in Secondary School. London: Longman Green and Co.
2. Hemming, J. (1953). The Teaching of Social Studies in Secondary Schools. London: Longman Green and Company.
3. Kochhar, S.K.; (1968). The Teaching of Social Studies. New Delhi: Sterling Publisher Pvt. Ltd.
4. National Curriculum Frame Work (2005). New Delhi: NCERT.
5. Preston, R.C. & Herman (1974). Social Studies in the Elementary School. New York: Rhinehart and Company.
6. Sansanwal, D.N. & Tyagi, S.K. (2006). Multiple Discriminant Type Item. MERI Journal of Education, 1(1), 18
7. Shaida, B.D. (1962). Teaching of Social Studies. Jalandhar: Panjab Kitab Ghar.
8. Singh, G. (2008). Samajik Adhain da Adhiapan. Ludhiana: Chetna Parkashan.
9. Trigg, R. (1985).Understanding Social Studies. New York: Basics Black Well.

Group E: Professional Education Courses (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSLA 301: Learning Assessment

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the Candidate will be able to:

- Gain a critical understanding of issues in assessment and evaluation
- Become cognizant of key concepts such as test, measurement, examination, formative and summative assessment, and evaluation
- Understand different kinds and forms of assessment that aid student learning
- Use a wide range of assessment tools, learn to select and construct them appropriately
- Evolve realistic, comprehensive and dynamic assessment procedures that are able to keep the whole student in view
- Understand the use of action research in solving problems

Course Contents

Unit I: Overview of Assessment and Evaluation

- Perspective on assessment and evaluation of learning in a constructivist paradigm
- Distinction between 'assessment of learning' and 'assessment for learning'
- Purposes of assessment in a 'constructivist' paradigm:
    - engage with learners' minds in order to further learning in various dimensions
    - promote development in cognitive, social and emotional aspects
    - Meaning and Objectives of :
    - test, measurement, examination, and evaluation
    - formative and summative evaluation
  - continuous and comprehensive evaluation
  - grading and its types

Unit II: School- Based Assessment and Evaluation: Policies, Practices and Possibilities

- Impact of examination-driven schooling
- On Pedagogy: content-confined, information focused testing; memory- and activity centric teaching and testing
- De-linking school-based assessment from examinations: some possibilities and alternative practices
- Contexts of assessment: subject- related and person- related

Unit III: Efforts towards Examination Reforms

- Efforts towards examination reforms in India based on**:** NPE,1986; POA, 1992; NCF, 2000 and 2005 and National Focus Group Position

Paper on Examination Reforms (Discussion should cover analysis of recommendations, implementations and the emerging concerns)

- Management of Examination in Schools
- Role of ICT in examination
- Action Research in improving classroom practices: concept,need and steps of action research, action research as an approach to improve class and school practices. Development of an Action Research Plan.

Unit IV: Teacher competencies in evolving appropriate assessment tools, Data Analysis, Feedback and Reporting

- Teacher competencies
- Visualizing appropriate assessment tools for specific contexts, content, and student
- Achievement test: meaning, need, steps and blue print.
- Evolving suitable criteria for assessment
- Organizing and planning for student portfolios and developing rubrics for portfolio assessment
- Statistical tools- percentage, graphical representation, frequency distribution, central tendency, variation, normal distribution
- Feedback as an essential component of formative assessment
    - use of assessment for feedback; for taking pedagogic decisions
    - Types of teacher feedback (written comments, oral); peer feedback
    - Place of marks, grades and qualitative descriptions
- Developing and maintaining a comprehensive learner profile
- Purposes of reporting: to communicate
    - progress and profile of learner
    - basis for further pedagogic decisions
- Reporting a consolidated learner profile

Modes of Learning Engagement: Some suggested modes of learning engagement are:

- Lecture-cum-discussion
- Readings and presentations
- Group discussions
- Analysis of a range of assessment tools
- Developing worksheets and other tasks for learning and assessment in one's specific subject area
- Maintaining a portfolio related to the course-work and devising rubrics for assessment
- Constructing a test or an examination paper in one's subject area; critical review of these
- Observing, interviewing and writing comprehensive profile of a student
- Simulated exercises in 'marking' and giving feedback to fellow student-teachers (on a written task); critical review of feedback
- Simulated exercise in marking an examination paper in one's subject area; critical review of marking

Practicum:

1. Compare different forms of assessment.
2. Presentation of different kinds of grading with advantages and disadvantages.
3. Focus group discussion on examination driven teaching and learning.
4. Critical evaluation of examination reforms suggested and implemented based on NPE-1986; POA-1992; NCF-2000; and NCF-2005.
5. Developing Action Research proposal following the established steps of Action Research.
6. Organizing student Portfolio assessment and developing rubrics for portfolio assessment.
7. Developing Achievement Test and practicing method of finalizing the test.

Suggested Readings:

1. Baker, B. Costa, A. & Shalit, S. (1997). The norms of collaboration. Attaining communication competence. In A. Costa & R. Liebmann (Eds.), the process-centered school. Sustaining a renaissance community (pp. 119-142). Corwin. Thousand Oaks, CA.
2. Black, P. Harrison. C., Lee, C., Marshall, B, & William, D. (2004). Working inside the black box. Assessment for learning in the classroom. Phi Delta Kappan, 86 (1), 8- 21.
3. Bransford, J. Brown, A.L., & Cocking, R.R. (Eds.). (2000). How people learn: Brain, mind, experience, and school. Washington. DC. National Academy Press.
4. Burke, K. (2005). How to assess authentic learning (4^{th} Ed.). Thousand

Oaks, CA. Corwin. Burke, K. Fogarty, R. &Belgrad, S (2002). The portfolio connection Student work linked to standards (2nd Ed.) Thousand Oaks, CA. Corwin.

5. 5. Carr, J.F. & Harris, D.E. (2001). Succeeding with standards. Linking curriculum, assessment, and action planning. Alexandria, VA: Association for Supervision and Curriculum Development.
6. Danielson, C. (2002). Enhancing student achievement: A framework for school improvement. Alexandria, VA: Association for Supervision and Curriculum Development.
7. Gentile, J.R. &Lalley, J.P. (2003). Standards and mastery learning: Aligning teaching and assessment so all children can learn. Thousand Oaks. CA. Corwin.
8. Guskey, T.R., & Bailey, J.M. (2001). Developing grading and reporting systems for student learning. Thousand Oaks. CA. Corwin.
9. NCERT (1985). Curriculum and Evaluation. New Delhi. NCERT.
10. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
11. NCERT (2005). National Focus Group Position Paper on Examination Reforms. New Delhi. NCERT.
12. Norris N. (1990). Understanding Educational Evaluation. Kogan Page Ltd.
13. NatrajanV.and Kulshreshta SP. (1983). Assessing non-Scholastic Aspects-Learners Behaviour. New Dlehi. Association of Indian Universities.
14. Newman, F.M. (1996). Authentic achievement: Restructuring schools for intellectual quality. San Francisco. CA. Jossey-Bass.
15. Nitko, A.J. (2001). Educational assessment of students (3rded.). Upper Saddle River. NJ.
16. Prentice Hall.
17. Singh H.S. (1974) Modern Educational Testing. New Delhi. Sterling Publication.

Group C: Core Courses

HIN 302: dFkk lkfgR; ¼dgkuh vkSj miU;kl½

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

उद्देश्य– विद्यार्थी कहानियों एवं उपन्यास के तत्वों की जानकारी प्राप्त कर सकें तथा उनकी समीक्षात्मक विवेचना करने की क्षमता विकसित हो सके।

प्रथम इकाई

1. नमक का दारोगा – प्रेमचंद
2. दुःख – यशपाल
3. एटमबम – अमृत लाल नागर

द्वितीय इकाई

1. चीफ की दावत – भीष्म साहनी
2. दादी माँ – शिवप्रसाद सिंह
3. मुगलों ने सल्तनत बख्श दी – भगवती चरण वर्मा

तृतीय इकाई

1. नौकरी पेशा – कमलेश्वर
2. सरहद के इस पार – नासिरा शर्मा
3. राजा का चौक – नमिता सिंह

चतुर्थ इकाई

त्यागपत्र उपन्यास : जैनेन्द्र कुमार

पाठ्य पुस्तकें :

1. कथा कलश : सं. मनोहर वर्मा, किरण पब्लिकेशन्स, अजमेर
2. त्यागपत्र : जैनेन्द्र कुमार प्रकाशकभारतीय ज्ञानपीठ 18 इन्स्टीट्यूशनल एरिया लोदी रोड, नई दिल्ली 110003

ENG 302 Indian Writing in English

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Develop their comprehension skills through reading various genres of literature in English from India.
- Develop their reading habits and literary taste by reading the authors from their own land.

Unit	Course Contents
Unit I Prose	➢ Mulk Raj Anand : The Lost Child ➢ Shashi Deshpande : My Beloved ➢ Ruskin Bond : Charioteer The Night ➢ Leila Seth Train at Deoli ➢ Subrato Bagchi : On Balance : How are you different?
Unit II Poetry	➢ Sri Aurobindo : The Tiger and the Deer ➢ Rabindranath Tagore : Where the Mind is Without Fear ➢ Nissim Ezekiel : Night of the Scorpion ➢ Kamala Das : An Introduction ➢ A.K. Ramanujan : A River
Unit III Fiction	➢ R.K. Narayan : Waiting for the Mahatma
Unit IV Drama	➢ Mahesh Dattani : Dance Like a Man

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings Unit I

- Anand,Mulk Raj. *Mulk Raj Anand: Greatest Short Stories*. New Delhi: Jaico Publishing House. 2013.
- Deshpande,Shashi. *Collected StoriesVol. I and II*. New Delhi: Penguin Books India. 2004.

- Narayan, R. K. *Malgudi Days*. New Delhi: Penguin Classics. 2006.
- Bond, Ruskin. *Night Train at Deoli and Other Stories*. New Delhi: Penguin Classics. 1988.
- Mehrotra, A. K. Concise *History of Indian Literature in English.* Permanent Black. 2010.

Unit II

- Aurobindo, Sri. *Collected Poems: The Complete Works of Sri Aurobindo Vol. II.*Pondicherry: Sri Aurobindo Ashram Trust. 2009.
- Tagore, Rabindranath. *Gitanjali.* New Delhi: Pan Macmillan India. 2015.
- Ezekiel, Nissim et al. *Nissim Ezekiel: Collected Poems*. 2nd Ed. New Delhi: OUP. 2005.
- De Souza, Eunice. *Nine Indian Women Poets: An Anthology*. New Delhi: OUP. 2001.
- Das, Kamala. *Kamala Das: The Old Playhouse and Other Poems*. New Delhi: Orient BlackSwan. 2011.
- Ramanujan, A. K. *The Collected Poems of A. K. Ramanujan*. New Delhi: OUP. 1999.
- King, Bruce. *Modern Indian Poetry in English*. Revised Edition. New Delhi: OUP. 2017.
- Mehrotra, A. K. *The Oxford India Anthology of Twelve Modern Indian Poets*. New Delhi: OUP. 1993.
- Aurobindo, Sri. *Indian Poets and English Poetry—Correspondence between Kathleen Raine and K. D. Sethna*. Pondicherry: Sri Aurobindo Ashram Publication. 2017.

Unit II

- Narayan, R. K. *Waiting for the Mahatma*. Mysore: Indian Thought Publication. 2010.
- Mehrotra, A. K. *Illustrated History of Indian Literature in English.* New Delhi: Orient BlackSwan. 2005.

Unit IV

- Dattani, Mahesh. *Dance like a Man: a Stage Play in two Acts*. New Delhi: Penguin Books India. 2006.

GEO 302: Geography of India

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

1. *To explain the physical diversity of India*
2. *To explain the socio-economic diversity of India*
3. *To explain understand the geography of India as constituted by diverse regions*

Course Contents

Unit I

Location and space relations; Geological evolution; Landforms; Drainage systems; Soil; Vegetation; Climate - characteristics and classification.

Unit II

Population distribution and growth; Characteristics of agriculture and agricultural regionalisation, Mineral belts; Industrial regions

Unit III

Distribution of population by race, caste, religion, language, tribes and their correlates

Unit IV

Regionalisation of India: Physiographic (OHK Spate and R. L. Singh), Socio – cultural (David Sopher and Aijazuddin Ahmad), Economic (P. Sengupta)

Reading lists

1- Deshpande C. D., 1992: *India: A Regional Interpretation*, ICSSR, New Delhi.
2- Johnson, B. L. C., ed. 2001. *Geographical Dictionary of India*. Vision Books, New Delhi.
3- Sdyasuk Galina and P Sengupta (1967): *Economic Regionalisation of India*, Census of India
4- Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ., New Delhi.
5- Singh R. L., 1971: *India: A Regional Geography*, National Geographical Society of India.
6- Singh, Jagdish 2003: *India - A Comprehensive & Systematic Geography*, Gyanodaya Prakashan, Gorakhpur.
7- Spate O. H. K. and Learmonth A. T. A., 1967: *India and Pakistan: A General and Regional Geography*, Methuen.
8- Tirtha, Ranjit 2002: *Geography of India,* Rawat Publs., Jaipur & New Delhi.

GEO 302: PRACTICALS

Map Projections

Total credit : 1 ***Contact hours: 2 per week***

Classification, Properties and Uses of map projections; Graphical Construction of

Cylindrical: Mercator's;

Conical: One standard parallel, Two standard parallel, Bonne's; Zenithal: Orthographic, Stereographic, Gnomonic and Conventional: Mollweide's Projections.

Reference to Universal Transverse Mercator (UTM) Projection.

Practical Record File:Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 20 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 3 out of 4 exercise) 10 Marks
  - Record File 05 Marks
  - Viva 05 Marks

Reading List

1- Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi. 2- Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
3- Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
4- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
5- Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot,Allahabad
6- Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher

HIS 302 Indian Nationalism and Freedom Struggle

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:

- The study materials of this Semester is much significance to learn the National consciousness among the people of twentieth century.
- The students will seek the knowledge of extremists and revolutionary Trends of Indian Freedom Struggle.
- The students will be aware of the devoted revolutionary Nationalist as Bhagat Singh, Rajguru and Chandrasekhar, Kalpana Datta etc.

Unit	Course Contents
Unit I	➢ Rise and Growth of Nationalism –causes, ➢ Role of various Intuitions and Middle class. ➢ Cultural and Ideological consciousness- Impact of Socio- Religions Reforms ➢ struggle for the freedom of press, swadeshi and Boycott and Home Rule Movement
Unit II	➢ Gandhian Era – Satyagraha Movements (Champaran, Khera, Ahmadabad), ➢ Rowllat Act, Non Cooperation Movement ➢ Civil Disobedience Movement ➢ Quit India Movement
Unit III	➢ Revolutionary Movements- Ghadar movement, (Lala Hardayal) ➢ Role of Naujawan Bharat Sabha ➢ Hindustan Socialist Republic Association, ➢ Revolutionary activities and their means.
Unit IV	➢ Contribution of Prominent Revolutionaries – with special reference to Sachindra Nath Sanyal, Ram Prasad Bismil, Suryasen, ➢ Bhagat Singh , Rajguru, Ashfaqulla, ➢ Chandra Shekhar Azad, Sukhdev, ➢ Kalpana Datta, Sunidhi Choudhary, Beena Dev and Shanti Gosh
Tutorials/Practicum : Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials. The learners may be given exercises to know various better fields and growth of Education, press, means of Transport and Communication.	

Suggested Readings

- Tara chand. *History of Freedom Movement in India (4 vols.)*
- Agrawal, R.C*. Indian constitutional development and National Movement in India*
- Tamlinson, B.R. *The Economy of Morden India,* Cambridge University Press
- Desai, A.R. *Social Background of Indian Nationalism*. Popular Prakashan . New Delhi
- Bandyopadhyay, Sekhar*. From Plassey to Partition and After*.Orient Blackswan
- Parobo, Parag D. *India's First Democratic Revolution*. Orient Blackswan
- Majumdar, R.C. *British Paramountcy and the Indian Renaissance. part I*
- Grover, B.L. *A New Look at the Morden Indian History*. New Delhi. 2000
- Fisher, M.H.(ed.). *politics of the British Annexation of India 1757 - 1857*. (Oxford in India Readings)
  . (Delhi.1993)
- Argov, Daniel. *Moderates and Extremists in India*
- Brown, Judith. *Gandhi's to power Indian Politics 1915 - 22.* (Cambridge University press. 1972)
- Brown, Judith. *Gandhi and Civil Disobedience: The Mahatma in Indian Politics 1928- 34*. (Cambridge). 1977
- Sarkar, Sumit. *The Swadeshi Movement in Bengal*
- Puri, K. Harish*. Ghadar Movement*
- Majumdar, B.B*. Militant Nationalism in India*
- Joshi, *Ram Mohan and Process of Modernization*

POL 302: INTERNATIONAL RELATIONS SINCE 1945

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Acquaint themselves with various approaches to the study of international politics.
- Understand important concepts which provide the framework for understanding international politics.
- Understand and take stock of the events and trends in International politics after the World War II.
- Understand the quest of developing countries for their identity and self determination in the era of cold War.
- Understand and critically appreciate the salient features of foreign policies of some major powers.
- Understand and appreciate the determinants and features of India's foreign policy and India's relations with her neighboring countries.
- Understand and acquaint themselves with recent developments and emerging trends in International politics.
- Understand and critically evaluate the role and functioning and impact of various organizations for regional cooperation.

Unit	Course Contents
Unit I	Meaning, Nature and Scope of International Relations, Approaches to the study of International Relations: Idealist and Realist approaches, Morgenthau's Realist Theory, Decision Making Theory. National Power: meaning and elements, Instruments of National Interest – Diplomacy and Propaganda
Unit II	Cold War, Detente, New Cold War, End of Cold War, International relations in unipolar world, Non Alignment Movement.
Unit III	Foreign Policy: meaning, elements and determinate, the salient features of the foreign policies of USA, China and India. India's relations with USA, Russia and her neighbors.
Unit IV	Major Contemporary Trends and Issues in International Politics, Role and Impact of UN in changing the World, Climate change, Global Terrorism, International Political Economy, Disarmament, Role of BRICS, SAARC, ASEAN, EUROPEAN UNION, ALBA.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

1. L.M.Goodrich, United Nation in changed world, New York, Columbia University Press, 1974.
2. M.S.Rajan (ed.), United Nations at Fifty and Beyond, New Delhi, Lancer Books 1996.
3. R.A.Folk, Law, Morality and War in the Contemporary World, New York,
4. Frederick A Praegar, 1963.
5. W.D. Coplin, Introduction to International Politics, Chicago, Markham 1971.
6. Mahendra Kumar: International Politics.
7. K.N.Waltz, Theory of International Politics Reading Massachusetts : Addison Wesley 1979.
8. Fredman : Introduction to World Politics.

ECO 302 :PUBLIC FINANCE

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Explain the nature and scope of public finance.
- Describe the concepts and principle of public finance, revenue, expenditure, debt and budget.
- Explain the financial administration in India.
- Use the statistics to understand the economic problem related to the public finance.

Unit	Course Contents
UNIT-I Nature and Scope of Public Finance	➢ Meaning, Nature and Scope of Public Finance; ➢ Distinguish between the private and public finance; ➢ Distinguish between the private goods and public goods; ➢ Concepts of Merits goods; ➢ Function of the Government, Market failure and Role of the State; ➢ The Principle of Maximum social advantage
UNIT-II Public Revenue	➢ Meaning and sources of public revenue; ➢ Taxation- Meaning, classification, cannons and effects of taxations; ➢ Division of tax burden; ➢ Theory of Taxation- Benefits and ability to pay principle of taxations; ➢ Impact and Incidence of Taxes and Taxable capacity; ➢ Major trends in tax revenue of central and state government in India.

UNIT-III **(a) Public Expenditure** **(b) Public Debt**	➢ Meaning and classifications of public expenditure; ➢ Cannon and Effect of Public expenditure; ➢ Causes of growth of public expenditure; ➢ Trends in growth of public expenditure in India. ➢ Theories of Public expenditure- Wagner's law of increasing state activity, Peacock-Wiseman hypothesis. ➢ Meaning and Sources of public borrowing, ➢ Effects of public debt, ➢ Methods of Redemptions of public debt, Debt burden and ➢ Deficit financing in India. ➢ Concept of Financial Administration, ➢ Meaning of Public Budget, ➢ Kinds of budget, ➢ Economic and functional classification of budget, ➢ Preparation and passing of budget in India.
Unit IV **International Trade and Finance Institution UNCTAD**	➢ InternationalOrganizations'-GATT/WTO(TRIPS and TRIMS), UNCTAD, Trade Blocks - EU, SAARC, NAFTA, SAFTA. ➢ International Financial Institutions-IMF, World Bank, Asian Development Bank,

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

- ✓ American Economic Association (1995) Readings in Fiscal Policy, George Allen and Unwin, London.
- ✓ Atkinson, A.B and J.E. Stiglitz(1980), Lectures on Public Economics, Tata-Mc Graw Hill, New York.
- ✓ Auerbach, A.J and M. Feidstern(Eds) (1985) , Handbook of Public Economics, Vol.1, North Holland, Amsterdam.
- ✓ Edminister, R.O(1986), Financial Institutions, Market and Management, Mc Grow Hills, New York.
- ✓ Goldsmith, R.W(1969), Financial Structure and Development, Yale, London
- ✓ Gupta, S.B ( ), Monetary Economics,
- ✓ Jha, R(1998), Modern Public Economics, Routledge, London
- ✓ Lekhi, R.K( ) , Public Finance

- ✓ Mithani, D.M(), Modern Public Finance
- ✓ Musgraves, R.A(1959), The Theory of Public Finance, Mc Graw Hill, Kogakhusa, Tokyo.
- ✓ Peacock, A and G.K, Shaw(1976), The Economic Theory of Fiscal Policy, George Allien and Unwin, Londan.
- ✓ Shoup, C.S(1970), Public Finance, Aldine Chicago.
- ✓ Tyagi, B.P( ) Public Finance,

Group E: Curriculum and Pedagogic Studies

CPSH 302 : Hkk"kk f'k{k.k fof/k;ka II

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

पाठ्यक्रम के विशेष उद्देश्य:

- भाषा की अलग-अलग भूमिकाओं को जानना
- भाषा के स्वरूप और व्यवस्था को समझना
- भाषा सीखने के तरीके और प्रक्रिया को जानना और समझना
- पाठ्यचर्या पाठ्यक्रम और पाठ्यपुस्तक का विश्लेषण कर कक्षा विशेष और बच्चों की समझ के अनुसार ढालना।
- भाषा और साहित्य के संबंध को जानना
- हिंदी भाषा के विविध रूपों और अभिव्यक्तियों को जानना
- भावों और विचारों की स्वतंत्र अभिव्यक्ति करना
- भाषायी बारीकियों के प्रति संवेदनशील होना
- विद्यार्थियों की सर्जनात्मक क्षमता को पहचानना
- भाषा के मूल्यांकन की प्रक्रिया को जानना।
- भाषा सीखने और सिखाने के सर्जनात्मक दृष्टिकोण को समझना।

इकाई-I हिंदी उच्चारण शिक्षण

- उच्चारण अवयव/स्थान
- हिंदी की मानक ध्वनियाँ एवं वर्गीकरण (स्वर व्यंजन)
- बलाघात, स्वराघात, अनुतान
- अशुद्ध उच्चारण के कारण, उनके प्रकार एवं सुधार के उपाय
- शब्द-रचना, शब्द शक्तियां, मुहावरे और लोकोक्तियों का भाषा शिक्षण में महत्व।

इकाई - II पाठ्यक्रम पाठ्य सामग्री का निर्माण और विश्लेषण

- पाठ्यचर्या , पाठ्यक्रम तथा पाठ्य पुस्तकों का संबंध
- पाठ्यक्रम का निर्माण एवं पाठ्यपुस्तक का विकास (माध्यमिक स्तर पर)
- भाषा की पाठ्य पुस्तक की विशेषताएँ
- पाठ्यक्रम एवं पाठ्यपुस्तक का विश्लेषण एवं मूल्यांकन
- रटंत प्रणाली से निर्मितवादी उपागम की ओर

इकाई - III

- प्रिंट मीडिया एवं अन्य पठन सामग्री।
- पत्रिकाएँ समाचार पत्र, कक्षा पुस्तकालय, सूचना प्रोद्योगिकी एंव श्रव्य-दृष्य सामग्री रेडियो, दूरदर्शन, फिल्म।
- पाठ्य सहगामी क्रियाएँ (साहित्य परिषद् परिचर्चा, वाद विवाद, कार्यगोष्ठी, सेमिनार इत्यादि)।
- भाषा प्रयोगशाला।

इकाई – IV मूल्यांकन - इसकी भूमिका और महत्व

- भाषा विकास की प्रगति और मूल्यांकन
- सतत और व्यापक मूल्यांकन
- मूल्यांकन की प्रविधियाँ- मौखिक, लिखित, स्वमूल्यांकन,
- आपसी मूल्यांकन, समूह मूल्यांकन
- प्रश्नों का स्वरूप- खुले प्रश्न, बहुविकल्पीय प्रश्न, सत्य असत्य प्रश्न इत्यादि।

अधिगम विधियाः व्याख्यान के साथ-साथ परिचर्चा छात्रों द्वारा स्वयं करके सीखना उनकी सहभागिता द्वारा शिक्षण।

परियोजना कार्य

1. कक्षा 6 से 8 तक की हिंदी की दो राज्यों की किसी एक पाठ्यपुस्तक की तुलना करना।
2. अपने राज्य की कक्षा 6 से 8 की हिंदी की पाठ्य पुस्तक की रूपरेखा बनाना।
3. विद्यालय पत्रिका की रूपरेखा बनाना
4. समकालीन बाल साहित्य की समीक्षा करना।
5. कक्षा 10 के हिंदी के प्रश्न पत्र की समीक्षा करना।
6. महिलाओं की किन्हीं दो पत्रिकाओं की समीक्षा करना।
7. हिंदी के किन्हीं दो दलित साहित्यकारों की किसी एक कृति की समीक्षा।
8. कक्षा 6 से 8 तक की किसी एक कक्षा के हिंदी प्रश्नपत्र का निर्माण।
9. विद्यालयी अनुभव कार्यक्रम के दौरान भाषा शिक्षण को लेकर आने वाली कठिनाइयों पर क्रियात्मक शोध।
10. अपने क्षेत्र में प्रचलित लोककथा लोकगीतों का संकलन तैयार करना।

सहायक पुस्तकें :-

1	माध्यमिक विद्यालयों में हिंदी शिक्षण,	निरंजन	कुमार सिंह
2	हिंदी भाषा शिक्षण विधि	–	भाई योगेन्द्र जीत
3	हिंदी शिक्षण विधि	–	डॉ. वैद्यनाथ प्रसाद वर्मा
4	सुबोध हिंदी व्याकरण एवं रचना	–	भानावत एवं जोशी
5	भाषा विज्ञान	–	डॉ. भोलानाथ तिवारी
6	हिंदी व्याकरण	–	कामता प्रसाद गुरु

CPSE 302 Pedagogy of English II

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: The students will be able to:
- Acquire knowledge about teaching of English
- Understand of production of sound, accents, stress etc.
- Develop their skills of English language teaching
- Improvise and use appropriate aids for teaching English
- Use various techniques for the evaluation of learner's achievement in English

Unit	Course- Contents
Unit I: Phonetics and spoken English	➢ Organs of Speech ➢ Description and classification of speech sounds: Vowels and Consonants ➢ Segmental features: Phoneme and allophone ➢ Supra-segmental features: accent, stress, intonation and rhythm ➢ Phonemic transcription ➢ Features of Indian English (GIE/ Standard Indian English (SIE) and RP/BBC)
Unit II: Language Teaching	➢ Teaching of Language Skills: LSRW and their Sub-Skills ➢ Teaching of Language: Grammar and Vocabulary ➢ Teaching of Literature: Prose, Poetry and Drama ➢ Lesson Planning in Language Teaching: Nature, Objective and Needs
Unit III: Teaching –Learning Materials and Aids	➢ Significance of materials in language classroom ➢ Why and what type of materials ➢ Text book and beyond textbook ➢ Teacher generated material, student chosen texts ➢ Audio-Visual Aids (Electronic and Print Media), NROER, E-content and Swayam Prabha, Radio, TV, Films, Mobile Phones, Computer, Internet, Realia, Pictures, Flashcards, Flannel Board, OHP, Blackboard, Models, Tape Recorder, Charts, Magazines, Newspaper, ➢ Planning co-curricular activities (discussion, debates, workshops, seminar etc) ➢ Language lab, CALL programmes etc.
Unit IV: Assessment and Evaluation	➢ Concept and Importance of Assessment and Evaluation ➢ Assessment of Language Skill (LSRW) and Language concepts (Sounds, Vocabulary, Structure and Grammar) ➢ Assessment in Poetry, Prose and Drama ➢ Techniques of evaluation –oral, written, portfolio; Close test, Self-evaluation; Peer evaluation; Group evaluation. ➢ Types of questions and test items: Assessment Activities and tasks

Language across the Curriculum Activities: As an integral part of teaching-learning process, relevant activities should be carried out to enhance and promote language skills (LSRW) and proficiency based on the rationale of Language Across Curriculum. The activities in this regard are language centered and, therefore, the focus of learning and teaching activities should be on language skills not necessarily on the content. The activities in this regard may be designed/improvised according to the context. Some of the exemplar activities may include:

- Presentation (Oral and Written) based on themes from the content area
- Debate on themes from the content area
- Panel discussion/Seminar/discussion etc
- Group discussion/group work
- Question –answer sessions
- Role play/dramatization
- Extempore speech/Elocution

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Practicum:

1. A write on the pronunciation –errors committed by student in English by given suitable suggestion for improvements.
2. Identify and analyze the challenge of teaching and learning English in the schools of the area in which the teaching practice was conducted.
3. Preparation of the following aids: 5 flashcards, 5 picture cards, 2 OHP transparencies,
4. Preparation of a ten-minutes duration CALL programme on vocabulary or Grammatical items or reading/writing skills
5. Analysis of a question paper in English prepared by the local school/board at different levels. 6. Preparation of a portfolio or a cloze test in English
7. Action Research on a classroom-based problem of teaching English in your state/province 8. Analysis of a prescribed textbook in English
9. Analysis of the syllabus in English at the upper-primary stage or secondary stage.

Suggested Readings

Unit I

- Krishnaswamy, N. et al. *Story of English in India*. New Delhi: Foundation Books. 2008.
- NCERT, *National Curriculum Framework-2005*. New Delhi: NCERT. 2010.
- NCERT, *National Focus Group Position Paper on Teaching of English*. New Delhi: NCERT. 2010.

Unit II

- Roach, Peter. *English Phonetics and Phonology*. Cambridge: CUP. 1991.
- Bansal, R.K. and J. B. Harrision. *Spoken English for India*. Madras: Orient BlackSwan. 2015.
- Cruttenden, Alan. *Gimson's Pronunciation of English* 7th Ed. London: Routledge. 2008.
- Jones, Daniel. *Cambridge English Pronouncing Dictionary*. 18th Ed. Cambridge: CUP. 2011.
- Cruttenden, Alan. *The Pronunciation of English: A Workbook*. London: Routledge. 2000.

Unit III

- Baruah, T.C. *The English Teachers' Handbook*. New Delhi. Sterling Publishing. 1985.
- Harmer, Jeremy. *How to teach English*. Harlow: Pearson Education Limited.2007.
- Harmer, Jeremy. *How to teach English*. Harlow: Pearson Education Limited.2007.

CPSSS 302 PEDAGOGY OF SOCIAL SCIENCE (CPS-2)

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.
iv) All questions will carry equal marks.

Objectives: After the completion of the course students will be able to:

- Understand the Concept of Social science Curriculum as reflected in NCF-2005.
- Plan lessons based on different approaches to facilitate learning of social sciences.
- Develop learning materials on selected units to facilitate learning in social sciences.
- Develop professional outlook and humane approach among Candidate s.

Unit I: Social Science Curriculum

- Features, Issues and Concerns in Social Science Curriculum as reflected in NCF -2005. Misconceptions in teaching- learning of social science.
- Major Social Science Discipline in Schools- Place of Social Science in the School Curriculum. Need for strengthening teaching of social science.
- Content and Syllabus of Social Science - Aims and Objectives, Content organization and presentation by different state boards of Northern region; Case Studies: *Uttar Pradesh, Rajasthan.*

Unit II: Teaching Learning Resources

- Human as resource: The significance of oral data; Primary and Secondary Sources of data: textual material, journals, magazines, newspapers etc;
- Using library as a learning resources; various contextual learning aids; audio-video material- charts, models, maps, atlas, graphs, visuals,
- Use of ICT in teaching and learning of social science- multimedia and internet. Local Community Resources.

Unit III: Professional Development of Social Science Teacher

- Concept of Professional Development, Need for updating content and pedagogical competencies. Professional Norms and Ethics.
- Ways of Professional Development- participation in seminars and conferences, online sharing, distance learning, member of professional organizations, writing in reflective journals.

Unit VI:Assessment for learning in Social Sciences-II

- Blue print, Evaluating and recording procedures to assess students' performance, Group assessment, peer assessment and Project work.
- Open books test: strengths and limitations.
- Continuous and Comprehensive Evaluation (CCE) in Social Science

Transactional Modalities: Lecture/Contact periods Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations.
Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture period; Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials.
Scheme of Assessment:

- The term -end examination will be of 70 marks.
- Two sessional tests, each test will carry a weight of ten (10) marks.
- Two assignments: one oral- presentation it will carry a weight of five (05) marks and one written- assignment it will carry a weight of five (05) marks.

Suggested Reading:

1. Dash, B.N. (2006).Content cum Method of Teaching of Social Studies. New Delhi: Kalyani Publication.
2. Heller, F. (1986). The use and abuse of Social Sciences. London: Sage Publications.
3. Kochhar, S.K. (1986). Methods and Techniques of Teaching. New Delhi: Sterling Publishers Pvt. Ltd.
4. Mofatt, M.R. (1955). Social Studies Instruction. New York: Prentice Hall.
5. National Curriculum Frame Work (2005). New Delhi: NCERT.
6. Position Paper by National Focus Group on Teaching of Social Sciences
7. Preston, R.C. (1959). Teaching Social Studies in the Elementary School. New York: Rinehart and Company.
8. Sahu, B.K. (2007). Teaching of Social Studies. New Delhi: Kalyani Publishers.
9. Singh, G. (2007). Teaching of Social Studies. Ludhiana: Kalyani Publishers.
10. Singh, G. (2009). Teaching of Social Studies. Ludhiana: Chetna Parkashan.
11. Taneja, V.K. (1992). Teaching of Social Studies. Ludhiana: Vinod Publication.
12. Wesley, E.B. (1951). Teaching of Social Studies. Boston: D.C. Herth and Co.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
EFSE 302: SCHOOL EXPOSURE AND RELATED ACTIVITIES

Credits: 4 **Marks: 100**
Contact hours: 04 weeks

Distribution of Marks for the School Exposure and Related activities		
Activity	**Max. Marks**	**Min. Pass Marks**
Content Analysis in each teaching subject	20	10
Preperation and use of learning resources during peer teaching in each teaching subject (two)	10+10 =20	10
Observation record • Five classes of regular classroom teacher • Five classes of peer	10+10=20	10
Actual classroom teaching (Two lesson in each teaching subject)	40	20
Total	**100**	**50**

Objectives of the Course: On completion of the Course, the students will be able to:

- Understand about the activities to be carried out during school internship programme.
- Observe classroom teaching, various school activities and gain a feel of the multiple roles of a teacher.
- Develop skill in content analysis, preparing TLM and observing classroom processes.
- Plan and implement teaching learning activity for peers and actual classroom.

Pre-Internship Tasks:

(The Internship Committee formulated by the Institute will prepare a Schedule for execution of Pre- Internship Tasks)

During the four week duration, the student teachers are oriented to the school internship programme.

For the first two weeks, they will be provided training in core teaching skills, content analysis, preparing Teaching Learning Material (TLM), writing observation records, Reflective Journals, conducting Action Research and Case Study, organizing school activities and their reporting, developing Achievement Tests, administering and analyzing. Student teachers will also write lesson plans and take up peer teaching.

For the next two weeks, student teachers will be placed in the schools. They will observe the classes being handled by the regular teachers as well as their peers. Every student teacher will teach at least one lesson in each teaching subject and reflect on the teaching.

Modes of Learning Engagement:

Pre internship will be carried out both in the Institute and the School.

First two weeks they will be exposed to theoretical knowledge about internship and receive information on various activities that are required to be carried out by the student teachers.

Student teachers will get hands on experience on performing certain tasks which they are expected to perform in the school.

In the beginning they learn to teach in a simulated condition by teaching their peers.

Next two weeks, student teachers are attached to the school on full time basis, observe the teaching by the regular classroom teacher, teach at least one lesson in each teaching subject, involve in all the activities of the school and learn to understand the school.

Student teachers keep a record of all the work carried out by them in the school .

Group D: Discipline Specific Elective (DSE)

HIN 401: अस्मितामूलक विमर्श और हिंदी साहित्य

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

उद्देश्य–

संप्रति हिंदी में स्त्री और दलित विमर्श की बहुत चर्चा है अत: इससे विद्यार्थी परिचित हो सकेंगे और अद्यतन लेखन से जुड़ सकेंगे। वे तत्संबंधी साहित्य एवं पत्र पत्रिकाओं से परिचित हो सकेंगे इस अध्ययन से विद्यार्थियों में समतावादी प्रगतिशील दृष्टिकोण का विकास होगा जिससे प्राचीन रूढ़िया समाप्त हो सकेगी।

प्रथम इकाई –

- **विमर्शों की सैद्धांतिकी:**
  - स्त्री विमर्श : अवधारणा और मुक्ति आंदोलन
  - दलित विमर्श : अवधारणा और आंदोलन, फूले और अम्बेडकर

(स्वाधीनता से पूर्व एवंस्वाधीनता के बाद स्त्री, दलित विमर्श)

द्वितीय इकाई

- **दलित विमर्श की प्रमुख विधाएँ**

(क)– आत्मकथा – जूठन : ओमप्रकाश वाल्मीकि (प्रथम भाग)
(ख)– नाटक, तड़प मुक्ति की : माता प्रसाद

तृतीय इकाई

(क)– कहानी: चर्चित दलित महिला कथाकारों की कहानियाँ: डॉ कुसुम वियोगी

चतुर्थ इकाई

- स्त्री और दलित विमर्श में हिंदी साहित्य की पत्रिकाओं का योगदान
- स्त्री और दलित विमर्श दशा और दिशा

संदर्भ ग्रंथ

1. जूठन – ओम प्रकाश राधाकृष्ण प्रकाशन
2. चर्चित दलित कहानियाँ – डॉ.कुसुम वियोगी, गौतम प्रकाशन 30/64 गली नं 8 विश्वास नगर शाहदरा दिल्ली 110032
3. तड़प मुक्ति की – माता प्रसाद, सम्यक प्रकाशन, 32/3, पश्चिम पुरी, नई दिल्ली 110063

ENG 401 American Literature

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquainted with various literary figures in English from America
- Appreciate literary sensibilities from America
- Expose themselves to literature in English outside Britain

Unit	Course Contents
Unit I Prose	Saki (H. H. Munro) : The Open Window Bernard Malamud : The Jewbird Young Goodman Brown Nathaniel Hawthorne : A Rose for Emily William Faulkner : : Self Reliance Emerson
Unit II Poetry	H.W. Longfellow : Snow-Flakes Robert Frost : Mending Wall Walt Whitman : A Noiseless Patient Spider Emily Dickinson : Because I Could Not Stop for Death : Edgar Allen Poe : The Raven
Unit III Fiction	Ernest Hemingway : The Old Man and the Sea
Unit IV Drama	Arthur Miller : Death of a Salesman

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

Unit I
Hart, James D. and Phillip Leininger. The Oxford Companion to American Literature. 6th Ed. New York: OUP. 1995.
Cassill, R.V. The Norton Anthology of Short Fiction. 3rd Ed. New York: W. W. Norton & Company. 1986.
Unit II
Ferguson, Margaret. The Norton Anthology of Poetry. New York: W. W. Norton & Company. 2005.
Unit III
Hemingway, Earnest. The Old Man and the Sea. (Vintage Classics). New Delhi: Vintage Classics. 1999.
Donaldson, Scott. The Cambridge Companion to Hemingway. Cambridge: CUP. 1996.
Unit IV
Miller, Arthur. Death of a Salesman. New York: Penguin Classics. 2011.
Bigsby, Christopher. The Cambridge Companion to Arthur Miller. Cambridge: CUP. 2010.

GEO 401: Population and Settlement Geography

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.
iv) All questions will carry equal marks.

Objectives:

1. *To know about various sources of demographic data*
2. *To explain concepts and theories related to population dynamics and settlement systems*
3. *To understand earth as constituted by people with distinct demographic attributes who dwell in urban and rural settlements located in diverse geographical environments.*

Course Contents

Unit I

Sources of population data with special reference to India (Census, Vital Statistics and NSS). Population Size, Distribution and Growth – Determinants and Patterns; Theories of Growth – Malthusian Theory and Demographic Transition Theory.

Unit II

Fertility, mortality and migration – measures, determinants and implications; Age-sex composition; Rural and urban composition; Literacy.

Unit III

Basic Concepts: Rural settlements, Urban settlements; Dwelling, Hamlet, Village, Town, City, Metropolis, Megalopolis, Conurbation, Rural-Urban Fringe.

Unit IV

Rural Settlements: Types and Patterns; Urban Settlements: classifications and typologies; Central place theory, Rank-size rule, Primate city.

Reading Lists

1- Barrett H. R., 1995: *Population Geography*, Oliver and Boyd.
2- Bhende A. and Kanitkar T., 2000: *Principles of Population Studies*, Himalaya Publishing House.
3- Chandna R. C. and Sidhu M. S., 1980: *An Introduction to Population Geography*, Kalyani Publishers.
4- Chishlom M., 2007: *Rural Settlement and Land Use*, Transaction Publishers.
5- Daniel, P. 2002: *Geography of Settlement,* Rawat Publs., Jaipur & New Delhi.
6- Ghosh, Santwana 1999: *A Geography of Settlements,* Orient Longman, Kolkata.
7- Kalia Ravi, 1999: *Chandigarh: The Making of Indian City*, Oxford University Press.
8- Kaplan D. H., Wheeler J. O. and Holloway S. R., 2008: *Urban Geography*, John Wiley.
9- Lutz W., Warren C. S. and Scherbov S., 2004: *The End of the World Population Growth in the 21st Century*, Earthscan
10- Newbold K. B., 2009: *Population Geography: Tools and Issues*, Rowman and Littlefield Publishers.
11- Pacione M., 2009: *Urban Geography: A Global Perspective*, Taylor and Francis.
12- Ramachandran R., 1989: *Urbanisation and Urban Systems of India*, Oxford University Press.
13- Ramachandran, R., 1992: *The Study of Urbanisation*, Oxford University Press, Delhi
14- Singh R. Y., 1994: *The Geography of Settlement*, Rawat Publication, New Delhi.
15- Tiwari, R. C. 2000: *Settlement Geography*, (in Hindi), Prayag Publ., Allahabad.

GEO 401: PRACTICALS

Geological Maps and Identification of Rocks and Minerals

Total credit : 1 ***Contact hours: 2 per week***

Geological Map: Study of horizontal, vertical and tilted beds along with alignment of contours: study of strike, dip and bedding plane.

Identification of rocks and minerals:

Rocks: granite, basalt, dolerite, shale, sandstone, limestone, conglomerate, laterite, slate, phyllite, schist, marble, quartzite and gneiss

Minerals: talc, gypsum, calcite, mica, feldsper, quartz, chalcopyrite, hematite, magnetite, bauxite, galena

Practical Record File:

Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 20 marks. Duration of examination will be 3 hours.
  - Record File 10 Marks
  - Participation/Viva 10 Marks

Reading List

- Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography,* Concept, New Delhi. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
- Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
- Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book Depot, Allahabad Singh, R.L. & Singh Rana, P.B. 1992: *Elements of practical Geography*, New Delhi: Kalyani Publisher**.**

HIS 401 : Contemporary India up to 2000 A.D.

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- This Semester is of most crucial information for the study of Indian History.
- We are closely to the present. The knowledge of history unfolds and leads us to the present.
- This semester will provide understanding how India developed today and competing with the Globalised world.

Unit	Course Contents
Unit I	➢ Legacy of freedom struggle, socio cultural values of non-violence. ➢ Problems and process of the integration of Indian states. ➢ Problems of displaced persons and rehabilitation process. ➢ Framing of Indian constitution main Features and Amendments
Unit II	➢ Agrarian reforms and Bhudan movement, Green revolution. ➢ Five-year plans and beginning of planned economy. ➢ Industrialisation: Problems and prospects ➢ Nationalisation of Banks and Abolition of Privy Purse
Unit III	➢ Main characteristics of Indian Foreign policy ➢ Principle of Panchsheel, Policy of Non-alignment and role of India ➢ Indo china war, Indo Pakistan wars, Kashmir problem, Shimla Agreement 1971-72 ➢ India's relations with neighbouring countries
Unit IV	➢ Indian women after Independence, Political participation and contribution of women in various spheres. ➢ Upliftment of depressed classes, problems and challenges before Indian society. ➢ Achievements in the field of science and technology with special reference to space, atomic energy and I T sector ➢ India emerging as a world power.

Tutorials/Practicum : Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials.

Suggested Readings

- Parobo, Parag D. *India's First Democratic Revolution*. Orient Blackswan
- Poswal, Sajjan,*Contemporary India 1947-2000,* Rajasthan Hindi Granth Academy
- Rao, M.S.A. *Social Movements in India . Vol I & II*
- Dev, Arjun .*Contemporary World* . NCERT. New Delhi.
- Heehs, Peter. *Morden India and the World* . Oxford University Press. New Delhi
- Phadnis, Urmila. *Towards Integration of Indian States.* New Delhi.
- Heehs, Peter. *Nationalism , Terrorism and Communalism*. Oxford University press Delhi. 1998
- Sharma, R.R.(Ed.). *The USSR in Transition and Themes* . New Delhi. 1995

POL 401: POLITICAL IDEOLOGIES

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Understand the meaning, evolution and nature ofPolitical Ideology.
- Acquire knowledge about the various traits of Liberalism.
- Acquire knowledge about the Socialism
- To understand the relevance of Contemporaryideologies of 21st century.

Unit	Content
Unit I	Political Ideology: Meaning ,evolution, Nature
Unit II	Liberalism: Classical , Morden , Contemporary
Unit III	Socialism: Marxism , Democratic Socialism
Unit IV	Contemporary Streams : Gandhian view, Nationalism , Feminism, Environmentalism.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

1. Andrew Heywood :Political Ideology, Palgravev. 2017
2. Brain.R.Nelson: Western Political Thought: From Socrates to the Age of Ideology, Pearson Education India 2004.
3. Joseph.A.S:Capitalism, Socialism & Democracy.Adarsh books ,New Delhi.2011
4. Freeden,M:Liberalism: A Very Short Introduction. Oxford University Press .2015
5. O.P. Guba : Political ideas and Ideologies, Mac Millar
6. Will Kymlicka Contemporary Political Philosophy

ECO 401: Introductory Micro Economics

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

On completion of this course, the student shall be able to

(i) Critically reflect and analyse the issues related to Micro Economics

(ii) Illustrate how microeconomic concepts can be applied to analyse real-life situations.

Unit	Course- Contents
UNIT-I Introduction to Micro Economics	➢ Meaning & Definition of Economics, ➢ Subject matter, Scope and Significance of Economics, ➢ Questions of what, how and for whom to produce and how to distribute outputs, ➢ positive and normative Economics, Economic Laws
UNIT-II Consumer Behaviour	➢ Consumer Behaviour & concepts and need for studying Consumer behaviour ➢ Process & ethics in consumer research ➢ Models of consumer behaviour ➢ Applications of consumer behaviour in Marketing Decisions.
UNIT-III Theory of Consumer Behaviour	➢ Cardinal approach and its criticisms, ➢ Law of Diminishing Marginal Utility, ➢ Law of Equi-Marginal Utility, ➢ Law of Demand, ➢ Exceptions to Law of Demand. ➢ Indifference curve approach, ➢ Budget Line, ➢ Consumers Equilibrium, ➢ Income, Substitution and Price effect, ➢ breaking up price effect to Income and substitution effect, ➢ Comparison between Marginal Utility approach and Indifference Curve approach.

Unit IV Supply & Demand: How Markets work, Markets and Welfare	➢ Individual demand and supply schedules and the derivation of market demand and supply; ➢ derivation of market demand and supply; ➢ shifts in demand and supply curves, ➢ the role of prices in resource allocation; ➢ the concept of elasticity and its application, ➢ consumer and producer surplus; ➢ taxes and their efficiency costs

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

✓ Karl E. Case and Ray C Fair, Principles of Economics, Pearson Education, Inc. 8th edition, 2007.
✓ N. Gregory Mankiw, Economics; Principles and Applications, India Edition by South Western a part of Cengage Learning, Cengage Learning India Private Limited
✓ Joseph E. Stiglitz and Cost E. Walsh, Economics, W.W. Norton & Company, Inc., New York, International Student Edition, 4th Edition, 2007
✓ Hal R. Varian, Intermediate Microeconomics, A Modern Approach, 8th Edition, W.W. Norton & Company 2010.
✓ H.L. Ahuja, Advanced Economic Theory, 8th Edition, S. Chand & Company Ltd. New Delhi
✓ Baumal, W.J. , Economic Theory and Operational analysis, Prentice Hall of India, New Delhi
✓ D.N. Dwivedi, Microeconomics, Theory & Application, Third Edition, Vikash Publishing House Pvt. Ltd.

Group E: Professional Education Courses (PEC)

IV: Engagement with the field (EF)

EFSI 401: School Internship

Credits: 0L+0T+14P **Marks: 300**
Contact hours : 14 weeks

Distribution of Marks for the School Internship	
Activity	**Marks**
Classroom Teaching (two Pedagogy courses)	200
Criticism Lessons (four lessons in total)	40
Reflective Journal (two Pedagogy courses)	10
Observation Records • Ten lessons of school teacher • Ten lessons of peer	5+5 =10
Achivement test-development, Administration and Analysis	10
Case Study / Action Research	10
Detailed Record of any two activities organized by the Candidate	10
Learning Resource in two teaching subjects	10
Total	**300**

Objectives of the course: On the completion of the course the Candidate s will be able to:

- Observe the classes of regular teachers and peers and learn about teaching learning process and classroom management.
- Develop skill in planning and teaching in actual classroom environment.
- Reflect, learn to adapt and modify their teaching for attaining learning outcomes of students.
- Maintain a Reflective Journal.
- Acquire skill in conducting Action Research/ Case Study.
- Inculcate organizational and managerial skills in various school activities.
- Create and maintain resources for teaching and learning in internship schools.
- Work with the community in the interest of the learner and their learning outcomes.

Internship Tasks:

The Candidate s will perform the following in the school attached to her/him.

(a) Delivery of lessons

- The Candidate s will deliver a minimum of 40 lessons including two criticism lessons (one at the end of 9th week and the other during the last week of the teaching assignment) in each Pedagogy course. In total they will teach 80 lessons in two Pedagogy courses (Preferably 20 lessons for Upper Primary classes and 20 for Secondary classes in each Pedagogy course).
- The Candidate s will visualize details of teaching learning sequences, keeping all considerations in view. They will also involve themselves in discussion, reflection, reconsideration and consolidation after each lesson as well as at the end of the unit.

(b) Practicum

- Preparation, administration and analysis of achievement tests in two Pedagogy courses.
- Conducting Action Research / Case Study.
- Observing ten lessons of a regular teacher and ten lessons of peers in each Pedagogy course and preparing an Observation Record.
- Preparing and using teaching aids in each Pedagogy course.
- Writing a Reflective Journal.
- Organising any two co curricular activities and reporting.

- Preparing a suggestive comprehensive plan of action for improvement of some aspects of the school, where they have been teaching during Internship.
- Reporting on activities conducted with the community.

Any other activity given under Suggested School Activities can be studied after consultation with the Faculty, in charge of Learning to function as a teacher (School Internship).

Suggested School Activities

- Organising cultural, literary, sports and games activities
- Framing of time table
- Organising Morning Assembly
- Maintenance of school discipline
- Maintenance of school records, library and laboratories
- Providing Guidance and Counseling services
- Studying the role of community in school improvement
- School Mapping
- Water Resource Management in schools
- Mass awareness of social evils and taboos
- Organising educational fair, exhibition, club activities, nature study and field trip. (Any other activity/ activities decided by the Institute)

Post Internship Tasks:

- Post Internship is organized for a day mainly for reflection and review of internship programme as a whole, to facilitate the understanding of the effectiveness of various activities undertaken during the internship. The tasks include the following.
- Seeking reactions from students, teachers, Heads and teachers of cooperating schools and supervisors of the Institute.
- Exhibition of the Teaching Learning Material used by the Candidate s during the internship.
- Any other activity decided by the Institute.
- Inviting suggestions for improving the programme.

Modes of Learning Engagement:

- Internship tasks will be carried out as a part of the 'in-school' practice. A mentor/cooperating teacher and supervisor of the Institute will guide the Candidate periodically.
- Candidate s will observe at least 10 lessons of regular classroom teacher and 10 lessons of their peers.
- Adequate classroom contact hours - a minimum of 40 lessons including two criticism lessons in each Pedagogy course preferably 20 lessons for Upper Primary classes (VI-VIII and 20 lessons for Secondary classes (IX and X) for subject based teaching – learning will be under taken in consultation with the school authorities.
- A Reflective Journal will be maintained by the Candidate in which she/he records her/his experiences, observations and reflections on classroom experiences.
- A portfolio will be maintained by the Candidate s which includes lesson plans, resources used, assessment tools, student observations and other records.
- Candidate s will always work in liaison with the regular teachers in the schools

involving themselves in all the school activities and conducting at least two activities.

- The Institute in consultation with the schools will prepare the details of the internship programme for each of the schools.

Group D: Discipline Specific Elective (DSE)

HIN 402 Hkk"kk lkfgR; vkSj f”k{kk

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

उद्देष्य–

शिक्षा के साथ–साथ साहित्य, समाज और संस्कृति के क्षेत्र में भाषा के योगदान और महत्ता से विद्यार्थियों को अवगत कराना।

प्रथम इकाई

- भाषा, समाज एवं साहित्य
- भाषा एवं संस्कृति
- भाषा एवं पहचान
- भाषा एवं लिंग (जेण्डर)
- भाषा एवं सत्ता
- भाषा एवं साहित्य की अवधारणा
- समाज के लिए साहित्य की महत्ता
- साहित्य पर समाज का प्रभाव

द्वितीय इकाई

- शिक्षा के लिए भाषा
- शिक्षा में भाषा की भूमिका
- भाषा एवं शिक्षामें संबंध
- शिक्षा पर भाषा का प्रभाव
- शिक्षा का माध्यम – बहुभाषिकता एक संसाधन के रूप में

तृतीय इकाई

- शिक्षा के लिए साहित्य
- शिक्षा में साहित्य की भूमिका
- साहित्य और शिक्षा में संबंध
- शिक्षा पर साहित्य का प्रभाव

prFk bdkbZ

- शिक्षा के लिए पाठ्यक्रम
- शिक्षा में पाठ्यक्रम, पाठ्यचर्या और पाठ्य पुस्तकों की भूमिका, पाठ्यचर्या, पाठ्यक्रम, पाठ्य पुस्तक और कक्षा, संप्रेषण में भाषा की भूमिका। भाषा के पार पाठ्यक्रम की अवधारणा।

संदर्भ ग्रंथ

1. राष्ट्रीय पाठ्यचर्या की रूपरेखा 2005 एन.सी.ई.आर.टी. प्रकाशन नई दिल्ली।
2. भारतीय भाषाओं के शिक्षण का आधार पत्र (पोजिशन पेपर) एन.सी.ई.आर.टी. प्रकाशन नई दिल्ली।
3. हिंदी शिक्षण का आधार पत्र (पोजिशन पेपर) कोठारी कमीशन
4. राष्ट्रीय शिक्षा नीति 1986 (पी ओ ए 1992)मुदालियर कमीशन

ENG 402: Literary Criticism and Theory

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Develop their analytical skills by reading various literary critiques.
- Develop their skills of literary analysis and interpretation by reading the eminent schools of literary theories.
- Familiarize the key concepts in classical criticism, neoclassicism, romantic criticism, Victorian criticism and new criticism with a view to enabling the students explicate, elucidate and interpret literary texts.

Unit	Course - Contents
Unit I: Classical Criticism, Neo Classical Criticism and Indian Aesthetics	➢ Aristotle : Poetics ➢ Johnson : Preface to Shakespeare ➢ Bharata: Natyashastra ➢ Theory of Rasa, Vynjana and Alankara.
Unit II Romantic Criticism and Victorian Criticism	➢ Wordsworth : Preface to Lyrical Ballads ➢ Mathew Arnold : "The function of Criticism at Present Time", "The Study of Poetry".
Unit III: Modern Criticism	➢ TS Eliot : "Tradition and Individual Talent", "Hamlet and His problems" ➢ Raymond Williams: 'Forms' in Culture.
Unit III: Post Structural, Post Colonial, Post Modernism and Feminism	➢ Jacques Derrida: Structure, Sign and Play ➢ Stanley Fish: Is there a text in this class? ➢ Edward Said: Orientalism (Chapter 1) ➢ Elaine Showalter: Towards a Feminist Poetics.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

Unit I

- Abrams, M.H. *The Mirror and the Lamp: Romantic Theory and the Critical Tradition.* OUP. 1972.
- Kermode, Frank. *The Romantic Image.* Routledge Classics. 2002.
- Wordsworth, William & S. T. Coleridge. *Lyrical Ballads*. Penguin Classics.2006.
- Bowara, C.M. *The Romantic Imagination*. OUP. 1961.
- Enright, D J and Ernst De Chickera (Ed.) *English Critical Texts*. OUP. 1997
- Habib, M. A. R. *A History of Literary Criticism: From Plato to the Present.* Blackwell. 2005.

Unit II

- Leitch, Vincent B. *The Norton Anthology of Theory and Criticism.* W. W. Norton & Company. 2001.
- Prasad, B. *An Introduction to English Criticism*. Macmillan. 2013.

Unit III

- Barry, Peter. *Beginning theory: An Introduction to Literary and Cultural Theory*. Manchester University Press. 3rd Rev. Ed. 2009.

Unit IV

- Bertens, Hans. *Literary Theory: The Basics*. Routledge. 2001.
- Dobie, Ann B. *Theory into Practice*: *An Introduction to Literary Criticism.* 3rd Ed. Wadsworth Cengange Learning.

GEO 402: Geographical Thought

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION
i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.
ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.
iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.
iv) All questions will carry equal marks.

Objectives:

1. *To understand the evolution of geography as a distinct field of intellectual inquiry*
2. *To understand the various facets of geographical thought*
3. *To understand the development of geography as a discipline in India*

Unit I

Philosophical basis of geography; Place of geography in the classification of knowledge; Development of geographical thought during ancient and medieval periods: Contributions of Greeks, Romans, Indians and Arabs.

Unit II

Geographical ideas of Bernhardus Varenius, Immanuel Kant, Alexander von Humboldt, Carl Ritter and Friedrich Ratzel; Nature of dualism and unity in geography

Unit III

German, French, British and American schools of geography; Development of Geography after the Second World War: Quantitative revolution; Behavioural geography, Welfare and Radical geography.

Unit IV

Development of geography in India during the British Period: Development of geography after Independence; Role of Geographical Societies and Government Institutions (Census and NATMO); Contributions of modern Indian geography

Reading list

1- Bonnett A., 2008: *What is Geography?* Sage.
2- Dikshit R. D., 1997: *Geographical Thought: A Contextual History of Ideas*, Prentice-Hall India.
3- Dikshit R.D. 1994: *The Art and Science of Geography: Integrated Readings,* Prentice-Hall India
4- Hartshone R., 1959: *Perspectives of Nature of Geography*, Rand MacNally and Co.
5- Holt-Jensen A., 2011: *Geography: History and Its Concepts: A Students Guide*, SAGE.
6- Husain, Majid, 2014: Evolution of Geographical Thought, Rawat Publications, Jaipur
7- Johnston R. J., (Ed.): *Dictionary of Human Geography*, Routledge.
8- Johnston R. J., 1997: *Geography and Geographers, Anglo-American HumanGeography since 1945*, Arnold, London.
9- Kapur A., 2001: *Indian Geography Voice of Concern*, Concept Publications.

10- Martin Geoffrey J., 2005: *All Possible Worlds: A History of Geographical Ideas*, Oxford.

GEO 402: PRACTICALS
Remote Sensing and GIS

Total credit : 1 ***Contact hours: 2 per week***

Principles of Remote Sensing; Properties of EMR

Resolution of satellite sensors with special reference to IRS series;

Geo-referencing of scanned maps and satellite images applying reference spheroids (WGS-84 and Everest)

Projections (Universal Transverse Mercator's and Polyconic);

Digitization and Extraction of physical and anthropogenic features for change detection;

Digitization of administrative maps and attachment of attribute tables;

Preparation of choropleths maps

Practical Record File:Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination will carry a weightage of 20 marks. Duration of examination will be 3 hours.
  - Lab Work (Any 3 out of 4 exercise) 10 Marks
  - Record File 05 Marks
  - Viva 05 Marks

Reading List

1- Campbell J. B., 2007: *Introduction to Remote Sensing*, Guildford Press.
2- Jensen J. R., 2004: *Introductory Digital Image Processing: A Remote Sensing Perspective*, Prentice Hall.
3- Joseph, G. 2005: *Fundamentals of Remote Sensing*, United Press India.
4- Lillesand T. M., Kiefer R. W. and Chipman J. W., 2004: *Remote Sensing and Image*
5- *Interpretation*, Wiley. (Wiley Student Edition).
6- Nag P. and Kudra, M., 1998: *Digital Remote Sensing*, Concept, New Delhi.
7- Rees W. G., 2001: *Physical Principles of Remote Sensing*, Cambridge University Press.

HIS 402: Military History of India

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- This semester will provide the knowledge of Ancient Indian warfares and its compression Greek warfare.
- The war strategies of medieval India as tulugma and Guerrilla techniques.
- Students will be informed about the organizations Indian armed Forces, Paramilitary forces, I.N.A, NCC etc.

Unit	Course Contents
Unit I	➢ Military System in Vedic, Pauranic & Epic Period. ➢ The battle of Hydaspes (326 B.C) and comparative study of Indo-Greek Military organization. ➢ Kautilya's Philosophy, war & military and organization of Mauryas. ➢ Military organization and war techniques of Rajputs and Turks with special reference to the Battle of Tarain (1192 AD)
Unit II	➢ Warfare of the Sultanate Period and Military reforms of Alauddin Khalji. ➢ Strategies of Babar with in the First Battle of Panipat (1526 A.D) ➢ Guerilla Techniques and Naval warfare of Marathas and their military organization under Shivaji. ➢ Martha Warfare in the third battle of Panipat (1761 AD)
Unit III	➢ Amalgamation of Presidency Armies. ➢ Lords Kitcher's Reforms ➢ Post Second World War Reorganization ➢ Growth of Indian Navy & Indian AIR Force
Unit IV	➢ The INA & Netaji Subhash Chandra Bose ➢ Higher Def. Organizationn ➢ Organization of Army, Navy & Air Force. ➢ Paramilitary Organization, BSF, ASSAM Rifles, TTBP, CRPF, Coast Guard, NCC & CISF

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any, may be resolved during tutorials.

May be given to draw the Tulugma and Guerrilla techniques of organizations army, Navy, Air Force., May prepare Modals of various weapons from Ancient Period Onwards.

Suggested Readings

- Mazumdarr, B. K. *Military System in ancient India*
- Dayld , Major Alfred. *Indian Art of War*
- Malison, Col. *Decisive battle of Indian History*
- Singh, Jaswant. *Indian Armed Force*
- Jackson, Peter. *The Delhi Sultanate A political and Military History*. Cambridge University Press
- Chandra, K. Hemendra. *Military History of India*. Vision Books
- Sandhu, Singh. Gurucharn. *A Military History of Medieval India*. Vision Books. 2003
- Sandhu, Singh. Gurucharn. *A Military History of Ancient India*. Vision Books. 2003
- Singh, Ajay. *The Battles that Shaped Indian History*. Pentagon Press. 2012
- Roy, Kaushik. *From Hydaspes to Kargil : A History of Warfare in India from 326 BC to AD 1999*. Manohar Publishers & Distributors. 2004

POL 402 :IDEAS AND CONCEPTS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – Teacher will be able to:

- Understand the nature and functions of the State according various perspectives.
- To understand basic theories of Democracy.
- Acquire knowledge about the Organization of Democracy.
- To understand and analyse the basic Concepts of Political Science.

Unit	Course Contents
Unit I	Nature of State: Ideal, Liberal, Marxian perspectives.Functions of State : Minimal State and Welfare State.
Unit II	Theories of Democracy: Classical, Liberal, Marxist
Unit III	Organization of Democracy : Election, Representation, Suffrage, Political Parties ,Pressure Groups.Models of Democracy: Representative, Participatory, Deliberative.
Unit IV	Concepts: Rights, Liberty, Equality, Justice, Citizenship

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

1. G.A.Almond: Comparative Politics Today: A world view, 7th end, New York, London.
2. Sir, Barker, Principles of Social and Political theory
3. N.P.Barry, Introduction to Modern Political Theory, London, Macmillan, 1995.
4. A Brochl, Political theory: The foundations of Twentieth Century Political Thought, Bombay, The Times of India Press, 1965.
5. D. Easton, the Political System: An Inquiry into the state of Political Science, New York, Wiley 1953.

ECO 402: Macro Economics

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- explore the basic principles of Macro Economic Theory
- discuss the preliminary concepts associated with the determination and measurement of aggregate macroeconomics variables like savings, investments, GDP, money, Inflation and the balance of payments

Unit	Course- Contents
UNIT-I Macro Economics, Meaning & Significance	➢ Meaning of Macro Economics, ➢ Need and characteristics of Macro Economics ➢ Scope of Macro economics ➢ Importance and Limitations of Macroeconomics
UNIT II National Income	➢ Circular flow of Income and Expenditure, ➢ concept of National Income, ➢ Methods of measurement of National Income and problems in measuring National Income
UNIT-III Functions of Money	➢ Quantity theory of money; ➢ determination of money supply and demand, ➢ credit creation, ➢ tools of monetary policy
UNIT-IV Inflation	➢ Meaning & Definition of Inflation, ➢ Types of Inflation, ➢ Causes of Inflation, ➢ Measures to Control Inflation

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings

1. Dombusch, Fixcher & Startz, Macro Economics, MC Graw Hill, 11th Editio, 2010
2. N. Gregory Mankiw, Macro Economics, Woth Pubishers, 7th Edition, 2010
3. Richard t. Frayen,Macro economics, Pearson Education Asia, 2nd edition, 2005
4. Errol D' Souza, Macroeconomics, pearson Education, 2009
5. Andrew B. Abel & Ben S. Bernanka, Macroeconomics, Pearson Education, Inc. 7th edition, 2011

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)

I: Perspectives in Education (PE)

Semester VIII

PEVE 402: Vision of Education in India-Issues and Concerns

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the Candidate will be able to:

- Understand determinants of the purposes and processes of education.
- Understand the role of education as an agency of social transformation.
- Reflect critically on concerns and issues of contemporary Indian schooling.
- Develop their insight as future concerns of education.
- Analyze development of education in light of socio, economic, political and cultural development.

Course Contents

Unit I: Vision of Indian Education and Indian Thinkers

a) Aims and purposes of education drawn from the ancient intellectual tradition of India
b) Communities, Religion, State and Market as the determinants of purpose and process of Education
c) An overview of salient features of the philosophy and practice of education by
   - Swami Vivekanand: Humanistic Approach
   - Rabindranath Tagore: Liberationist pedagogy
   - M. K. Gandhi: Basic education or Education for self sufficiency
   - Aurobindo Ghosh: Integral Education
   - J. Krishnamurthi: Education for individual and social transformation

Unit II: Contemporary Indian Schooling: Concerns and Issues

a) Constitutional interventions for universalization of education and RTE Act 2009
b) Constitutional provisions on education that reflect National ideals (Democracy, Equality, Liberty, Secularism and Social justice)
c) Equality of Educational Opportunity:
   - Meaning of equality of educational opportunity and constitutional provisions
   - Prevailing nature and forms of inequality, including dominant and minor groups and related issues

- Inequality in schooling: Public and private schools, rural-urban Schools, single teachers' schools and many other forms of inequalities in school systems and the processes leading to disparities

d) Issues of Quality and Equity in schooling (with specific reference to girl child, weaker section and differently abled children), Variations in school quality
e) Idea of 'common school' system

Unit III: Future Concerns and changing scenario in Education

a) Impact of globalization, liberalization and privatization on Indian society and education
b) Rights and Scheme for education of Girl Child
c) Education for National Integration and International Understanding
d) Citizenship education, Education for Sustainable Development of society
e) ICT In School Education- National Repository of Open Educational Resources (NROER)

Unit IV: Education and Development- An Interface

- Emerging trends in the interface between:
  - political process and education
  - economic developments and education
  - Socio- cultural changes and education
  - Skill development with reference to vocational education
  - Educational development through community participation (Govt. and Non- Govt. Agencies)

Modes of Learning Engagement:

- Sourcing and studying relevant portions of documents relevant to the themes.
- Presentations based on readings (including original writing of at least one educational thinker).
- Conduct surveys of various educational contexts (e.g. Schools of different kinds) and make interpretative presentations based on these.
- Study writings on analysis of education-development interface and make presentations.
- Group discussions, debates and dialogue on the themes.

Practicum:

1. Preparing an assignment on Constitutional Provisions on Education.
2. Preparing a brief summary of Educational writers/books contributed by any of the Indian Thinkers.
3. Reporting on Practice of Rights of the Child with special reference to Girl Child.
4. Comparative analysis of different types of schools.
5. Conducting surveys and presentations based on afore said units.
6. Interpretation of field studies and experiences in terms of the course themes
7. Comprehension of ideas of thinkers and presenting them in groups.
8. Extent of innovative ideas and sensitivity in visualizing project on 'peace' or 'environmental concerns'

Suggested Readings:

1. Agrawal, J.C. & Agrawal S.P. (1992). Role of UNESCO in Educational. New Delhi. Vikas Publishing House.
2. Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society. New Delhi. NCERT.
3. Govt. of India (1986). National Policy on Education. New Delhi. MHRD.

4. Govt. of India (1992). Programme of Action (NPE). New Delhi. MHRD.
5. Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore. New Delhi. New Book Society.
6. Manoj Das (1999). Sri Aurobindo on Education. New Delhi. National Council for Teacher Education.
7. Mistry, S.P. (1986). Non-formal Education-An Approach to Education for All. New Delhi. Publication.
8. Mohanty, J. (1986). School Education in Emerging Society. sterling Publishers.
9. Mukherji, S.M. (1966). History of Education in India. Baroda. Acharya Book Depot.
10. Naik, J.P. & Syed, N. (1974). A Student's History of Education in India. New Delhi. MacMillan.
11. NCERT (1986). School Education in India – Present Status and Future Needs. New Delhi. NCERT.
12. Ozial, A.O. 'Hand Book of School Administration and Management'. London. Macmillan.
13. Radha Kumud Mookerji (1999). Ancient Indian Education (Brahmanical and Buddhist). New Delhi . Cosmo Publications.
14. Sainath P. (1996). Everybody loves a good drought. New Delhi. Penguin Books.
15. Salamatullah. (1979). Education in Social context. New Delhi. NCERT.
16. Sykes, Marjorie (1988). The Story of Nai Talim. Wardha. Naitalim Samiti.
17. UNESCO (1997). Learning the Treasure Within.
18. Vada Mitra. (1967). Education in Ancient India. New Delhi. Arya book Depot.
19. National Policy on Education (1986). Ministry of HRD. New Delhi. Department of Education.
20. NCERT (2002). Seventh All India School Education Survey. New Delhi. NCERT.
21. UNESCO. (2004). Education for All. The Quality Imperative. EFA Global Monitoring Report. Paris.
22. Varghese, N.V. (1995). School Effects on Achievement. A Study of Government and Private Aided Schools in Kerala. In Kuldip Kumar (Ed.) School effectiveness and learning achievement at primary stage: International perspectives. New Delhi. NCERT.
23. World Bank (2004). Reaching The Child: An Integrated Approach to Child Development. New Delhi. Oxford University Press.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester VIII
EPCPE 402: Peace Oriented Value Education

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:-

- Understand the importance of peace education.
- Analyze the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhhaand logic.
- Understand the co-ordination with Indian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute values in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that make them sensitive to promote certain educational values while marginalizing others.
- Explore the meaningofEthics and values.
- Understand the processof value education.

UNIT- I: Importance of Peace

- Aims, objectives and importance of Peace Education.
- Barriers- Psychological, Cultural, Political
- Factors responsible for disturbing Peace: Unemployment, terrorism, Exploitation, Suppression of individuality, complexes.
- Characteristics of good textbook, evaluation of textbook, analysis of text book from peace

education perspective.

UNIT – II: Nature and sources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

UNIT – III: Values in religious scriptures

- Bhagwad gita-Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastyaand Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran–Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

UNIT – IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacheras teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty to wards self and society

Practicum/Field Work (Any two of the following)

7. Preparation of a report on school programmes for promotion of peace.
8. Observation of classroom situation and identification of factors promoting peace.
9. Analyse morning assembly programme of a schoolfrom the point of view of value education.
10. Analysis of a text book of a school subject from the point of view of values hidden.
11. Preactice of role- play in two situations and preparation of report.
12. Report on value conflict resolution in a situation.

Suggested Readings:

1. AcharyaMahaprija : TowardsInnerHarmony, NewDelhi,B. Jain Publishers, 1999
2. Dutt,N.K.andRuhelaS.P.:HumanValuesandEducation,SterlingPublishersPvt.Ltd., NewDelhi, 198
3. Gandhi K.L.: Value Education, GyanPublishingHouse, NewDelhi, 1993
4. Gupta,NathuLal:ValueEducation:TheoryandPractice:JaikrishanAgarwal,MahatmaGandhi Road,Ajmer – 2000
5. I.A.Lolla:ValueCertification:AnadvancedHandbookfortrainersandTeachers,Calif, UniversityAssociatePress, KrischanBoum, Howard 1977
6. PremKripal: Value in Education, NCERT, NewDelhi 1981
7. Rajput, J.S. (2001).Values in Education, NewDelhi, SterlingPublishers, 2005
8. RokeachM.: The Nature ofHumanValues, The FreePress , NewYork 1973
9. SharmaR.S.: The Monk who sold Ferrari, Mumbai, JaicoPublishingHouse, 2003
10. Swami RagunathAnand: Eternal ValuesforaChangingSociety, BVB Bombay1971.

11. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
12. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
13. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
14. Sheshadri, C., Khadere, M. A., &Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
15. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
16. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
17. Khan, IntakhabAlam (2007). Peace, Philosophy and Islam, Academic Excellence.Delhi-31.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester VIII

EPCGI 402: Gender Issues in Education

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the Candidate will be able to:

- develop basic understanding and familiarity with key concepts - gender, gender perspective, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism
- understand the gradual paradigm shift from women studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period
- learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, culture, religion and region
- understand how Gender, Power and Sexuality relate to education (in terms of access, curriculum and pedagogy)

Course Contents

Unit I: Gender Issues: Key Concepts

- Gender, Social construction of Gender.
- Gender Socialization, Gender Roles.
- Gender discrimination.

Unit II: Structures of Gender Inequality

- Patterns of Gender inequality in terms of caste, class and Culture.
- Patterns of violence against women: Female foeticide, Female Infanticide.
- Child marriage. Dowry, Widowhood, Female commercial sex workers, Domestic violence.
- Gender Identities and Socialization Practices in: Family, Schools, Other formal and Informal Organization.

Unit III: Gender and Education, issues related to marginalized women

- Gender bias in curriculum, drop out, Sex Ratio, Literacy and Recent trends in Women's education.

- Issues related to marginalized Women: ST/SC/Minorities.

Unit IV: Gender Jurisprudences

- The Pre-natal diagnostic Techniques Act, 1994.
- The Draft sexual Assault Law Reforms, India, 2000.
- Domestic violence Act 2005.
- Reservation for Women.
- Child marriage Act.

Modes of Learning Engagement:

Classroom will be interactive by sharing experiences, discussing day today happenings in the society, visiting centres and offices, showing films followed by discussions and priority will be given to Candidate s throughout the transaction of the course.

Practicum/ Tutorials

1. Write a paper on efforts of the Central and State governments for Gender Jurisprudences.
2. Prepare on any one topic from any one unit with the support of Teacher Educator and present in the classroom.
3. Review one recent article on Gender Issues in Education.
4. Prepare a report on recent trends in Educational development of girl child in India.
5. Conduct an opinion survey for Gender Issues in Education.

Suggested Readings:

1. Radha Kumar (1993). The History of Doing. Zubaan.
2. Sharma, Kumud, (1989). Shared Aspirations, Fragmented Realities, Contemporary Women's Movement in India, Its Dialectics and Dilemmas. New Delhi. Occasional Paper No. 12, CWDS.
3. Maithreyi Krishna Raj, (1986). Women Studies in India – Some Perspectives. Bombay. Popular Prakasham.
4. Devaki Jain and Pam Rajput (Ed) (2003). Narratives from the Women's Studies Family. New Delhi. Recreating Knowledge, Sage.
5. Bonnie G. Smith, (2013). Women's Studies: the Basics. Routledge.
6. Rege, Sharmila (2003) (ed), Sociology of Gender. New Delhi. The Challenge of Feminist Sociological Knowledge, Sage.
7. Singh, Indu Prakash, (1991). Indian Women: The Power Trapped. New Delhi. Galaxy Pub.
8. Mohanty, Manoranjan, (2004). (eds), Class, Caste, Gender. New Delhi. Sage.
9. Census Document Karve, Irawati (1961). Hindu Society: An Interpretation Poona. Deccan College.
10. Ahuja, Ram (1993/2002). Indian Social System. Jaipur. Rawat.
11. Report of the CABE (2005) Committee on Girl's Education and the common School System New Delhi. MHRD,
12. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
13. NCERT (2006). Gender Issues in Education, Position Paper. New Delhi. NCERT.
14. Bhasin, Kamla (2000). Understanding Gender. New Delhi: Kali for Women.
15. Bhasin, Kamla. 2004. Exploring Masculinity. New Delhi. Women Unlimited.

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME
TABLE 1, SEMESTER I EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC(I) Hindi/English	3	3	1(T)	0	5	20	80	--	100
2	4	AEC(I) Information & Communication Technology (ICT) inEducation-I	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
3	4	Core Course 1(I) Physics/ Botany3	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(I) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(I)Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E : Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 101: Basics	3	3	1	2	5	20	80	--	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 101 Work Education (Agriculture Practice)-1/ WEEE : 101: Work Education (Electricity & Electronics)	2	2	1(P)	2	4	10	40	--	80
Total	27	**Total Marks of Semester I**									650

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME
TABLE 2, SEMESTER II EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC(I)(III) Hindi-II/English-II	3	3	1(T)	0	5	20	80	--	100
2	4	AEC2(III) Information & Communication Technology (ICT) in Education-II	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
3	4	Core Course 1(II) Physics/ Botany	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(II) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(II)Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E : Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 102: Childhood and Growing up	3	3	1	2	5	20	80	--	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 102 Work Education (Agriculture Practice)-1/ WEEE : 102: Work Education (Electricity & Electronics)	2	2	1(P)	2	4	10	--	40	50
Total	27	**Total Marks of Semester 2**									650

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME
TABLE 3, SEMESTER III EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCEE 201: Environmental Education & Sustainable Development	3	3	1(T)	0	5	20	80	--	100
Group C: Core Course											
2	4	Core Course 1(III) Physics/ Botany	3	3	1	2	5	20	60	20	100
3	4	Core Course 2(II) Chemistry	3	3	1	2	5	20	60	20	100
4	4	Core Course 3(II)Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E : Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
5	4	PESS 201: Schooling, Socialization and Identity	3	3	1	2	5	20	80	--	100
6	2	EPYH 201: Yoga, Health and Well being	1	1	1(P)	2	3	10	40	--	50
7	2	EFWC 201: Working with Community	0	0	1(P)	--	2 weeks	--	--	50	50
Group G: Choice Based Courses (CBC											
8	4	(Choose any one from following)									
1) CBCPH -I-201 : Physics: Renewable Energy Sources Electronics-II 2) CBCPH-II-201 : Physics, Nano Science 3) CBCCH-I-201: Chemistry: Green Chemistry 4) CBCZO-I-201: Zoology, Biodiversity 5) CBCBO-I-201: Botany: Biodiversity 6) CBCOE-201:Geography: Basics of Geographical Information System -OIS			3	3	1(P)	2	5	20	80	--	

7) CBCMT-I-201: Mathematics: Discrete Mathematics 8) CBCED -I-201: Education: Guidance & Counselling in School 9) CBCED-II-201: Education: Peace Oriented Value Education 10) CBCLH-201: Language: jpukRed ys[ku vne vuqokn 11) CBCLE-201: Language: Language Literature & Education 12) CBCHS-201: History: Heritage & Tourism 13) CBCPS-201: Political Science : Democracy at Work 14) CBCEC-201: Economics: Recent Trends & Practices in Economics			3	3	1(T)	2	5	20	80	--	100
		Total Marks of Semester -III									700

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME
TABLE 4, SEMESTER IV EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCIR 202: Indian Constitution and Human Rights	3	3	1(T)	0	5	20	80	--	100
Group C: Core Course											
2	4	Core Course 1(IV) Physics/ Botany	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(IV) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(IV)Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E : Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEIS 202: Inclusive Schooling	3	3	1(T)	2	5	20	80	--	100
7	4	PELT 202: Learning & Teaching	3	3	1(T)	2	5	20	80	--	100
Group E: Professional Education Courses (PEC) -III : Curriculum and Pedagogic Studies (CPS)											
8	4	CPSKC 202: Knowledge and ?Curriculum	3	2	1(T)	2	5	20	80	--	100

		Total Marks of Semester -IV	700

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME

TABLE 5, SEMESTER V EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group C: Core Courses											
1	4	Core Course 1(V) Physics/ Botany	3	3	1	0	5	20	60	20	100
2	4	Core Course 2(V) Chemistry	3	3	1	2	5	20	60	20	100
3	4	Core Course 3(V) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E: Professional Education Courses (PEC) II: Enhancing Professional Capacities (EPC)											
4	2	EPCAA 301: Arts and Aesthetic Education	1	1	1(P)	2	3	10	--	40	50
Group E : Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
5	4	CPSPS 301: Physical Science: Pedagogy of Physical Science (CBZ Group)	3	2	1(T)	2	5	20	80	--	100
6	4	CPSPM 301: Pedagogy of Mathematics (I)/ CPSPBS 301: Pedagogy of Biological Science	3	2	1(T)	2	5	20	80	--	100
7	4	CPSLA 301: Learning Assessment	3	3	1(T)	2	5	20	80	--	100
Total	26	**Total Marks of Semester -V**									650

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME

TABLE 6, SEMESTER VI EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group C: Core Courses											
1	4	Core Course 1(VI) Physics/ Botany	3	3	1	2	5	20	60	20	100
2	4	Core Course 2(VI) Chemistry	3	3	1	2	5	20	60	20	100
3	4	Core Course 3(VI) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	--	
Group E : Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
4	4	CPSPS 302: Physical Science: Pedagogy of Physical Science (CBZ Group)	3	2	1(T)	2	5	20	80	--	100
5	4	CPSPM 302: Pedagogy of Mathematics (II)/ CPSPBS 301: Pedagogy of Biological Science	3	2	1(T)	2	5	20	80	--	100
Group E: Professional Education Courses (PEC)-IV Engagement with Field (EF)											
6	4	EPSE 302: Social Exposure and related Activities	0	0	4(P)	--	04 Weeks	--	--	100	100
Total	24	**Total Marks of Semester -VI**									600

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME

TABLE 7, SEMESTER VII EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE) #											
1	3	PHY 401: Physics: Quantum Mechanics and Statistical Physics	3	3	1(P)	2	5	20	60	20	100
2	3	CHM 401: Chemistry: Advance Chemistry-I	3	3	1(P)	2	5	20	60	20	100
3	3	ZOO 401: Zoology: Evolution and Palaeontology	3	3	1(P)	2	5	20	60	20	100
4	3	BOT 401: Botany: Plant Anatomy and Ecology	3	3	1(P)	2	5	20	60	20	100
5	3	MTH 401: Mathematics: Number Theory and Theory of Equations	3	3	1(T)	2	5	20	80	--	100
Group E: Professional Education Courses (PEC)-IV Engagement with Field (EF)											
6	14	EPSE 302: Social Internship	0	0	14(P)	--	14 Weeks	--	--	300	300
Total	23	**Total Marks of Semester -VII**									600

 # For CBZ group combination is Chemistry, Botany and Zoology and for PCM group combination is Physics, Chemistry and Mathematics

SCHEME OF EXAMINATION FOR B.SC.,B.ED.(FOUR YEARS INTEGRATED) REGULAR PROGRAMME
TABLE 8, SEMESTER VIII EXAMINATION

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field)(P) / Tutorial(T)	Practicum/ al Hours Per week(T/P)	Total Hours per week (L+T+P)	Marks			
								Internal Assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE)#											
1	5	PHY 402: Physics: Atomic, Molecular and Nuclear Physics	4	4	1(P)	2	5	20	60	20	100
2	5	CHM 402: Chemistry: Advance Chemistry-II	4	4	1(P)	2	5	20	60	20	100
3	5	ZOO 402: Zoology: Molecular Genetics, Biotechnology and Instrumentation	4	4	1(P)	2	5	20	60	20	100
4	5	BOT 402: Botany, Molecular Biology, Biochemistry and Biotechnology	4	4	1(P)	2	5	20	60	20	100
5	5	MTH 402: Mathematics: Numerical Analysis	4	4	1(P)	2	5	20	80	--	100
6	6	*DSE 402: One Project in Physics / Chemistry/ Mathematics/ Botany/ Zoology	0	0	6(P)	--	--	--	--	100	100
Group E : Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
7	4	PEVE 402: Vision of Education in India- Issues and Concerns	3	2	1(T)	2	5	20	80	100	100
Group E: Professional Education Courses (PEC)-II Enhancing Professional Capacities (EPC)											
8	2	EPCPE 402: Peace Oriented Value Education	1	1	1(T)	2	3	10	40	--	50
9	2	EPCGI 402: Gender issues in Education	1	1	1(T)	2	3	10	40	--	50
Total	29	**Total Marks of Semester -VIII**									600

 # For CBZ group combination is Chemistry, Botany and Zoology and for PCM group combination is Physics, Chemistry and Mathematics

DSE 402: One Project in Physics/ Chemistry/ Mathematics/ Botany/ Zoology, candidate may take a project from any one discipline. The project will be assigned in the semester VI only to the candidates of CBZ & PCM groups and they are required to work for the project during the semester VI to semester VIII on topics selected by the candidates in consultation with the project guide/ supervisor and final project report shall be submitted only in semester VIII for its evaluation.

TABLE 9 SEMESTER-SISE BREAKUP OF CREDIT IN B.SC. AND B.ED. COMPONETNS

S.No.	Semester	B.Sc. Content Part	B.Ed. Education Part	Total Credits	Total Marks
1	I	20	7	27	650
2	II	20	7	27	650
3	III	20	8	28	700
4	IV	16	12	28	600
5	V	12	14	26	700
6	VI	12	12	24	600
7	VII	9	14	23	600
8	VIII	21	8	29	600
	Total:	**130**	**82**	**212**	**5100**

KURUKSHETRA UNIVERSITY, KURUKSHETRA
B.Sc..B.Ed.- 1st SEMESTER SYLLABI AS PER CBCS PATTERN

B. Sc. B. Ed. (CBCS) Semester- I

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (HINDI)-I

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENTS

Unit I: History of Language and Literature-1

Hindi Bhasha aur Sahitya ka Itihas [Aarmbha se Lekar 1857 Tak]

Unit II: Short Story-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kahani Ka Vikas

1. Chandradhar Sharma Guleri- Usne Kaha Tha
2. Jayshankar Prasad- Puraskar
3. Premchand- Panch Parmeshwar
4. Jainendra- Ek Raat

Unit III: Short Story-2 [Post-Independence Literature]

Swatantrayottar Hindi Kahani Ka Vikas

1. Mohan Rakesh- Uski Roti

2. Kamleshwar- Dilli Mein ek Maut
3. Phanishwar Nath Renu- Teesari Kasam
4. Bhism Sahani- Cheef ki Dawat

Unit IV: Communication skills

Group Discussion [Samooh Charcha]

Introduction – Definition – Characteristics – Types of Discussion –Round table, Symposium, Lecture forum etc. – Relevance of Group Discussion – Exercises.

Reference:

1. Hindi Sahitya Ka Itihas: Ramchandra Shukla Rajkamal Prakashan,Delhi
2. Hindi Sahitya Ka Itihas: Dr Nagendra, Mayoor Paperbacks, Delhi
3. Hindi Sahitya Ki Bhoomika: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
4. Hindi Sahitya Ka Adikaal: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
5. Hindi Sahitya Ka Udbhav Aur Vikas:Hajari Prasad Divedi Rajkamal Prakashan,Delhi
6. Hindi Sahitya Ka Ateet: Viswanath Prasad Mishra, Rajkamal Prakashan,Delhi
7. Bhakti Aandolan Aur Bhaktikavya: Shivkumar Mishra,Lokbharti Prakashan, Delhi
8. Bhakti Aandolan aur Surdaska Kavya: Maneger Panday, Vani Prakashan, Delhi
9. Bhakti Ke Aayam: Dr P Jayraaman, Vani Prakashan, Delhi
10. Bhartiya Bhakti Sahitya: Dr Rajmal Bora, Vani Prakashan, Delhi
11. Bhaktikavya ka Samajdarshan: Dr Premshankar, Vani Prakashan, Delhi
12. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
13. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
14. Hindi Kahani- Antarang Pahchan: Dr Ramdars Mishra, Vani Prakashan, Delhi
15. Hindi Kahani-Sanrachana aur Samvedana: Dr Rachna Saah, Vani Prakashan, Delhi
16. Galp Ka Yatharth-Kathaloochan ke Aayam: Suvas Kumar, Vani Prakashan, Delhi
17. Hindi Ka Gadyaparva: Namvar Singh, Rajkamal Prakashan,Delhi
18. Sahitya ki Pahchan: Namvar Singh, Rajkamal Prakashan,Delhi
19. Katha Vivechan aur Gadyashilp: Ramvilas Sharma, Vani Prakashan, Delhi
20. Kahani Anubhav aur Abhivyakti: Rajendra Yadav, Vani Prakashan, Delhi

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (ENGLISH) –I

Time: 3 Hours | Max. Marks: 100

Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENTS

Unit I: Descriptive Grammar

1. Tenses:

a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.

b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous

Unit II: Skills in Communication

1. Negotiating a point of view – learning to talk persuasively so as to get across one's perspective.

2. Debating on an issue – agreeing / disagreeing.

Unit III: Study and Reference Skills

Note making; Note- taking; Summary writing.
Comprehension Skills
Extracts from literary, scientific and educational journals.

Unit IV: Skills of Communication

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application.
Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Suggested Activities:

- Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.
- Students introduce themselves though using symbols/ metaphors.
- Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

· Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
· Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
· Hornby,A.S.(2001).Oxford Advanced Learner's Dictionary, OUP
· Thomsan,A.J. & Martinet.(2002).A Practical English Grammar.OUP

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC2(I): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-I

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical :20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the course:

On completion of the course the students will be able to:

- Appreciate the historical development of various educational media.
- Identify and demonstrate an understanding of the main components of the computer hardware in use.
- Differentiate various operating system and explain main functions of the system and application software environment.
- Use a word processor, spread sheet, drawing and presentation software to produce various teaching learning resources for educational use.
- Use internet technologies efficiently to access remote information, communicate and collaborate with others.
- Model collaborative knowledge construction using various web 2.0 tools and technologies.
- Understand the social, economic, security and ethical issues associated with the use of ICT.

Course Contents

Unit I: Learning and Technology

- How technology enhance learning: basic theories of communication, system theory and learning theory
- Historical account of the development of various educational media (audio, video, print, storage, display, projection)
- Communication process and role of technology in communication

- Information and Communication Technology: Meaning, nature and advantages
- Media literacy and digital literacy – need and importance
- Digital divide and enhancing access
- National ICT policies, curriculum, schemes and programmes
- Cyber security: privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe and ethical practices

Unit II: Fundamentals of Information and Communication Technology

- Computer hardware fundamentals (anatomy, input devices, output devices, storage devices, display devices)
- Computer Network-LAN, WAN. Internet – concept and architecture ; Locating internet resources – browsing, navigating, searching, selecting, evaluating, saving and bookmarking
- Licenses – software license, document license, fare use and piracy
- File formats and conversion, utility tools
- Cloud computing: meaning, types, and advantages

Unit III: Computer Software

- Digitalization, software –meaning and types
- Source and binary code. Proprietary software, Open Source software, shareware and freeware- concept, philosophy, types, and advantages.
- Operating systems –meaning, types –Windows, Linux, Macintosh – Navigating the desktop, control panel, file manager, explorer, and accessories
- Software as Service – Online software tools and applications and their educational use
- Managing the ICT infrastructure: software installation, troubleshooting of hardware, seeking and providing help, storage and backup, updating and upgrading software

Unit IV: Application Software

- Application software- meaning and types
- Word processing, spreadsheet, presentation: Features and educational applications (Unicode)
- Drawing tools – diagrams, concept maps, timelines, flow charts:educational applications of these tools
- Web 2.0 technology and tools: meaning characteristics and types
- Social networking and social book marking – educational applications
- Blog and micro blog – reflective journaling and other educational applications
- Wiki – collaborative authoring and projects
- Instant messaging and its educational applications
- Online forums/discussion groups and chats: educational applications
- Social media sharing – video, presentations, audio (podcasts), graphics, and text
- Web 2.0 tools for creating, sharing, collaborating, and networking

Sessional activities:

- Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices
- Practicing word processing using Indian language software
- Practice in installing various system and application software
- Using word processor, spread sheet, and presentation software to produce various teaching learning resources and sharing it online
- Locating internet resources – navigating, searching, selecting, saving and evaluating (use standard internet evaluation criteria)
- Creating social bookmarking account and creating social bookmarking of internet resources using any social bookmarking tools (diigo,delicious,stumbleupon)
- Creating digital concept maps, flow charts, timelines for a particular content using online and offline tools
- Creating account in teachertube/slideshare and sharing your video/presentation. View and comment on others contributions
- Creating account in wikispace/wikipedia/mediawiki and adding/editing content
- Developing an educational blog in www.blogger.com, www.wordpress.com, or www.edublog.com
- Review of national ICT policy and curriculum

Suggested Readings:

1. Andrew A Kling(2010). Web 2.0 (Technology 360). Lucent Books: New Delhi
2. Andrew M. St. Laurent. (2004). Understanding Open Source and Free Software Licensing. Oreilly: Cambridge
3. Bharihok Deepak. (2000). Fundamentals of Information Technology. Pentagon Press: New Delhi
4. Crumlish Christian (1999). The Internet No Experience Required. BPB Publications: New Delhi
5. Evant, M: The International Encyclopedia of Educational Technology.
6. Gwen Solomon, Lynne Schrum. (2014). Web 2.0 How-to for Educators, Second Edition. ISTE
7. James, K.L. (2003). The Internet: A User's Guide. Prentice Hall of India Pvt. Ltd: New Delhi
8. Jean-Eric Pelet (2014). E-Learning 2.0 Technologies and Web Applications in Higher Education (Advances in Higher Education and Professional Development (Ahepd)). Idea Group: U.S.
9. Mishra, S. (Ed.) (2009). STRIDE Hand Book 08: E-learning. IGNOU: New Delhi.Available at http://webserver.ignou.ac.in/institute/STRIDE_Hb8_webCD/STRIDE_Hb8_index.html
10. Sarkar, S.K. & Gupta, A.K.(1998). Elements of Computer Science. S. Chand & Company: New Delhi

GROUP C: CORE COURSE (CC)

Semester I

Core Course1(I): PHYSICS: RELATIVITY, MECHANICS, OSCILLATIONS AND ACOUSTICS

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Acquaint with the key concepts of special theory of relativity, mechanics, oscillations and acoustics.
- Appreciate the applications of the concepts in real life situations.
- Solve the problems based on special theory of relativity, mechanics, oscillations and acoustics.
- Apply the theory in execution of practicals.

COURSE CONTENTS

UNIT I:

Relativity: Reference systems, inertial and non-inertial frames, Galilean transformation, Galilean invariance and conservation laws, propagation of light, Michelson – Morley experiment. Postulates of the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass-energy equivalence, particle with a zero rest mass.

UnitII:

Mechanics: Motion under central force, Kepler's laws, Gravitational law and field, Potential due to a spherical body, Gauss and Poisson equations for gravitational potential, gravitational self-energy, Rigid body motion, Rotational motion, Moment of inertia and their products, principal moments and axes, Euler's equations. System of particles, centre of mass, equation of motion, single stage and multistage rocket, energy and momentum conservation, concepts of elastic and inelastic collisions.

UnitIII:

Oscillations: Potential well and periodic oscillations, cases of harmonic oscillations, different equations and its solutions, Kinetic and potential energy, Simple Harmonic oscillations in – Spring and mass system, Simple and compound pendulum, Torsional pendulum, Bifilar oscillations, Helmholtz resonator, LC circuits, Vibration of a magnet, Oscillation of two masses connected by a spring, Superposition of two mutually perpendicular simple harmonic vibrations of same frequency, Lissajou's figures.

UnitIV:

Coupled Oscillations & Acoustics: Two coupled oscillators, normal modes, N-coupled oscillators, damped harmonic oscillators, Power dissipation, Quality factor, Driven harmonic oscillator, Transient and steady state, Power absorption, Resonance in system with many degrees of freedom.

Acoustics: Noise and Music, The human ear and its responses, limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instruments, Production and detection of ultrasonic and infrasonic waves and applications,

Transducers and their characteristics, recording and reproduction of sounds, various systems, measurements of frequency, waveform, intensity and velocity, acoustics of halls, reverberation period, Sabine's formula.

Suggested Readings:

1. Robert Resnick, Introduction to special relativity (Wiley India Pvt. Ltd., 2006)
2. Charles Kittel, Berkeley Physics Course vol.-1, Mechanics (McGraw-Hill, 1966)
3. R P Feynman, R B Ligton and M Sands, The Feynman Lectures on Physics, vol-1(Narosa Publishing House)
4. N K Bajaj, The Physics of Waves and Oscillations (Tata McGraw-Hill Pub. Com. Ltd., 2006)
5. R S Gambir, Mechanics (CBS Publishers and Distributors, New Delhi)
6. S Garg, C K Ghosh, S Gupta, Oscillations and Waves (PHI Learning Pvt. Ltd., 2009)
7. R K Ghosh, The Mathematics of Waves and Vibrations, (Mc Milan, 1976)
8. Frank S Crawford Jr., Berkely Physics Course: Vol.4, Waves (McGraw Hill book company, 1968)
9. I G Main, Vibrations and Waves (Cambridge University Press, 1986)
10. H J Pain, The Physics of Vibrations and Waves (John Wiley & Sons Ltd., 2006)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course Outline:

1. To study the variation of power transfer to different loads by a DC source and verify maximum power transfer theorem. (Plotting of the graph).
2. Conversion of a Galvanometer into a ammeter (Range 1A).
3. Conversion of a Galvanometer into a Voltmeter (Range 1V).
4. To study the random decay and determine the decay constant using the statistical board.
5. To determine internal resistance of Lechlanche Cell using a Voltmeter
6. To study the characteristics of a semiconductor junction diode and to determine forward and reverse resistances
7. To determine the band gap using a PN junction diode.
8. To study the normal modes of oscillators of system of coupled oscillator and to study the effect of coupling mass on the frequency of normal modes
9. To study the effect of damping on motion of a simple pendulum and determine damping constant for simple pendulum as damped harmonic oscillation.

GROUP C: CORE COURSE (CC)

Semester I

Core Course2(I): CHEMISTRY: INORGANIC CHEMISTRY

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.
- To acquire basic knowledge to students teachers about atomic structure, periodic properties, Chemical Bonding and Ionic solids, Understanding the chemistry of s- and p-block elements, the fundamentals of the chemistry of the main group elements, and important real world applications of many of these species and Acids and Bases and solvent system.
- Students will be able to describe the fundamentals of acid/base chemistry, including pH calculations, buffer behaviours.

COURSE CONTENTS

Unit I: Atomic Structure and Periodic trends

Atomic Structure: Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of Ψ and Ψ^2, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d and f orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule, effective nuclear charge.

- **Periodic Properties**
  Atomic and Ionic radii, Ionization energy, electron affinity and electronegativity-methods of determination or evaluation, trends in periodic table and applications in predicting and expecting the chemical behaviour.

Unit II: Chemical Bonding and Ionic solids

- **Structure and Bonding**: Covalent Bond -Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory with special reference to NH_3, H_3O^+, SF_4, ClF_3, ICl_2^- and H_2O, MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules such as Boranes, bond strength and bond energy, percentage ionic character from dipole moment and electro-negativity difference.
- **Ionic solids** – Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule, Metallic bond-free electron, valence bond and band theories.
- **Weak Interactions**- Hydrogen bonding, Van der Waals' forces.

Unit III: Chemistry of sand p block elements

- **s-Block Elements**: Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in bio-systems, an introduction to alkyls and aryls.
- **p-Block Elements**: Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxy acids and halides of group 13-16, hydrides of boron-diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetra nitride, basic properties of halogens, interhalogens and polyhalides.
- **Chemistry of Noble Gases**: Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

Unit IV: Acids and Bases and solvent system

- **Theories of Acids and Bases**: Arrhenius, Bronsted-Lowry, Lux-Flood, solvent system and Lewis concept of acids and bases. Solvent system of acids and bases with special reference to liquid Ammonia, liquid BrF_3
- **Concept of Hard and Soft Acids and Bases (HSAB):** Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity.
- **Solvent Systems:** Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Suggested Readings:

1. Lee, J.D. Concise Inorganic Chemistry, ELBS.
2. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry
3. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications.
4. Shriver and Atkins Inorganic Chemistry, W. H. Freeman and Company

5. James Huheey, Inorganic chemistry: Principles of Structure and Reactivity, Pearson Education India
6. B.N. Figgis, J.E Huheey, P.W. Atkins Inorganic Chemistry, Pearson Education
7. Duward Shriver, Inorganic Chemistry, W. H. Freeman
8. Gary Wulfsberg, Inorganic Chemistry, University Science Books
9. A. R. West, Solid State Chemistry and its Applications, Wiley

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Outline:

1. Inorganic Chemistry:

Semi micro analysis: Detection of the presence of three cations and three anions (including interfering) in a given mixture qualitatively.

2. Quantitative Analysis: Volumetric Analysis

a. Determination of acetic acid in commercial vinegar using NaOH.

b. Determination of alkali content – antacid tablet using HCl.

c. Estimation of calcium content in chalk as calcium oxalate by permanganometry.

d. Estimation of ferrous and ferric by dichromate method.

e. Estimation of copper using thiosulphate.

GROUP C: CORE COURSE (CC)
Semester I
Core Course3(I): ZOOLOGY: NON-CHORDATA

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: To enable students to understand invertebrates, the organizational hierarchies and complexities, the evolutionary trends in external morphology and internal structure; identification and classification with examples, to enable them to understand various modes of adaptations in animals.

COURSE CONTENTS

Unit: I

- General principles of taxonomy and classification. Outline classification of Protozoa up to order.
- General Structural organization of *Amoeba, Euglena and Plasmodium*.
- Habit and habitat, structure, nutrition, osmoregulation and reproduction in *Paramecium*
- Locomotion in Protozoans- pseudopodial, ciliary and flagellar.
- Nutrition in Protozoa
- Reproduction in Protozoa.

Unit: II

- Outline classification of Porifera and Coelenterata up to order.
- Habit, habitat and general account of internal structure& reproduction in*Sycon*
- Canal system and skeleton in Sponges
- Habit, habitat, morphology, internal structure, nutrition and reproduction in *Obelia*
- Polymorphism in coelenterates, coral reefs
- Outline classification of Platyhelminthes and Aschelminthes up to order.

- Habit and habitat, reproduction and life–cycle of *Fasciola*, and *Ascaris*
- Parasitic adaptations in Helminthes

Unit: III

- Outline classification of Annelida and Arthropoda up to order.
- Habit and habitat, structure, nutrition, respiration, circulation, excretion, nervous system and reproduction of
  - *(i) Hirudinaria*
  - *(ii) Palaemon*
- *Peripatus*: structure and affinities
- Mouth parts and feeding habits of Insects.

Unit: IV

Outline classification of Mollusca and Echinodermata up to order

- Habit and habitat, structure, nutrition, respiration, blood vascular system, excretion, nervous system and reproduction of *Pila*
- Torsion in Gastropoda
- Habit and habitat, structure, nutrition, respiration, blood vascular system, excretion, nervous system and reproduction of *Asterias*
- Larval forms of Echinoderms.

Suggested Readings:

1. Modem Textbook of Zoology Invertebrates by R.L. Kotpal –(Rastogi Publication , Meerut 10th Revised Edition)
2. Invertebrate Zoology series (Protozoa of Echinnodermata) by R.L. Kotpal - – (Rastogi Publication , Meerut)
3. Invertebrate Zoology by E.L. Jordan and P.S. Verma – S. Chand & Co., Delhi
4. Invertebrate Zoology by J.K. Dhami and P.S. Dhami – S. Chand & Co., Delhi
5. A textbook of Invertebrate Zoology by S.N. Prasad – (KitabMahal, Allahabad)
6. Life of Invertebrate Zoology by Russel and Hunter – (Macmillan)
7. Invertebrate Zoology by R.D. Barnes :- (W.B. Saunders, Philadelphia)
8. A manual of Zoology Vol. I by EkambernathaAyyar (Vishwnathan,Madras)
9. The invertebrate series of L.H. Hyman – (McGraw Hill)
10. A student's textbook of Zoology by Adma Sedgwick Vol .I, II & III (Central Book Depot, Allahabad)
11. A textbook of Zoology Vol. I by Parkar and Haswell – (Macmillan)
12. Lower non chordate, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta, Jaipur
13. Higher non Chordate, Dr VS Pawar, Hindi Edition, College book centre , Chaura Rasta, Jaipur
14. Animal taxonomy and evolution, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta, Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva voice	5
Record	5
Total Marks	**20**

Course Outline:

- Study of Microscopes: Simple and compound microscope, working mechanism and maintenance, use of Micro-image projection system.
- Study of museum specimens with respect to levels and patterns of organization biosystematics, biodiversity, adaptations, development stages, population dynamics, ecological implications:
- **Porifera***: Sycon, Spongilla, Euplectella, Leucosolenia, Hylonema , Hippospongia, Euspongia;*
- **Coeleterata***: Hydra, Tubularia, Millepora, Physalia, Porpita, Vellela, Aurelia, Tubipora, Alcyonium, Metridium, Pennatula, Grantia, Fungia, Gorgonia.*
- **Helminthes***: Fasciola, Taeniasolium, Planaria, Ascaris, Ancyclostoma;*
- **Annelida**:*Nereis, Heteroneresis, Aphrodite, Chaetoptrus, Arenicola, Pheretima, Hirudinaria*
- **Arthropoda**:*Palaemon, Eupagurus, Scolopendra, Apis, Peripatus.*
- **Mollusca**: *Chiton, Pila, Aplysia, Helix, Dentalium, Mytilus, Pinctada, Unio, Sepia, Loligo Octopus:*
- **Echinodermata**:*Antedon, Holothuria, Cucumaria, Astropecten, Asterias, Echinus*
- Study of Permanent slides*Paramecium*, *Paramecium* in Conjugation, *Paramecium* binary fission, *Euglena*, *Vorticella*, *Sycon* L.S., *Sycon* T.S. , *Hydra* L.S., *Hydra* T.S, Cercaria larva, Metacercaria, Miracidium larva, Sporocyst larva, Redia larva , *Ascaris* male and female T.S. , T.S. through pharynx region, Gizzard and intestinal region of Earthworm, T.S. through buccal cavity of *Hirudinaria*, Zoea, Metazoea, Nauplius, Mysis, T.S. of gill of Unio. T.S. of the shell & mantle of *Unio*,Glochidium larva of *Unio*.
- Dissections and/or its demonstration through Charts/Models/Video/CD/digital alternative etc and/or preparation of working models of the different systems of the following animals.
- Earthworm: Alimentary canal, Nervous system and Reproductive system.
- Leech Alimentary canal
- Cockoach : Mouthparts Digestive system, nervous system
- Prawn : Nervous system

- Pila : Nervous system
- Microsopic preparation or their observation of the following. *Paramecium,Englena,*Sponge spicules, gemmules, *Obelia,Hydra,*parapodium of *Nereis*, statocyst of Prawn, mouth parts of *Cockroach,* radula of *Pila*, gill of *Unio*.
- Culture of *Paramecium, Euglena* and *Amoeba.*

Note:

- Use of animals for dissection is subject to the conditions that these are not banned under the Wildlife Protection Act or any other legislation.
- Students are required to submit the following during examination:

a) One assignment on the instrument/ technique about its principle, working, precautions and applications; and /or reagents / solutions preparation.

b) Report on study of animals from their natural habitat from their local surroundings or Vermicompost etc.

GROUP C: CORE COURSE (CC)
Semester I
Core Course1(I): BOTANY: DIVERSITY OF MICROBES AND LOWER PLANTS

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understanding diversity that exists in microorganisms.
- Understand the morphology, organization, structure, and reproduction in microbes.
- Appreciate the role and significance of microbes in human welfare and environment.
- Study the symptoms of selected diseases caused by microbes.

COURSE CONTENTS

Unit I: Viruses and Bacteria

- Structure, multiplication, transmission and disease symptoms of viruses
- Structure and economic importance of Mycoplasma
- Bacteria – structure, nutrition, reproduction and economic importance. Gram's staining
- General account and economic importance of Cyanobacteria. Study of *Spirulina, Nostoc* and *Oscillatoria.*

Unit II: Algae

- General account of occurrence, structure, thallus organization, reproduction, economic importance and classification (classification of Fritsch).
  - Study of the structure, reproduction and life-cycle of the following:
  - Chlorophyceae: *Chlamydomonas, Volvox*, *Oedogonium,*
  - Phaeophyceae: *Sargassum*
  - Rhodhophyceae: *Polysiphonia, Batrachospermum*
  - Bacillariophyceae: General account, structure and reproduction of diatom, economic importance.

Unit III: Fungi

- General characters, thallus organization, reproduction, economic importance and classification (Alexopoulos and Mims).
- Study of structure, reproduction, life-cycle and phytopathology and/or economic importance of the following:
  - Myxomycetes -*Stemonitis*
  - Phycomycetes –*Albugo, Phytophthora*
  - Ascomycetes – Yeast, *Penicillium*

Unit IV: Lichens

- Study of structure, reproduction, life-cycle, phytopathology and economic importance of the following:
  - Basidiomycetes – *Puccinia, Agaricus,*
  - Deuteromycetes – *Cercospora, Colletotrichum, Alternaria*
- Lichens – General characters, distribution, types, structure, reproduction, economic and ecologicalimportance.

Suggested Readings:

1. Smith, G.M.,1971, Cryptogamic Botany Vol.I, Algae & Fungi, TMH Publishing Co., NewDelhi.
2. Sharma,O.P.,1992,TextbookofThallophytes,TMHPublishingHouse,NewDelhi.
3. Pandey, B.P., A Text book of Algae, Sultan Chand & Co., NewDelhi.
4. Sharma, P.D. 2005, The Fungi, Rastogi Publications,Meerut.
5. Singh, V., P.C.Pande & D.K.Jain, 2007, Diversity of Microbes and Cryptogams, Rastogi Publications,Meerut.
6. Singh.V.P.C.Pande & D.K.Jain, 2006. A Text book of Botany, Rastogi Publications, Meerut.
7. Kumar, H.D., A Textbook ofAlgae.
8. Alexopoulos.C.J. IntroductoryMycology.
9. Dubey H.D. A Text book of Fungi, Bacteria andViruses.
10. Chopra, A Class book of Fungi, S.Nagin & Co.,Jullandar.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Outline:

- Gram staining of bacteria.
- Identification, Observation and Section cutting of diseased material infected by Fungi, Bacteria, Viruses and Mycoplasma.
- Study of the genera included in theory syllabus of Algae and Fungi by making temporary micro preparations and observation of permanent slides.
- Study of crustose, foliose & fruticose Lichens.

GROUP C: CORE COURSE (CC)
Semester I
Core Course 3(I): MATHEMATICS: CALCULUS

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of course, learner will be able to:

(i) Apply concepts of differentiation in single variable and several variables.
(ii) Apply concept of definite integral in finding area between curves, length of curve, surface area, volume of solid of revolutions including applications of double and triple integral.
(iii) Apply concepts of Vector calculus i.e; Vector functions, Vector fields, directional derivatives, gradient, divergence and curl of Vector, line integrals and surface integrals.

COURSE CONTENTS

Unit I:

Tangents and Normal, sub tangent and subnormal (Cartesian and polar forms), Derivative of an arc (Cartesian and polar), pedal equations, curvature, Asymptotes, multiple points, curve tracing (Cartesian, parametric and polar), Envelops and Evolutes.

Unit II:

Functions of several variables, Partial differentiation with Euler's theorem and its applications, total derivative, change of variables (polar to Cartesian and vice-versa), concept of tangent plane and normal to a surface, maxima and minima of two variables including method of undetermined multipliers.

Unit III:

Applications of definite integral: Area between two curves, Polar coordinates, Cylindrical and Spherical coordinates, Graphs of polar coordinates, Area between

two curves when their equations are given in polar coordinates, Length of a curve, Surface area, Area of surface of revolution, method of Lagrange multipliers. Double integral, Volumes and Areas. Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications. Change of variables in a triple integral.

Unit IV:

Continuity and differentiability of vector functions, unit tangent vector, Vector fields, Directional derivatives, Gradient, Divergence and Curl of a vector field, Line integrals, Surface integrals, Green's Theorem, Gauss divergence theorem, Stokes' Theorem.

Suggested Readings:

1. Advanced Engineering Mathematics: E. Kreyszig, 9th ed., Wiley Eastern, 2011.
2. Engineering Mathematics: Ram Babu, Pearson, India, 2010.
3. Calculus Vol. 1 and 2: T.M. Apostol (2007) Wiley
4. Calculus: M. Spivak (2006) Cambridge
5. Calculus: J. Stewart (2012) Cengage Learning
6. Calculus and AnalyticGeometry: G.B. Thomas, R. Finney (1995) Addison-Wesley.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester I
PEBE 101: BASICS IN EDUCATION

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On the completion of course, the student teacher will be able to:

- Understand and analyze educational concepts, their premises and contexts that are unique to education.
- Understand the nature and purpose of education with reference to school knowledge.
- Learn to avail opportunity for interactive and reflective modes of learning.
- Understand the concepts of teacher and learner's autonomy.
- Become aware of importance to values and value formation process in education.

COURSE CONTENTS

Unit I: Education: Nature, Purpose and Process

- Meaning, Nature, Purpose and Importance of Education: Education as a purpose of development (individual, social and harmonious).
- Education as an intentional (intellectual and self- critical) and unintentional.
- Agencies of education: Family, Society and Institute.
- Processes and Modes of Education: Education is a natural and social process. Education as an ability to question.and imagine alternatives. Education in schools and its linkage with outside school experience.

Unit II: Knowledge and Knowing

- Concept, Meaning and Nature of Knowledge and Knowing.

- Differentiate between information, knowledge, belief and truth.
- Knowing Process: Different ways of knowing, Knowledge construction, Process of Construction of Knowledge. Relative roles of knower and known in knowledge transmission and construction, Limitations of knowing, role of culture in knowing.
- Facets of knowledge: Different facets of knowledge and relationship, such as: local and universal, concrete and abstract, theoretical and practical, contextual and textual, school and out of school with an emphasis on understanding special attributes of school knowledge.
- Reflection on knowledge in the form of curriculum, syllabus and textbooks.

Unit III: Autonomy of Teacher and Learner

- Autonomy of teacher- why, what and to what extent. Difference between autonomy and freedom. Teacher's autonomy and its importance in enriching learning environment. Relationship between autonomy and accountability. Hindering factors that affect teacher's autonomy.
- Autonomy of learner- why, what and to what extent, Restrains on learners in schools. Learning without burden, Joyful, collaborative and cooperative learning. Individual autonomy and collective responsibility of teacher and learner.

Unit IV: Education and Values

- Concept and nature of values- Relative and absolute. Education with reference to human rights and values. Values prevalent in Indian Constitution and society. Education is a normative endeavor.
- Process of value formations in schools and out of schools and its impact on learners' value perspective. Role of education in transmission of values in society. School system to nurture a culture of peace.

Modes of Learning Engagement:

- The Course is visualized to be conducted through group discussion, self- study and reflection.
- The study of themes in each unit will be done through a range of activities such as: initiation of the dialogue within the group, organizing study groups, organizing discussion in small groups, or planning for short presentations.
- The sub-themes organized as units of the course, can be discussed by student teachers (using their own experiences and common-sense understanding, to begin with).
- Teacher educators will be present and participate in the plenary discussions as 'facilitators'.

Practicum/Tutorials:

Some activities for practicum are listed below.

- Individual self-study of a text/ article, with theme questions in mind
- Group study of a text/ article on a given theme
- Observational studies and activities: it may be worthwhile to carry out observations in the field, record what is observed and use the information while discussing with either teacher educator or peers.

- Observation with a purpose to reflect on knowledge preservation, transmission/construction and generation in oral, written, and technological traditions.
- Observation of schools, teachers, student activities in a school context.
- The student- teachers will maintain a portfolio of observations and notes on discussions; these will be submitted periodically to the faculty for appraisal and feedback.

Suggested Readings:

1. Agrawal, A. (1995). Dismantling the Divide between Indigenous and Scientific Knowledge: Development and Change. 26:413-39
2. Ant Weiler, C. (1998). Low Knowledge and Local Knowing: An Anthropological Analysis of Contested “Cultural Products” in the Context of Development. Anthropos. 93:46-94.
3. Chomsky, N. (1986). Knowledge of Language. New York. Prager.
4. Datta, D.M. (1972). Six ways of Knowing. Calcultta. Calcutta University Press,
5. Dewey, John (1997). Experience and Education, Touchstone, New York.
6. Krishna Murthy, J. (1947). On Education, New Delhi. Orient Longman.
7. Kumar Krishna (1996). Learning From Conflict, New Delhi: Orient Longman.
8. Peters, R.S. (1967). The Concept of Education, UK: Routledge.
9. Margaret, K.T. (1999). The open Classroom, New Delhi. Orient Longman.
10. Prema Clarke (2001). Teaching & Learning: The Culture of pedagogy, New Delhi: Sage Publication.
11. Steven H. Cahn. (1970). The Philosophical Foundation of Education, New York. Harper & Row Publishers.
12. Sykes, Marjorie. (1988). The Story of Nai Taleem. Wardha. Nai Taleem Samiti.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester I

WEAP 101: WORK EDUCATION (AGRICULTURE PRACTICE)-I

Time: 1.5 Hours Max. Marks: 50

Credit- 4 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.
- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Modes of Learning Engagement: Hands on experiences, Activity based learning, Experimentation, Interactive engagement, Group work, Peer learning, Project work.

COURSE CONTENTS

Unit I:

Agriculture: Meaning, definition, scope, history, branches and objectives.

Unit II:

Soil Science: Definition of pedology, soil management, soil erosion, soil conservation practices; structure of soil, soil profile; soil fertility and productivity, essential plant nutrients. Fertilizers and manures including bio-fertilizers. Identification of manures and fertilizers.

Unit III:

Irrigation: Definition, method of irrigation, systems of irrigation, drainage, irrigation pattern of India.

Horticulture: Definition, branches of horticulture, layout of orchards, propagation by seeds and by vegetative means; Pot filling technique; Planning, planting and maintaining lawn; Practice related to landscaping.

Unit IV:

Agricultural practices: Preparation of land, selection of seeds, watering, thinning, hoeing and weeding, harvesting of crop, identification of important agricultural tools, trees and crop plants. Minor project preparation on agriculture.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).
4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

PRACTICAL

Practicum: All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Bajra
- Maize
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester I

WEEE 101: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-I

Time: 1.5 Hours | Max. Marks: 50

Credit- 4 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: on completion of the course, the students will be able to-

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.
- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Modes of Learning Engagement:

Constructivist Approach: Hands on Experience, Activity used Learning, Experimentation Interactive Engagement, Group work, Peer Learning, Project Work

COURSE CONTENTS

Unit I:

Symbols, Tools and Soldering: Precautions used for making any electrical connection, Identification of conductors & insulators. Symbols for electrical components, knowledge of electrical accessories and their rating.

Tools used for making any electrical connection, their sizes and use.

Hand soldering, Soldering alloy, soldering flux and de-soldering pump. Practice of hand soldering.

Unit II:

Wires, Wirings and connections of lamps: Different types of wire, use of SWG, Different types of wiring such as: Batten wiring, CTS wiring, casing capping wiring, Cleat and conduit wiring. Their advantage and disadvantage on each other. Series

and parallel connections of lamps (up to four lamps). Staircase wiring of one, two and three lamps, Go-down wiring, connection for fan.

Unit III:

Electrical Components and Appliances: Color coding in resistor and Capacitor, use of resistor and capacitor in electrical appliances,

Understanding the working of electrical appliances: Electric iron, room heater, Immersion heater, geyser, Electric bell, emergency light

Unit IV:

Electronic Components and Their Use: Semiconductor materials, Semiconductor diode, Diode testing, Zener diode, LED, Photo diode, Solar cell, Rectification by diodes, Voltage multiplication by diodes.

Suggested Readings:

1. Electrician - I Year- Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician - II Year- Trade Theory Published by national Instructional Media Institute Chennai re-print 2007
3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007
4. N.N. Bhargava, D.C Kulshrestha and S.C Gupta, Basic Electronics and Liner Circuits. Tata Mc. Graw Hills Ltd. New Delhi(2000)
5. B.L. Theraja, Basic Electronics, S.Chand New Delhi, (2005)

Practical

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects/Models based on the following **(Only Suggestive)**-

1. Clap switch
2. IR Remote switch (fan, tube light)
3. Remote operated musical bell
4. Alarm for luggage security
5. Mobile cell-phone charger using cell
6. Power supply failure alarm
7. Blown fuse indicator
8. Rectifier
9. Voltage Multiplier
10. Transistor Amplifier

KURUKSHETRA UNIVERSITY, KURUKSHETRA
B.Sc..B.Ed.- 2nd SEMESTER SYLLABI AS PER CBCS PATTERN

B. Sc. B. Ed. (CBCS) Semester- II

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester II

AEC1(II): LANGUAGE SKILLS (HINDI)

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalise grammar rules so as to facilitate fluency in speech and writing .
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENTS

Unit I: History of Language and Literature-2

Aadhunik Hindi Sahitya ka Itihas [1857 Se Lekar Ab Tak]

Unit II : Modern Poetry-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kavita Ka Vikas

1. Maithilisaran Gupt- Nar Ho Na Nirash Karo Man ko
2. Jayshankar Prasad- Himadri Tung Sring Se Prabudh Sudhha Bharti
3. Suryakant Tripathi Nirala- Joohi ki Kali
4. Sumitranandan Pant- Drut Jharo Jagat Ke Jirn Patra
5. Mahadevi Verma-MaiNeer Bhari Dhukh Ki Badli,

Unit III : Modern Poetry-2 [Post-Independence Literature]

Swatantrayottar Hindi Kavita Ka Vikas

1. Gajanan Madhav Muktibodh- Bhool Galti,
2. Kedarnath Agrawal- Chandra Gahna Se Lautati Ber
3. Raghveer Sahay- Aapki Hansi
4. Nagarjun- Aakal Aur Uske Bad
5. Kedarnath Singh- Aakal Me Saras

Unit IV : Communication skills Conversation [Varta]:

Characteristics – Definition – Styles of conversation – Higher order skills- Telephonic conversation, Role Play, – Models, etc. – Exercises.

References:

1. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
2. Hindi Sahitya ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Dr Nagendra , Mayoor Paperbacks, Delhi
4. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
5. Hindi Sahitya Ka Dusara Itihas: Bacchan Singh, Vani Prakashan, Delhi
6. Aadhunik Hindi Sahitya ka Itihas: Bacchan Singh, Lokbharti Prakashan, Delhi
7. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
8. Hindi Sahitya ka Sanchhipt Itihas:Viswanath Tirpathi, Orient Longman, Delhi
9. Sawtantrayotar Hindi Sahitya Ka Itihas: Dr Laxmisagar Vasney, Delhi
10. Hindi Sahitya Aur Samvedana Ka Vikas: Ramswaroop Chaturvedi, Lokbharti Prakashan
11. Bhasha, Yugbodh aur Kavita: Dr Ramvilas Sharma, Vani Prakashan, Delhi
12. Kavita ka Vartmaan: Dr P Ravi, Vani Prakashan, Delhi
13. Hindi Kvaya ka Itihas: Ramswaroop Chaturvedi, Lokbharti Prakashan, Delhi
14. Kavita ki Zameen aur Zameen ki Kavita: Namvar Singh, Rajkamal Prakashan, Delhi
15. Nayee Kavita aur Astitvawad: Ramvilas Sharma, Rajkamal Prakashan,Delhi
16. Chhayavad: Namvar Singh, Rajkamal Prakashan, Delhi
17. Kavita ke Naye Pratiman: Namvar Singh Raajkamal Prakashan, Delhi
18. Hindi Kavita ka Atit aur Vartmaan: Maneger Panday, Vani Prakashan, Delhi
19. Hindi Kavita Ki Tisari Dhara: Mukesh Manas, Swaraj Prakashan, Delhi
20. Effective Communication Skills, by Omkar N Kour
21. Prayojanmoolak Hindi- Madhav Sontakke, Rajkamal Prakashan Samooh, Delhi
22. Prayojanmoolak Hindi ki Nayee Bhoomika- Kailash Nath Panday, Rajkamal Prakashan Samooh, Delhi
23. http://www.hindisamay.com

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may

be given .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester II

AEC1(II): LANGUAGE SKILLS (ENGLISH)-II

Time: 3 Hours | Max. Marks: 100

Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives :

Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENT

Unit I: Descriptive Grammar

Function of Auxiliaries; Modals; Question form
Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Development of Language Competence

To be based on the use of multiple texts which address issues of multiculturalism, gender, racism and texts which relate with current issues and contemporary trends.

Short stories, comic strips, cartoons and animations (both print and non-print media) to be used. Speeches of famous persons, diaries, travelogues can also be used.

Unit III: Writing for Functional Purposes

Letter-writing (Professional / Personal)

Unit III: Creative Skills in Writing

Writing dialogues, poems and essays

Unit IV: Basic Phonetics

Sounds of English language, intonation and transcription using IPA.

References:

1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA
2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2 nd Ed. New Harbinger Publications.
5. Merrriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.
6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
7. Graves,D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.:Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester II
AEC2(II): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-II

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the course: On completion of the course the students will be able to:

- Explain the process and stages of instructional design.
- Design anddevelopteachnologyintegratedlearningexperiencesusing ICT tools.
- Explain the different pedagogical approaches of ICT integration in education.
- Develop skills in using various e-learning tools and technologies.
- Plan, develop, and use multimedia based learning content using open source authoring software.
- Create and use Open Educational Resources under different CC licenses.
- Use various online and offline ICT tools for assessment.
- Appreciate the scope of ICT for improving the personal productivity and professional competencies.
- Explain the emerging trends in information and communication technology.

Course Contents

Unit I: Instructional Design and E-content

- Instructional Design – concept, principles, models and stages of instructional design.
- Basic Understanding of Audio-Visual Studio
- Basic Photography Aesthetics

- Types of Camera and Microphones
- Multi Camera Setup
- Various Formats of Video and Audio
- Shot Division/ Types of Shot Sizes and their impact on narrative/ continuity
- Genres in Video Communication
- Steps in the Video Production
- Multimedia tools- Audio editing, video editing, screen casting, graphic editing, and basics of animation, and creating interactive media.
- Designing, developing and using Massive Open Online Courses (MOOCs).

Unit II: ICT and Pedagogy

- Approaches to integrating ICT in teaching and learning.
- Techno pedagogical content knowledge (TPCK).E-learning: concept, types, characteristics, advantages and limitations. E-learning tools and technologies, Learning Management Systems (LMS).
- Flipped classrooms: meaning and possibilities.
- Web quest and virtual field trips: concept, process, and use in the classroom.Subject specific ICT tools for creating and facilitating learning.Designing technology integrated authentic learning designs and experiences.
- ICI integrated Unit plan – Web 2.0 for creating constructivist learning environment.
- Assistive technology for special needs and inclusion: tools and processes, ICT and Universal design for Learning (UDL).
- ICT for Assessment: Online and offline assessment tools – rubrics, e-portfolio, survey tools, puzzle makers, test generators, reflective journal, question bank.

Unit III: Designing and Developing E-Content

- Learning theories – implications for instructional design
- E-learning courseware (e-content) design
- Identifying and organizing course content: need analysis(learner, content, task), learning objectives, course sequence.
- Designing instructional media, evaluation, and delivery strategies.
- Creating interactive content – story board, courseware outline, interactivity and interface.
- Courseware delivery and evaluation.
- Reusable learning objects (RLO)– meaning, types and characteristics, RLO repositories, metadata and standards.

- E-content authoring tools- open source and proprietary alternatives.
- Open Educational Resources – Meaning and importance, various OER initiatives, creative common licensing.

Unit IV: ICT for Educational Management and Professional Development

- ICT for personal management: email, task, events, diary, networking.
- ICT for educational administration: scheduling, record keeping, student information, electronic grade book, connecting with parents and community, Library Automation.
- ICT for professional development: tools and opportunities.
- Electronic teaching portfolio- concept, types, tools, portfolio as a reflective tool for professional development.
- Self-directed professional development: role of ICT.
- Teacher networks and community of practice, web conferencing- tools and techniques.
- Technology and design based research and its pedagogical implications for professional development.
- Emerging Trends in ICT and its educational implications: augmented reality, 3D printing, learning analytics, digital games, artificial intelligence.

Sessional activities:

- LMS experience- hands on various features of LMS – the ICT course may be provided through LMS.
- Enrolling and completing some MOOC courses of interest.
- Creating resources for flipped classroom and practicing flipped learning in school.
- Evaluating OER resources. Creating and sharing OER materials- may be in NROER.
- Developing technology integrated unit/lesson plan and trying out this in the school.
- Hands on experience on subject specific software tools like geogebra.
- Evaluation of RLO repositories and creating RLO and uploading to repositories.
- A critical study of some e-learning courses and enrolling and completing some free e-learning courses.
- Developing a multimedia e-content for a topic using eXe Learning.
- Creating screen cast video of a lesson.
- Creating a podcast using audacity and sharing it on podcasting site.

- Shooting, editing, producing and sharing of videos segment on any educational topic.
- Creating a simple 2D animation using pencil or Tupi.
- Creating and editing various graphics.
- Planning and creating digital rubrics for any topic.
- Organize web conferencing using Skype.
- Review of ICT labs (plans and equipments/resources) in school from internet.
- Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation.
- Developing an electronic assessment portfolio.
- Developing an electronic teaching portfolio.
- Readings on emerging ICT trends in education.
- Using FOSS tools for timetabling, grade sheet.

Suggested Readings:

1. Athanassios Jimoyiannis (Editor) (2011). Research on e-Learning and ICT in Education. Springer: USA
2. Costantino, P.M., DeLorenzo,M.N., Kobrinski,E.J. (2006).Developing a professional teaching portfolio: a guide for success. Pearson
3. Christopher Moersch(2009). Beyond Hardware-Using Existing Technology to promote Higher-Level thinking. Viva Books: New Delhi.
4. David Moursund (2009).Project Based Learning- Using Information Technology-Second Edition. Viva Books: New Delhi.
5. Howard Pitler, Elizabeth R. Hubbell, and Matt Kuhn.(2012)Using Technology with Classroom Instruction That Works, 2nd Edition. ASCD:Denver
6. Liz Arney (2015)Go Blended!: A Handbook for Blending Technology in Schools
7. M. D. Roblyer, Aaron H. Doering (2012). Integrating Educational Technology into Teaching (6th Edition)
8. Mohit K (2003). Design and implementation of Web-enabled Teaching Tools : IRM Press, UK.
9. Pradeep Kumar (2011). Web Resources in Pedagogy . Apple Academics: Oakville.
10. Sonny Magana, Robert J. Marzano (2013).Enhancing the Art & Science of Teaching With Technology (Classroom Strategies)

GROUP C: CORE COURSE (CC)

Semester II

Core Course1(II): PHYSICS: MATHEMATICAL BACKGROUND, PROPERTIES OF MATTER AND ELECTROMAGNETIC WAVES

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint with the key concepts of mathematical background, properties of matter and electromagnetic waves.
- Apply the concepts in various real life situations.

- Solve the problems based on mathematical background, properties of matter and electromagnetic waves.
- Apply the theory in execution of practicals.

Course-Contents

Unit: I

Scalars and Vectors: dot products, triple vector product, gradient of scalar field and its geometrical interpretation, divergence and curl of a vector field, line, surface and volume integral, Flux of a vector field, Gauss divergence theorem, Green's theorem and Stoke's theorem. Functions of two and three variables, Partial derivatives, geometrical interpretation of total differential of a function of two and three variables, Higher order derivatives and their applications.

Unit: II

Elasticity, Small deformations, Young's modulus, bulk modulus and modulus of rigidity for anisotropic solid, Poisson's ratio, relation among elastic constants,Theory of bending of beams and cantilever, Torsion of a cylinder, Bending moments and Shearing forces.

Unit: III

Kinematics of moving fluids, Equation of continuity, Euler's equation, Bernoulli's theorem, viscous fluids,Streamline and turbulent flow, Poiseuill's law, Capillary flow, Reynold's number, Stoke's law, Surface tension and surface energy, molecular interpretation of surface tension, Pressure on a curved liquid surface, wetting.

Unit: IV

Faraday's law (it's integral and differential form), Energy in a static magnetic field, Measurement of self-inductance by Rayleigh's method, Maxwell's displacement current, Maxwell's equations, Electromagnetic field and Energy density.

Plane electromagnetic wave in vacuum, Pointing vector, Reflection and Refraction at a plane boundary of dielectrics, Polarization by Reflection and total internal Reflection, Faraday effect, Wave in conducting medium, Reflection and Refraction by the ionosphere.

Suggested Readings:

1. Haliday and Resnik, Physics-VI Ed.
2. D.J Griffith "Introduction to electrodynamics", (Prentice Hall of India A.M parties, Electomagnetic field.
3. V.V Sarvate, Electromagnetic field and Waves , (Wiley Eastern Ltd., New Delhi)
4. S.N Ghosh, Electromagnetic theory and wave propagation, (Narosa Publishing House.)
5. D.S. Mathur, Mechanics, (S. Chand Publishing)
6. R.K. Shukla, AnchalSrivastava, Mechanics, (New Age International Publishers)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10

Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine Young's modulus by bending of beam.
2. To determine Y, η and σ by Searle's method.
3. To determine dispersive power of prism.
4. To determine modulus of rigidity of material of wire using Maxwell's needle.
5. To determine modulus of rigidity by static vertical method.
6. To determine modulus of rigidity by static horizontal method.
7. To study the characteristics of transistor and determine and common base and common emitter configuration.
8. To determine the frequency of AC Mains.
9. To study the frequency response and phase relationship of A.C. in a R.C. series circuit.

GROUP C: CORE COURSE (CC)
Semester II
Core Course2(II): CHEMISTRY: PHYSICAL CHEMISTRY

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To acquire basic knowledge to students teachers about Mathematical concepts and learn the basic concepts of nuclear radioactivity and Nuclear reactions.
- To enhance the understanding of students in concepts related to Liquid, Colloidal states & Structure of Ionic solids, Behaviour of Gases, concepts in

thermodynamics, different thermodynamic quantities such as heat and work and how are they measured, related or transformed from one to the other.

Course Contents

Unit I: Mathematical concepts and Nuclear Chemistry

- **Mathematical Concepts**: Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k_x, e^x,x^n, sin x, log x; maxima and minima, partial differentiation and reciprocity relations, Integration of some useful/relevant functions; permutations and combinations, Factorials, Probability.
- **Nuclear Chemistry:** Radioactive decay – decay law, disintegration constant, half-life and average life, alpha and beta disintegration reactions, group displacement law, nuclear reactions fission, fusion, artificial radioactivity, applications of radioactivity, nuclear power, carbon dating, biological effects of various types of radiations, nuclear chemistry for peace, Nuclear chemistry in Medicine and diagnostic techniques.

Unit II : Liquid, Colloidal states & Structure of Ionic solids

- **Liquid State:** Intermolecular forces, structure of liquids (a qualitative description).Structural differences between solids, liquids and gases, Liquid crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholestric phases, Thermography and seven segment cells.
- **Colloidal States:** Definition of colloids, classification of colloids, Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, Emulsifier, Liquids in solids (gels): classification, preparation and properties, inhibition, general application of colloids, colloidal electrolytes.
- **Structure of Ionic solids**: Definition of space lattice, unit cell; Laws of crystallography – (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals, Derivation of Bragg's equation, Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Unit III : Behaviour of Gases

- **Gaseous States:** Postulates of kinetic theory of gases, deviation from ideal behaviour, Vander Waals' equation of state;
- **Critical Phenomena**: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and Van der Waals' constants, the law of corresponding states, reduced equation of state.
- **Molecular Velocities**: Root mean square, average and most probable velocities, Qualitative discussion of the Maxwell's distribution of molecular velocities,

collision number, mean free path and collision diameter, Liquification of gases (based on Joule – Thomson effect).

Unit IV : Thermodynamics

- *First Law of Thermodynamics*: Statement, definition of internal energy and enthalpy.Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature. Calculation of w, q, dU, &dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, temperature dependence of enthalpy, Kirchhoff's equation.
- *Second law of thermodynamics*: Need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy: entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.
- *Third law of thermodynamics*: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G with A with P, V and T.

Suggested Readings:

1. Engel, Physical Chemistry, Pearson Publications.
2. Mary Anne White, Physical Properties of Materials, Taylor & Francis second edition.
3. D N Bajpai, Advanced Physical Chemistry, S. Chand Publishing
4. S Lewis and D Gladstone, Elements of Physical Chemistry, Macmillan.
5. Peter Atkins Julio de Paula, The elements of Physical Chemistry, Oxford University Press.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. Colloids

- To prepare arsenious sulphide sol and compare the precipitating power of mono - , bi- and trivalent anions.

2. Viscosity

- To determine the percentage composition of a given mixture (non interacting systems) by viscosity method.

- To determine the percentage composition of a given binary mixture by viscosity method (acetone & ethyl methyl ketone)

3. Surface Tension

- To determine the surface tension of amyl alcohol in water at different concentrations and calculate the excess of these solutions.
- To determine the percentage composition of a given surface tension binary mixture by surface tension method (acetone &ethyl methyl ketone).

GROUP C: CORE COURSE (CC)

Semester II

Core Course3(II): ZOOLOGY: CHORDATA

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to understand in respect of vertebrates – their organizational hierarchies and complexities, the evolutionary trends in external morphology and

comparative studies of internal structures; identification and classification with examples; to enable them to understand various modes of adaptations in animals.

Course Contents

UNIT: I

An outline classification of chordates up to orders but up to subclasses only in case of proto-chordate groups and mammals.

Comparative anatomy of vertebrates from an evolutionary point of view of the following:-

(i) Integument including structure and development of placoid scales, feathers and hair.

(ii) Heart and aortic arches.

(iii) Kidney and associated urinogenital ducts

Habit and habitat, reproduction (excluding development) and affinities to following types:-

a) Hemichordate: *Banlanoglossus*

b) Urocohordata:*Herdmania,* ascidian tadpole larva and its metamorphosis.

c) Cephalochordata: *Amphioxus*

Unit: II

Habit, habitat, of the following types:

a)Agnatha: Petromyzon (affinities with other vertebrate groups), affinities of Cyclostomates.

b) Pisces: *Scoliodon* (Digestive system, respiratory system, blood vascular system, urinogenital system, nervous system (central and peripheral) including sense organ)

c) Scales and fins of fishes.

Unit: III

Habit, habitat, structure (morphology, digestive system, respiratory system, blood vascular system, nervous system and urinogenital system of the following types:-

a) Amphibia *: Hoplobatrachus tigerinus*

b) Reptilia*: Sara hardwickii*

c) Venomous and non-venomous snakes, poison apparatus and biting mechanism. First aid of snake bite.

d) Parental care in Amphibia.

Unit: IV

Habit, habitat, structure, morophology, digestive system, respiratory system, blood vascular system, nervous system and urinogenital system of the following types:-

a) Aves: *Columba*

b) Mammalia: *Rabbit*.

c) Origin of birds, migration & flight adaptation of birds.

Suggested Readings:

1. Modern Textbook of Zoology: Vertebrate by R.L. Kotpal – Rastogi Publication, Merrut, 3rd Edition,2008

2. A Textbook of Zoology Vol. II by Parkar and Hasswel – (MacMillan)
3. A Textbook of Zoology Vol. II by R.D. Vidyarthi – (S. Chand & Co. Delhi)
4. Life of Vertebrates by J. Z. Young – (Oxford University Press)
5. The Vertebrates by A.S. Romer – (vakils, Ferrer& Simons, Bombay)
6. Elements of Chordate Anatomy by Weichert – (McGraw Hill)
7. The Birds by R.L. Kotpal (4th Edition) – Rastogi Publications, 2008
8. Bird Migration by D.R. Griffin – (Doubleday, Garden city, USA)
9. The Book of Indian birds by salim Ali.
10. Fish and Fisheries by K. Pandey and J.P. Shukla (2nd Edition) (Rastogi Publication, 2008)
11. Indian Fishes by Qureshi – (Brij Brothers., Bhopal)
12. Comparative anatomy of the vertebrates by George C Kent- 3rd Saint Louis: The C.V. Mosby Co 1973
13. Animal taxonomy and evolution, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta Jaipur.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Content:

1. Study of Museum specimen with respect to levels and patterns of organization, biosystematics, biodiversity, adaptations, development stages, population dynamics, ecological implications etc.

a) **Hemichordata**: *Balanoglossus*.
b) **Urochordata**: *Herdmania, Pyrosoma.*
c) **Cephalochordata**: *Amphioxus.*
d) **Cyclostomata**:*Petromyzon, Myxine.*
e) **Pisces**: *Scoliodon, Sphyrna, Torpedo, Pristis, Trygon, Lepidosteus, Clarias, Ophiocephalus, Anabas, Exocoetus, Hippocampus, Tetradon, Protopterus.*
f) **Amphibia:** *Icthyophis, Necturus, Proteus, Ambystoma, Axolotl larva, Triturus. Amphiuma, Alytes, Bufo.*

g) **Reptilia:** *Testudo, Trionyx, Sphenodon,Hemidactylus, Draco, Calotes, Chamaeleon, Varanus, Heloderma, Typhlops, Eryx, Hydrophis, Viper, Bungarus, Naja, Alligator;* Identification of Venomous and Non-venomous Snakes.

h) **Aves:** *Pavo, Columba, Psitacula, Passer, Corvus, Archaeopteryx.*

i) **Mammals:** *Ornithorhynchus, Echidna, Macropus, Loris, Manis, Rattus*.

2. **Study of Permanent Slides:**

a) ***Balanoglossus****:* T.S. of proboscis, collar region and trunk

b) ***Amphioxus****:* T.S. or oral hood, pharynx.

c) **Mammals**: T.S. of skin, stomach, duodenum, ileum, liver, Pancreas, spleen, lungs, kidney, Testis, Ovary.

3. **Osteology:**

a) Study of skull bone of Frog, *Varanus*, Bird and Rabbit.

b) Study of vertebral of Frog. *Varanus*, Bird and Rabbit.

c) Study of girdles, forelimb and hind limb bones of Frog, *Varanus*, Bird and Rabbit.

4. Dissections and / or its demonstration through Charts / Models / Video / CD / digital alternatives etc and / or preparation of working models of the different system of the following animals.

a) ***Scoliodon****:* Afferent branchial systems, efferent branchial system, cranial nerves and internal ear.

b) **Frog**: Digestive, system, Urino-genital system

5. **Permanent /Temporary preparation of the following-:**

a) Scales: Placoid, Cycloid

b) Blood film of any vertebrate

c) Filoplumes of birds

d) Thigh muscles of frog

6. **Microtomy**: Fixing, block making, section cutting, staining, mounting and submission of slides.

Note:

- Use of animals for dissection is subject to the conditions that these are not banned under the Wildlife Protection Act or any other legislation.
- Students are required to submit the following during examination.
  a. One assignment on the instrument/ technique about its principle, working, precautions and applications; and /or reagents / solutions preparation.
  b. Report on study of animals from their natural habitat from their local surroundings. Live Zoology Project Report.

GROUP C: CORE COURSE (CC)

Semester II

Core Course1(II): BOTANY: DIVERSITY OF CRYPTOGAMS

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understand the structure, classification and life history of Bryophyta

andPteridophyta.

- Understand the Geological time scale and the importance offossils.
- Understand the evolutionary trends amongPteridophytes.

Course contents

Unit I: Bryophyta

- General characters, distribution, structure, reproduction, alternation of generations.
- Classification and economic importance.
- Origin and affinities of bryophytes.
- Study of morphology, anatomy and reproduction in-
  - Hepaticopsida:*Marchantia*
  - Anthocerotopsida :*Anthoceros*
  - Bryopsida : *Funaria*

Unit II: Palaeobotany

- General account of geological time scale, types of fossils, fossilization process, radioactive carbon dating, and importance offossils.
- Study of *Rhynia, Calamites* and *Glossopteris.*

Unit III: Pteridophyta

- General characters, distribution, reproduction, life cycle andclassification.
- Study of morphology, anatomy and reproduction in -
  - Psilopsida:*Psilotum*
  - Lycopsida: *Lycopodium, Selaginella*

Unit IV: Morphology, Anatomy and Reproduction

- Study of morphology, anatomy and reproduction in -
  - Sphenopsida :*Equisetum*
  - Pteropsida :*Pteris, Marsilea*
- Evolution of steles inPteridophytes
- Origin and significance of heterospory and seedhabit.

Suggested Readings:

1. Smith.G.M.,1971,CryptogamicBotanyVol.II,TMHPublishingHouse,NewDelhi.
2. Sporne, K.R., 1974, Morphology of Pteridophytes, Hutchinson & Co.,London.
3. Rashid, A. An Introduction toPteridophyta.
4. Pandey, Mishra & Trivedi, 2007, A Textbook of Botany Vol.II, Rastogi Publications, Meerut.
5. Singh,V., P.C.Pande & D.K.Jain 2006, A Textbook of Botany, Rastogi Publications, Meerut.
6. Singh V., P.D.Pande & D.K.Jain 2005, Diversity and Systematics of Seed plants, Rastogi Publications,Meerut.
7. Parihar, N.S.,Bryophyta.
8. Parihar, N.S., Introduction to Embryophyta Vol.IIPteridophyta.
9. Vashishta, P.C.1982, Peridophyta, S.Chand & Co. Ltd., NewDelhi.
10. Gangulee H.C., Kar and Ashok Kumar,1982, College Botany Vol.II, Central Book Agency,Calcutta.

11. Anrold, Introduction to Palaeobotany, McGraw Hill,London.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course content:

- Study of the morphology, anatomy and reproductive structures of genera included in Bryophyta andPteridophyta by making micro preparations and observation of permanent slides.

Group C: Core Course (CC)

Semester II

Core Course 3(II): MATHEMATICS: DIFFERENTIAL EQUATIONS

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of the course students will be able to understand the principles and techniques of Differential Equations in problem solving.

Course Contents

Unit-I

Linear equations and equations reducible to linear form. Exact differential equations, integrating factors, first order andhigher degree equations solvable, for x, y, p. Clairaut's form and singular solutions, Geometric meaning of a differential equation, orthogonal trajectories, linear differential equations with constant coefficients, homogeneous linear ordinary differential equations.

Unit: II

Ordinary simultaneous differential equations, total differential equations. Linear differential equations of second order, transformation of the equation by changing dependent independent variable, method of variation of parameters.

Unit: III

Series solution of differential equations, power series method, Bessel, Legendre and hyper geometric equations, Bessel, Legendre and hyper geometric functions and their elementary properties.

Unit: IV

Partial differential equations of the first order, Lagrange's solution, some special type of equations which can be solved easily by methods other than the general method, Charpit general method of solution.

Suggested Readings:

1. Differential Equations Vol I:J.L. Bansal and H.S. Dhami, JPH, 2004.
2. Ordinary and Partial Differential Equations: M.D. Raisinghania and R.S. Aggarwal, S. Chand & Company, New Delhi, 2ndedition 1983.
3. Theory and problems of Differential equations: Frank Ayres, McGraw-Hill Book Company, Singapore, 1stedition 1972.
4. An Introduction to Ordinary Differential Equations, Dover Books on Mathematics: E. Coddington (1990) Dover
5. Differential Equations and Dynamical Systems: L. Perko (2010) Springer
6. Theory of Ordinary Differential Equations: Codington and Levinson (1987) Tata McGrawHill.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester II
PECG 102: CHILDHOOD AND GROWING UP

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives of the Course: On the completion of course, the student teacher will be able to:

- Situate individual development in a socio-cultural context.
- Develop an understanding about the impact/influence of socio-cultural context in shaping human development, especially with respect to the Indian context.
- Acquire theoretical perspectives and develop an understanding of dimensions and stages of human development and developmental tasks.
- Understand a range of cognitive skills and affective processes in human learners.
- Become aware of different contexts of learning and situate schools as a special environment for learning.
- Reflect on their own implicit understanding of the nature and kinds of learning.
- Gain an understanding of different theoretical perspectives on learning with a focus on cognitive views of learning as well as social– constructivist theories.
- Explore the possibilities of an understanding of processes in human cognition and meaning–making them as basis for designing learning environments and experiences at school.
- Appreciate the critical role of learner's based on differences and contexts in making meanings, and hence draw out implications for schools and teachers.

Course Contents

Unit I: Learner as a Developing Individual and individual differences among learners

- Developmental Influences: Development as a resultant of interactions between individual potential (innate, acquired) and external environment (physical, socio-cultural, economic and technological).
- Nature and nurture, continuity and discontinuity and growth and maturation issues.
- The understanding of cognitive and affective processes influencing the development of the learner and their applications in classroom teaching.
- Dimensions of differences in psychological attributes—cognitive abilities, interest, aptitude, creativity, personality, values.
- Understanding learners from multiple intelligence perspective with a focus on Gardner's theory of multiple intelligence. Differences in learners based on predominant 'learning styles'.

Unit II: Development and Learning

- Meaning and principles of development, relationship between development and learning.
- Dimensions of individual development: physical, cognitive, language, emotional, social and moral, their interrelationships and implications for teachers (relevant ideas of Piaget, Erikson and Kohlberg).
- Stages of development—developmental tasks with focus on processes growth and development across various stages from infancy to post adolescence (special emphasis on concerns of adolescence).

Unit III: Theoretical Perspectives on Learning

- Perspectives on human learning: Behaviourist (conditioning paradigm in brief), Cognitivist and Social Cognitivist (Bandura), Information-Processing view, Humanist, Social-Constructivist Social Cognitive Learning (drawing selectively on the ideas of Skinner, Piaget, Rogers, Vygotsky).
  (i) Concepts and principles of each perspective and their applicability in different learning situations
  (ii) Relevance and applicability of various theories of learning for different kinds of learning situations
  (iii) Role of learner in various learning situations, as seen in different theoretical perspectives
  (iv) Role of teacher in teaching- learning situations: a) transmitter of knowledge, b) model, c) facilitator, d) negotiator, e) co- learner. (The focus is on building understanding of different psychological perspectives of learning and helping student teachers to learn to apply them in different learning situations).

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':
  (i) Experiential learning and reflection
  (ii) Social mediation
  (iii) Cognitive negotiability
  (iv) Situated learning and cognitive apprenticeship
  (v) Meta-cognition.
- Creating facilitative learning environment.
- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Modes of Learning Engagement: Modes of learning engagement will include:

- Reflective Written Assignments
- Lecture-cum-discussion
- Study of selected readings and discussions around overviews
- Anecdotes, experiential and reflective writings.
- Audio-visual clips of learning situations and interactions, analysis and discussion in small groups as well as large group
- Group presentations of key themes and concepts
- Exemplars of 'constructivist' learning situations, Case studies, their analysis and discussion

- Close observation of learners (students) in learning situations at school, as well as in other contexts; making field notes
- Interpretation, analysis and discussion of observations
- Assignments based on the above

Practicum/ Tutorials:

- Reflective Written Assignments
- Field observation notes
- Analysis of a learning situation and case study, using theoretical perspectives
- Administration of any one standardized tests (Intelligence/aptitude/attitude/creativity) and preparation of psychological assessment report.
- Prepare a critical report on implications of any one theory for learning – Piaget, Erickson and Bandura.
- Select a child with learning problem (refer 5.5) and carry out academic assessment in any one subject, identify the remedial measures and prepare a report.
- Preparation of learners' profile based on cognitive and non-cognitive characteristics to depict inter and intra individual differences.
- Project work

Suggested Readings:

1. Ambron, S.R. (1981). Child Development. New York. Holt Rinehart & Winston.
2. Atkinson, Richard C. et.al. (1983). Introduction to Psychology. New York. Harcourt Brace Johanovich Inc.
3. Benjafield, J.G. (1992). Cognition. Prentice Hall, Englewood Cliffs.
4. Blackie, J. (1971). How Children Learn in J.C. Stone and F.W. Schneider (eds.) New York. Readings in the Foundations of Education, Vol II, Cromwell.
5. Brown, J.S., Collins, A and Dugrid, P (1989). Situated Cognition and the Culture of Learning, Educational Researcher: 32-42.
6. Dececco. (1970). Italy. Psychology & Learning and Instruction Educational Psychology Prentice.
7. Flavell, J.H. (1963). The Developmental Psychology of Jean Piaget, New York. Van No strand.
8. Gange, R. M. (1985). The Conditions of Learning and Theory of Instruction (4th edition). New York. Holt, Rinehart and Winston.
9. Gardner, H. (1999). The disciplined mind what all students should understand. New York. Simon & Schuster.
10. Gardner, Howard (1989). Frames of Mind. New York. The Theory of Multiple Intelligences, Basic Books.
11. Gardner, Howard (1991). The Unschooled Mind. New York. Basic Books.
12. Hurlock, E.B. (1964). Child Development. New York. Mcgraw Hill Book Co.
13. Phillippe Aives. (1962). Centuries of Childhood. A Sociology of Family Life. New York. Knops.

14. Wolfolk (1987). Educational Psychology. Prentice Hall Eaglewood Cliff.
15. Srivastava, A.K. (1998). Child Development. The Indian Perspective. New Delhi. NCERT.
16. Sibia, A. (2006). Life at Mirambika. New Delhi. NCERT.
17. Chauhan S. S. (2002). Advanced Education Psychology. Delhi. Vikas Publication.
18. Woolfolk, A.E. (2009). Educational Psychology (11th Edition) (My Education Lab Series) Prentice Hall.
19. Wertsch, J.V. (1985). Vygotsky and the Social Formation of Mind. Harvard University Press.
20. Chauhan, S.S. (1990). Advanced Educational Psychology. New Delhi. Vikas Publication House.
21. Sharma R.A. (1996). Fundamentals of Educational Psychology. Meerut. Lal Book Depot.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester II

WEAP 102: WORK EDUCATION (AGRICULTURE PRACTICE)-II

Time: 1.5 Hours | Max. Marks: 50
Credit- 3 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.

- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Course Contents

Unit I: Identification

- Seeds of common crops.
- Seeds of common vegetables.
- Important weeds.
- Manures commonly used.
- Fertilizers commonly used.

Unit II: Seeds and Seedlings

- Characteristics of a good seed for sowing.
- Calculation of germination percentage of seeds.
- Planting seeds and transplanting seedling.
- Raising seedlings in a nursery
- Study about green-house.

Unit III: Ornamental gardening

- Identification of different summer flowers.
- Identification of different winter flowers.
- Identification of common hedge and creeper plants.
- Preparation and maintenance of rockeries and borders.
- Preparation and maintenance of borders through hedge and flower plantation.

Horticulture Practices

- Agro forestry and related concepts
- Potting and repotting practices.
- Practices related to production of important flowering plants.
- Collection of different types of seeds.
- Preparation of a project.

Unit IV: General Field practices

- Earthing.
- Planting.
- Hoeing.
- Weeding.
- Watering of plants.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).

4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Mustard
- Gram
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester II

WEEE 102: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-II

Time: 1.5 Hours | Max. Marks: 50

Credit- 3 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to-

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.

- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Course Contents

Unit I: Lamps

Understanding the working of CFL tubes, Incandescent lamp, arc lamp, sodium vapor lamp, neon lamp, fluorescent lamp, use of choke and starter

Unit II: Transformer

Construction of Transformers, recognition of primary and secondary winding, knowledge of step-up and step-down transformer, use of transformers.

Unit III: Electrical Appliances

Understanding the working of Electrical appliances such as Refrigerator, Air conditioners etc, making Resistance and Capacitance boxes, use of testing board and extension boards for laboratory.

Unit IV: Transistor

Recognition of emitter, base and collector in a transistor, characteristics of transistor, transistor action, Amplification by transistor, Basic idea of integrated circuits, FET – recognition of drain, source and gate terminals, FET and its characteristics, testing of transistor and FET, LCD.

Suggested Readings:

1. Electrician – I Year Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician – II Year – Trade Theory Published by national Instructional Media Institute Chennai re-print-2007
3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects/Models based on the following **(Only Suggestive)**-

1. Alarm for luggage security
2. Mobile cell-phone charger using cell
3. Power supply failure alarm
4. Blown fuse indicator
5. IR Remote switch (fan, tube light)
6. Remote operated musical bell
7. Voltage Multiplier

B. Sc. B. Ed. (CBCS) Semester- III
GROUP B: GENERIC COURSE (GC)
GCEE 201: ENVIRONMENTAL EDUCATION & SUSTAINABLE DEVELOPMENT

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course

The Course 'Environmental Education' aims to orient student-teachers to analyze and understand environment concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

Course Contents

Unit I: Importance and Scope of Environment

Importance need and scope of Environmental Conservation and Regeneration, Structure and functions of different ecosystems, India as a mega biodiversity nation, Role of individual in conservation of natural resources: water, energy and food, Equitable uses of resources for sustainable livelihoods, Environmental legislation: awareness and issues involved in enforcement.

Unit II: Natural Resources

Community participation in natural resource management- water, forests. Deforestation in the context of tribal life, Sustainable land use management, Traditional knowledge and biodiversity conservation, Developmental projects including Government initiatives and their impact on biodiversity conservation.

Unit III: Practices in Environment Management

Consumerism and waste generation and its management, Environmental degradation and its impact on the health of people, Organic farming,

Agricultural waste: their impact and management, Rain water harvesting and water resource management, Biomedical waste management.

Unit IV: Sustainable Environment in Global World

Environmental conservation in the globalised world, Alternative sources of energy, Impact of natural disaster/man-made disaster on environment, Biological control for sustainable agriculture, Heat production and greenhouse gas emission, Impact of industry/mining/transport on environment, Sustainable use of forest produces.

Modes of Learning Engagement:

- Case studies and success stories (involve local material).
- Problem solving and enquiry methods
- Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
- Setting up of Eco-clubs.
- Conducting a seminar and developing a seminar document
- Project work and writing of project report
- Discussion of activities pertaining to two different classes and subjects.
- Activities on infusion of appropriate concerns.

Practicum:

- The students on completion of each topic of Unit-I will submit a small assignment in the form of an activity. This may include observation of importance of relevant season, preparation of bulletin board material, wall games, crossword puzzles, worksheet etc.
- The class can also form an environment club. The activity has to be on some local specific issue pertaining to the native place of the students.
- From the wide range of topics suggested in Units, the student will be assigned one topic. The student will develop a seminar document, which will be submitted after the seminar.

Suggested Readings:

1. NCERT (1981) Environmental Education at School Level. New Delhi. NCERT.
2. Odum, E.P (1971). Fundamental Ecology. London. W.B. Saunders Company.
3. Palmer, Joy A. (1998). Environmental education in the 21st Century. London. Routledge.
4. Sharma R. C and Tan, Marle C (Eds.) (1990). Resource Book in Environmental education for school lectures. Bangkok. UNESCO.

5. Sharma, R.C. (1981). 'Environmental Education. New Delhi. Metropolitan Publishers.
6. gfj'kpUnzO;kl ¼2001½- i;kZoj.kf'k{kk] ubZ fnYyh-
7. lDlsukgfjeksgu ¼2003½- i;kZoj.k v/;;u] Jhxaxkuxj- vxzokylkfgR; lnuA
8. iadtJhokLro ¼1998½- ^i;kZoj.kf'k{kk*- Hkksiky- e/;izns'kfgUnhxzaFkvdknehA
9. lDlsuk ,-ch- ¼1998½- i;kZoj.kf'k{kk- ubZfnYyh- vk;ZcqdfMiksA
10. UNESCO (1990). Sourcebook in Environmental Education for School Teachers. Bangkok.
11. CEE (1995). Joy of learning handbook of environmental education activities. Vol.I-3 to 5.—Ahmedabad. Centre for Environment Education,
12. CEE (1996) Joy of learning. Handbook of environmental education activities. Vol.II-6 to 8.-- Ahmedabad: Centre for Environment Education
13. Pandya (1999). Mamata, Guide to green material: experiences and learning in developing effective environmental education material. Ahmedbad. Centre for Environment Education,
14. Sharma, R. C. (1981). Environmental Education. Delhi. Metropolitan.
15. Reddy, K. Purushotham. (2007). Environmental education. New Delhi. Neel kamal Publications Pvt. Ltd.
16. NCERT (2009). Project book in Environmental Education for class VII, VII, IX and X. New Delhi. NCERT.
17. NCERT (2011). Teachers' Handbook on Environmental Education for the higher secondary stage. New Delhi.
18. NCERT (2013). Project book in Environmental Education for the higher secondary stage. New Delhi. NCERT.

GROUP C: CORE COURSE (CC)
Semester III
PHY 201: PHYSICS: ELECTRODYNAMICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Know the fundamental concepts of electricity and magnetism.
- Appreciate the link between electricity and magnetism.
- Apply the concepts in understanding the various physical phenomena.
- Solve the problems related to electrodynamics.
- Apply the theory in related practicals.

Course Contents

Unit I: Electro Statics:

Coulomb's law, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields, Work done on a charge in an electrostatic field, conservative nature of the electrostatic field, Electric potential,relation between electric field and electric potential, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, Fields at the surface of conductor, Screening of E field by a conductor, capacitors, electrostatic field energy, force per unit area of the surface of conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor.

Unit II: Dielectrics

Parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector D, molecular interpretation of Claussius – Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics, illustration through simple example

UnitIII: Electric Currents (steady and alternating)

Steady current, current density J, non-steady currents and continuity equation, Kirchoff's law and analysis of multi loop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and its application in solving AC circuit problems, complex impedance and reactance, Measurement of capacitance using impedance at different frequencies, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor, Y and ∇ networks and transmission of electric power.

UnitIV: Magneto statics

Force on a moving charge: Lorentz force, equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, Torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio.

Motion of charged particles in electric and magnetic fields

Linear accelerator, E as deflecting field – CRO, sensitivity, Transverse B field, curvatures of tracks for energy determination of nuclear particles, principle of a cyclotron, Mutually perpendicular E and B fields- mass spectrograph, velocity selector, its resolution.Response curve for LCR circuit and resonance frequency, quality factor.

Magnetic Fields in Matter

Biot-Savart law, calculation of H in simple geometrical situations, Ampere's Law, the divergence and curl of B, field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (linear cases), interpretation of a bar magnet as a surface distribution of solenoidal current, the field of a magnetized object**.**

Plane electromagnetic wave in vacuum, Wave equation for E and B of linearly, Circularly and elliptically polarized electromagnetic waves, Poynting vector, Reflection and Refraction at a plane boundary of dielectrics, Polarization by Reflection and total internal Reflection, Faraday effect, Wave in conducting medium, Reflection and Refraction by the ionosphere.

Suggested Readings:

1. Barkeley Physics Course; Electricity and Magnetism, Ed. E.M. Purcell (McGraw-Hill).
2. Halliday and Resnik; Physics, Vol 2.(Wiley Eastern)
3. D.J. Griffith; Introduction to Electrodynamics (Prentice-Hall of India).
4. Reitz and Milford; Electricity and Magnetism (Addison-Wesley).
5. A.M. Portis; Electromagnetic Fields.
6. Pugh and Pugh; Principles of Electricity and Magnetism (Addison-Welsley).
7. Panofsky and Phillips; Classical Electricity and Magnetism (India Book House).
8. S.S.Atwood; Electricity and Magnetism (Dover).

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To Study resonance in a series LCR circuit and determine Q of the circuit.
2. To determine difference between two small resistances using Carey Foster's bridge.
3. To study the variation of current in RC circuit for different time constants (using a DC source).
4. To find the e/m of electron by Milikan's oil drop experiment.
5. To determine the self inductance of a coil by Anderson's bridge.
6. To compare the two capacities by De Sauty's bridge.
7. To study the variation of magnetic field along the axis of a current carrying circular coil. Plot the graph and find radius of the coil.

Group C: Core Course (CC)
Semester III
CHM 201: CHEMISTRY: ORGANIC CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To acquire basic knowledge to students teachers about the concept of hybridization and geometry of atoms and the three-dimensional structure of organic molecules, Stereochemistry and Reaction Mechanism, General aspects of Organic Reactions; an understanding of nucleophiles, electrophiles, electronegativity and resonance.
- To acquire basic knowledge to students teachers about understanding of Cyclo alkanes, Cyclo Alkenes and Alkadienes, how to use their understanding of organic mechanisms to predict the outcome of reactions, the fundamentals of electronic structure and bonding in aromatic systems, reactivity patterns of aromatic molecules, chemical properties of Alkyl and Aryl Halides and general periodicity patterns of (organic/inorganic) molecules and the ability to design synthetic approaches to such species.

Course Contents

Unit I: Stereochemistry and Reaction Mechanism

A. **Stereochemistry of Organic Compounds**

Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereogeniccenter, optical activity, properties of enantiomers, chiral and achiral molecules with two

stereogeniccenters, diastereomers, threo- and erythrodiastereomers, meso compounds, resolution of enantiomer, inversion, retention and racemisation.

Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer and flying wedge formulae, Difference between configuration and conformation.

B. **General aspects of Organic Reactions:**

Inductive effect,hyperconjugation, conjugation and Resonance, Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy considerations.Reactive intermediates – Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit II: Chemistry of Cyclo alkanes, Cyclo Alkenes and Alkadienes

A. **Cycloalkanes**: Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring, banana bonds, Stereochemistry of cyclo alkanes.

B. **Cycloalkenes**: Methods of formation, conformation and chemical reactions of cycloalkenes.

C. **Alkadienes:** Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction.

Unit III: Aromatic Hydrocarbons

A. **Arenes and Aromaticity:** Nomenclature of benzene derivatives, the aryl group, Aromatic nucleus and side chain, Structure of benzene; molecular

formula and Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. **Aromaticity**: The Huckle rule, aromatic ions.

B. **Aromatic Electrophilic Substitution**: General pattern of the mechanism, role of σ- and π- complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts' reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio, Side chain reactions of benzene derivatives, Birch reduction; Methods of formation and chemical reactions of alkylbenzenesalkynylbenzenes and biphenyl, naphthalene and Anthracene.

UnitIV:Alkyl and Aryl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reactions, Mechanisms of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams, Polyhalogencompounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions, addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions,relative reactivities of alkyl halides vsallyl, vinyl and aryl halides, synthesis and uses of DDT and BHC.

Suggested Readings:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
5. Jerry March, Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Sixth Edition
6. Peter Sykes, A Guidebook to Mechanism in Organic Chemistry Paperback – 2003.
7. Harkishan Singh and V. K. Kapoor. Medicinal and Pharmaceutical Chemistry. VallabhPrakashan Publishers, Delhi. 1996.

8. R L Madan Chemistry for Degree Students B.Sc. 2Nd Year S. Chand Publishing.
9. Hashmatali, Reaction Mechanism in Organic Chemistry S. Chand publishing.
10. John Leonard, Barry Lygo, Garry Procter Advanced Practical Organic Chemistry, Third Edition

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. **Organic Chemistry: Laboratory techniques**

- **Calibration of Thermometer**
  Naphthalene (80-82°C), Acetanilide (113.5-114°C), Urea (132.5-133°C), Distilled Water (100°C)
- **Distillation**
  Simple distillation of ethanol-water mixture using water condenser
  Distillation of nitrobenzene and aniline using air condenser
- **Crystallization**
  Concept of induction of crystallization, Phthalic acid from hot water (using fluted filter paper and stem less funnel), Acetanilide from boiling water, Naphthalene from ethanol,Benzoic acid from water
- **Decolourisation and crystallization using charcoal**
  Decolourisation of brown sugar (sucrose) with animal charcoal using gravity filtration.
  Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of Congo Red using 1g decolorizing carbon) using ethanol.
- **Sublimation (simple and Vacuum)**
  Camphor, Naphthalene, Phthalic acid and Succinic acid.
- **Determination of melting point/ boiling points**
  Determination of melting point: Naphthalene, Benzoic acid, Urea, Succinic acid, Cinnamic acid, Salicylic acid, Acetanilide, m-Dinitrobenzene p-Dichlorobenzene, Aspirin.
  Determination of boiling points: Ethanol, Cyclohexane, Toluene, Aniline and Nitrobenzene.

2. Functional Group Analysis

a. Detection of extra elements (N, S and halogens), solubility behavior and functional groups (Alcoholic, phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

b. Identification of an organic compound through the functional group analysis and preparation of suitable derivatives.

GROUP C: CORE COURSE (CC)
Semester III
ZOO 201: ZOOLOGY: ANIMAL CELL BIOLOGY AND GENETICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to comprehend the modern concepts and applied aspects of Cell Biology and modern concepts of Genetics and to create awareness regarding inheritance.

Note: The paper is divided in four independent units.

Unit I: Cell

Introduction to cell: Discovery, characteristics of prokaryotic (bacterial) and eukaryotic cells (plant and animal cells), cell theory, viruses and viroids.

Cell membrane: Ultra structure, chemical composition, models, unit membrane concept, fluidity, glycocalyx and functions of cell membrane. Transport across cell membrane: Passive transport (osmosis, diffusion), facilitated (mediated) diffusion; active transport (primary and secondary) and endocytosis and exocytosis.

Mitochondria: Ultra structure, chemical composition, functions, origin, electron transport chain and generation of ATP molecules.

Unit II: Cell Organelle

Ultrastructure, types, chemical composition and functions of

(i) ER and Golgi-complex
(ii) Lysosome, Ribosome,
(iii) Centriole,
(iv) Cilia and flagella

Nucleus: occurrence, number, shape, size and structure (nuclear envelopes, nuclear matrix and nucleolus)

Chromosomes: Introduction, structure (chromatids, primary and secondary constrictions, nucleolar organizer and telomeres) types; Chemical composition and functions. Chromosomal organizations: Nucleosome concept, Euchromatin, heterochromatin.

Unit III: Cell Cycle and Division

a) Cell reproduction: Cell cycle and significances of mitosis and meiosis. Regulation of Cell cycle.
b) Mendelian principles of inheritance- monohybrid and di-hybrid cross, back cross and test cross.
c) Deviation of Mendelism – incomplete dominance, co-dominance with examples.
d) Gene interactions: Epistasis, complementary, supplementary, duplicate genes with cumulative effects and collaborator genes.
e) Multiple alleles: Characters, examples pseudoalleles, inheritance of A, B , AB, O and Rh blood groups (antibody reactions)

Unit IV: Genetics

a) Chromosomal mutations-
   i. Variation in chromosome number (aneuploidy and euploidy)
   ii. Structural changes in chromosomes (deletion, duplication, inversion and translocation).
b) Sex–determination: Genetic (sex chromosome, genic balance and haplo-diploidy mechanisms), hormonal and environmental control of sex determinations with examples.
c) Sex-linked inheritance: white eye colour in Drosophila, colour blindness and hemophilia in man.
d) Linkage: Definition, difference between linkage and independent assortment, chromosomal theory of linkage, kinds, linkage groups and significances.
e) Crossing over- Definition, mechanism, theories, kinds, frequency, factors affecting crossing over and significances.

Suggested Readings:

1. Molecular Biology of the Cell, Alberts et al, *5thed Garland Science 2008*.
2. Molecular Cell Biology, H Lodish MP Scott et al 7th Ed, McMillan Pub 2013.
3. Biochemistry, Molecular Biology and Genetics 5th ED, Lippincott Willaims and Wilkinson, 2013.
4. Cell Biology Gerald Karp, 7thed, Wiley Pub 2014

5. Cell and Development Biology by Sastry, Singh &Tomar- (Rastogi Publications . 2008)
6. Essentials of Molecular Biology ,2nded, David Freifileder, Panima Publishing N Delhi 1996
7. Biochemistry and Molecular Biology , K Wilson & J Walker, 7th Cambridge 2010.
8. Cell and Molecular Biology by P.K Gupta – (RastogiPublications 2008)
9. Cell Biology by C.B Power –(Himalaya publishing House, Bombay)
10. Cell Biology by de Robertis et. al-(W.B Saunders , Philadelphia)
11. A textbook of Cytology by R.C Dalela& S.R. Verma – (Jaiprashnath& Co. Meerut)
12. Cell Biology by J.D. Burke – (Scientific Book Agency , Calcutta)
13. Cell Biology : A molecular approach by R.D Dyson- Allyn& Bacon, Boston)
14. Cell Biology by R.M. Dowben – (Harper & Row, New York)
15. Cell function by L. L Langley – (Affiliated East West Press, New Delhi)
16. Cytology by C.D. Darlington
17. Cell and Molecular Biology by de Robertis EDP & de Robertis EMI Jr. (1996) . Holt WB Saunders Internationl
18. Genetics- P.S. Verma& V.K. Agarwal , S. Chand&Co.Delhi
19. Principles of Genetics Gardner , Ed 7th Wiley Eastern Pvt Ltd 2013
20. Genetic – Winchester , Oxford IBH Publications
21. Genetic – Stickberger, Macmillian Publications.
22. Immunology , Kuby 7thed, Owen Punt Stenford McMillan, 2013

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

- Microscope : Simple and compound microscope, working mechanism and maintenance
- Study of bacterial and enkaroytic cell.
- Slides of sub cellular components (Cell organelles)
- Erythrocyte plasma membrane permeability.
- Study of Karyotype and Idiogram of man.

- Study of Barr Bodies in human buccal epithelial cells.
- Identification of blood groups (ABO) and Rh factor in man.
- *Drosophila* culture and life cycle.
- Sexual Dimorphism in *Drosophila,* Identification of wild or mutant varieties.
- Study of salivary gland chromosomes of Drosophila
- Problems on pedigree analysis.
- Meiotic studies of testes of cockroach.

GROUP C: CORE COURSE (CC)
Semester III
BOT 201: BOTANY: GYMNOSPERMS AND REPRODUCTIVE BIOLOGY IN FLOWERING PLANTS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understand the morphology, anatomy, reproduction and classification of Gymnosperms;
- Understand the structure, development and processes associated with Angio spermembryology;

Course Contents

Unit I: Morphology and Anatomy of Gymnosperms

- General characters, distribution, classification, affinities and economic importance of Gymnosperms
- Study of morphology, anatomy and reproduction in Cycadopsida: *Cycas.*
- Study of morphology, anatomy and reproduction in Coniferopsida:*Pinus* and Gnetopsida:*Ephedra*

Unit II: Reproduction in Gymnosperm Part - I

- Flower – Structure, morphology, embryological perspective.
- Microsporangium – Development of wall layers, tapetum types, microsporogenesis, tetrad types.
- Male gametophyte – Development and structure; vegetative and generative cells; male gametes.
- Mega sporangium (ovule): Development, types, mega sporogenesis, tetrad

types.

- Female gametophyte: Development, ultra structure, mono, bi and tetrasporic embryo sacs.

Unit III: Reproduction in Gymnosperms Part - II

- Pollination and fertilization: Definitions, types of pollination, pollen-pistil interaction, self-incompatibility ,double-fertilization.
- Endosperm: Definition, types – cellular, nuclear and helobial; endo spermhaustoria.
- Embryo: Classification, types, development of Crucifertype.

Unit IV: Angiosperm Embryology

- Fruit and seed: Development, structure of monocot and dicot seeds, dispersal mechanisms, importance.
- Fruits- Types, classification with examples.
- Brief account of apomixis andpolyembryony, causes and applications.
- Brief account of anther/ pollen culture, endosperm, embryo and protoplast culture, Applications of tissueculture.
- Origin and evolution of Angiosperms, Fossil Angiosperms.

Suggested Readings:

1. Sporne, K.R., 1974, Morphology of Gymnosperms, Hutchinson & Co.,London.
2. Gangulee, S.C., Kar and Ashok Kumar, College Botany Vol.II, Central Book Agency, Calcutta.
3. Singh V., P.C.Pande & D K Jain 2006 Diversity and Systematics of Seed Plants, Rastogi Publications,Meerut.
4. Pandey, Mishra and Trivedi, 2000, A Text book of BotanyVol.II.
5. Chopra G.L., 1972, Gymnosperms, S. Nagin & Co., Jullandar.
6. Bhojwani S S and S P Bhatnagar, 2007. The Embryology of Angiosperms, Vikas Publishing House,Delhi.
7. Raven P.H, R.F.Evert and S.E.Eichhorn, 1999, Biology of Plants, 5th Ed., W.H.Freeman and Co., Worth Publishers, NewYork.
8. Swamy B.G.L. and K.V. Krishnamurthy, 1980, From Flower to Fruit, TMH Publishing House, NewDelhi.
9. Johri B.M.(Ed.),1984, Embryology of Angiosperms, Springer-Verlag,Germany.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course Contents

- Study of morphology, anatomy and reproductive structures of genera of Gymnosperms included in theorysyllabus.
- Study of structure of anther, microsporogenesis and pollen grains using permanent slides andmounts.
- Study of structure of ovules and embryosac development (monosporic type) using permanentslides.
- Examination of a wide range of flowers for study ofpollination.
- *In vitro* germination of pollengrains.

GROUP C: CORE COURSE (CC)
Semester III
MTH 201: MATHEMATICS: LINEAR ALGEBRA

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of the course students will be able to:

(i) Understand concepts, principles and techniques of matrix and determinants in problem solving.

(ii) Understand the concept of Vector space, Isomorphism of Vector spaces, quotient spaces and Euclidean Vector spaces and apply these in problem solving.

(iii) Understand 3-Dimensional shapes viz. Sphere, Cone, Cylinder, Ellipsoid, Hyperboloid, its equations and applications in problem solving.

Unit: I

Matrices, determinants, Basic properties of determinants, Co-factor expansion, system of linear equations, Gauss elimination method, Elementary matrices, invertible matrices Gauss-Jordan method for finding inverse of a matrix. Vector space, subspaces, Linear combinations, Linear span, Linear dependence and Linear independence of vectors, Basis and Dimension, Finite dimensional vector space-some properties.

Unit: II

Quotient spaces, Homomorphism of vector spaces, Isomorphism of vector spaces, Direct sum, inner product spaces, Euclidean vector spaces, Distance, Length, Properties, Orthogonal vectors, Gramm Schmidt Orthogonalisation Process, Orthogonal Complement.

Unit: III

Matrices of lineartransformations, Change of basis and the effect of associated matrices, Kernal and Image of a Linear transformation, Rank Nullity theorem, Singular and Nonsingular linear transformations, Elementary matrices and transformations, Similarity, Eigen values, Eigen Vectors, Diagonalisation, Characteristic polynomial, Cayley-Hamilton theorem, Minimal polynomial.

Unit: IV

Quadratic curves, Surfaces, Sphere, Cylinder, Cone, Ellipsoid, Hyperboloid, Paraboloid.

Suggested Readings:

1. Theory and Problems of Linear Algebra, Seymour Lipschutz, Schaum Outline Series
2. Linear Algebra: K. Hoffman and R. Kunze (2009) Prentice-Hall
3. Introduction to Linear Algebra: G. Strang (2009) Wellesley CambridgePress
4. Linear Algebra done right: S. Axler (2014) Springer
5. Linear Algebra with applications: Bretscher (2012) Pearson
6. Calculus and Analytical Geometry by Thomas and Finney.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester III
PESS 201: SCHOOLING, SOCIALIZATION AND IDENTITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of course, the student-teachers will be able to:

- Become aware of the processes of socialization at home and school that act as shaping factors in identity formation of the school going child (in Indian contexts)
- Reflect critically on factors that shape identity formation and influence sense of self of the growing 'student' as well as 'teacher' in school as well as out of school.
- Understand the processes that have shaped/continue to shape one's own sense of identity as 'student' and a 'person' located in multiple social contexts and roles
- Reflect on one's aspirations and possibilities in order to develop a growing sense of agency as a 'teacher', a 'professional', as well as a 'human being'.

Course Contents

Unit I: Socialization and Development of Self

- Understanding the nature and processes of socialization
- At home: family as a social institution; impact of parenting style/child rearing practices; transmission of parental expectations and values.

- In the community: neighbourhood, extended family, religious group and their socialization functions.
- At school: impact of entry to school; school as a social institution; value-formation in the context of schooling.

Unit II: Emergence of 'person' and 'identity' and Schooling for identity formation

- Understanding 'identity formation'; emergence of multiple identities in the formation of a person placed in various social and institutional contexts; the need for inner coherence; managing conflicting 'identities'.
- Determinants of identity formation in individuals and groups: such as caste, class, gender and religion.
- The influence of peer group, media messages, technology, and globalization on identity formation in contemporary Indian society.
- Schooling as a process of identity formation: ascribed, acquired and evolving.
- Potential role of school in developing national, secular and humanistic identities.

Unit III: Coping with social complexities: Role of education

- Expanding human activities and relations; decreasing unhealthy competition, uncertainty and insecurities and the resultant identity conflicts.
- Indian concept of 'vasudhaiva kutumbakam' and 'sarvadharm sambhava'.

Unit IV: Evolving a 'holistic identity' as a teacher

- Reflections on one's own aspirations and efforts in becoming a 'teacher'.
- Evolving an identity as a teacher, which is progressive and open to re-construction.
- Teachers' professional identity and Teachers' professional ethics.

Modes of Learning Engagement:

- Introductory lectures-cum-discussion, to introduce key themes of the course – socialization, identity formation, sociological notions and experiential sense of 'self' etc.
- Observations of schools and classrooms through the lens of course themes; interviews with teachers; making field notes.
- Group discussion and exploration, around selected readings and key questions.
- Viewing selected documentaries and film clippings.
- Writing critical reviews of readings and films viewed.
- Presentations of reviews.

- Reflective, autobiographical writing, towards self-understanding, on given topics.
- Journal writing, on course experiences (to be initiated with this course; to be continued through the year, with occasional sharing with a 'mentor').

Practicum / Tutorials:

- Visit to a school and studying the role of school in socialization of the child.
- Preparing notes on ways of managing conflicting identities with illustrations.
- Studying the school activities which enhance secular identity in children.
- Observing school processes that contribute to peaceful living of teachers and students.
- Describing ones' own process of socialization quoting some experiences.
- Presentations based on readings and film reviews.
- Reflective written assignments (towards critical awareness of issues, for self-understanding and formulating aspirations as a teacher.
- Journal writing.
- Notes from field observations/interviews and linking these with course themes.

Suggested Readings:

1. Pathak, Avijit (2002). Social Implications of Schooling. New Delhi. Rainbow Publishers.
2. Kumar Krishna (2004). What is Worth Teaching? 3rd edition, Orient Longman.
3. Krishnamurti, J. Education and the Significance of Life. KFI Publications.
4. Butler, J. (1990). Gender Trouble Feminism and the subversion of Identity. New York. Routledge.
5. Sharma, R&E. Annamalai. (2003). Indian Diaspora In Search of Identity. Mysore. CIIL.
6. Kumar,K. (2001). Prejudice and Pride School Histories of the Freedom Struggle. New Delhi. Viking/Penguin.
7. Amalendu Misra (2004). Identity and Religion Foundations of Anti-Islamism in India. New Delhi. Sage Publications.
8. Dipankar Gupta (Ed.) (2004). Caste in question Identity or Hierarchy. New Delhi. Sage Publications.
9. Kamala Ganesh & Usha Thakkar (Ed.) (2005). Culture and Making of Identity in India. New Delhi. Sage Publications.

10. Saraswati, T.S. (Ed.) (1999). Culture, Socialization and Human Development. Theory Research and Applications in India. New Delhi. Sage Publication.
11. Sen Amartya (2006). Identity and Violence. The Illusion of Destiny. New Delhi. Allen and Lane Penguin Books India Pvt. Ltd.
12. Shashi Tharoor (2007). The Elephant, the Tiger &The Cell phone. (Particularly part two of the book). New Delhi. Penguin Viking.
13. Srinivas M.N. (1986). Social Changes in Modern India. Bombay. Allied Publishers.
14. Vidyanathan, T.G. (1989). 'Authority and Identity in India', in 'Another India.' Dae dalus, Fall, 118 (H): 147-69.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester III
EPYH 201: YOGA, HEALTH AND WELL BEING

Time: 3 Hours Max. Marks: 50
Credits- 4 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 08 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Understand the importance of games, sports and yoga for development of holistic health.
- Know the status, identify health problems and be informed of remedial measures.
- Know about safety and first aid.
- Acquire the skills for physical fitness.
- Practice yogasanas, meditation and relaxation.
- Understand various policies and programmes related to health, physical education and yoga.

Course Contents

Unit I: Concept of Health, Body, First Aid

- Concept of health, importance, dimensions and determinants of health, health needs of children and adolescents including differently abled children.
- Understanding of the body system – skeleton, muscular, respiratory circulatory and digestive in relation to health.

- Common health problems and diseases- causes, prevention and cure, immunization and first aid.

Unit II: Food - habits, hygiene, diseases and their prevention, Safety, security and physical fitness

- Food and nutrition, food habits, nutrients and their functions.
- Preservation of food value during cooking, indigenous and modern ways of preserving food.
- Practices related to food hygiene, malnutrition, obesity, food and waterborne and deficiency diseases and prevention.
- Safety and security – disasters in and outside schools, ways of prevention.
- Safety from snake and dog bites, animal attacks, prevention and treatment.
- Physical fitness, strength, endurance and flexibility, its components, sports skills and self- defence activities.

Unit III: Athletics and Games

- Athletics – general physical fitness exercises.
- Games – lead up games, relays and major games.
- Rhythmic activities, gymnastics and their impact on health.

Unit IV: Yoga, Policies and Programmes for Health

- Yogic practices – importance of yoga, yogasanas and pranayamas
- Role of institutions in developing healthy individuals- family, school and sports
- Health services, policies and health and physical education related programmes, blood banks and role of media

Modes of Learning Engagement:

- Interactive discussions, group work, sharing experiences, organizing activities, analyzing topics on health related issues.
- Demonstrations, observations, field visits, preparing work books, maintaining diary, participating in school health checkup, practical classes of first aid, projects and assignments.
- Playing games and sports and performing Asanas and Pranayamas

Practicum / Tutorials:

- Rules regulations related to games, sports and yoga.
- Playing Volleyball, Basketball, Badminton and recreation games.
- Performing Suryanamaskara and selected yogasanas, mudras and pranayamas.
- Standing Asanas- Konasana, Trikonasana, Vrikshasana, Veerebhadrasana
- Sitting Asanas – Vajrasana, Gumukhasana, Navasana, Veerasana
- Lying on the stomach – Bhujangasana, Dhanurasana

- Body twisting asanas – Ardha Matsyendrasana, Vakrasana
- Back bending – Ushtrasana
- Mudras – Arham, Ananda Mudra
- Pranayama – Anuloma viloma, Bhramari

Suggested Readings:

1. Pande, P. K. (1988). Sports Medicine. Delhi. Khel Sahitya Kendra.
2. Larry G. Shaver. (1982). Essentials of Exercise Physiology. Delhi. Surjeet Publications.
3. Kanabur, Vyjayanthi V. (2007). Sports Nutrition the Scientific Facts. New Delhi. Kanishka Publishers.
4. Dheer. S. Kamal Radhika (2002). Organization and Administration of Physical Education. Friends Publications.
5. Chandler Timothy, Mohin Mike, Vamphew Wary (2007). Sports and Physical Education. London. Routledge Taylor Francis Group.
6. Verma, Veena (1999) Sports Psychology. Delhi. Sports Publication.
7. Prakash, Agam (1999) A Textbook of Health Education. Delhi. Sports Publication.
8. Uppla AK. (1996). Physical Fitness. New Delhi. Friends Publication.
9. Thani Lokesh (2003) Rules of Games and Sports. New Delhi. Sports Publication.
10. Sonkar Sathish. (1998). Methods, Measurement and Evaluation in Physical Education. Jaipur, Book Enclave.
11. NCERT, Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
12. Seetharam AR (1996) Yoga for Healthy Living. Mysore. Paramahamsa Yogashrama.
13. Ganguly, S.K., Bera, T.K., Gharote, M.L.(2003) Yoga in relation to Health related physical fitness and academic achievement of school boys. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
14. Gharote, M.L. (1976). Physical Fitness in relation to the practice of selected yogic exercises. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
15. Kulkarni,D.D. (1997).Yoga and Neurophychology. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
16. 'kekZ] vks- ih-] ¼2004½- ^[ksy ds eSnkuksa dh eki ,oa fuekZ.k dh fof/k ubZ fnYyh- [ksy lkfgR; dsUnzA
17. Ikljhtk ehuw] lijk pk#] ¼2004½- ^[ksy fpfdRlk Kku dks'k ubZ fnYyh- LiksVlZ ifCyds'kUlA

18. [kku] ,jkt vgen] oekZ] mek'kadj ¼1988½- ^QqVcky^ iVuk- Hkkjrh Hkou ifCy'klZ ,aM fMLVªhC;wVlA

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester III
EFWC 201: WORKING WITH COMMUNITY

Time: 2 weeks Max. Marks: 50
Credits- 2 External Assessment: 10

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Acquaint themselves with the factors working in the society/community i.e. knowledge of social realities.
- Develop the dignity of labour among them.
- Arouse their interest in the social and economic reconstruction oj the country.
- Make themselves aware of the educational problems and needs of thi society.
- Enable themselves for preparing youth for sustainable development.
- Develop their personality through community service.

Methodology: The students will spend 2 weeks at a stretch during the academic year in the identified village. Separate activities will be undertaken every year out of the following or given by the Institute.

Suggested Activities:

1. Shramdaan and beautification
2. Study of educational scenario of a community. Reporting the profile of each Institution/NGO/social organization, which is directly or indirectly concerned with educational /literacy programme.
3. Micro planning exercises for assessing the educational status of the community.
4. Organization of "Nukad Natak" "Cultural Programmes", "Rallies" etc. for motivating the villagers for sending their wards to schools.
5. School mapping exercises for assessing the educational need of the community.
6. Study of enrolment, stagnation and dropout problems.
7. Exploring the community resources and finding means and ways of using them for betterment of school.

8. Adopting a community and implementation of the Lab Area Concept in adopted community.
9. Survey of nearby community (adopted community) and assessing its educational needs, social needs etc.
10. Conducting awareness programmes in the community- like Environment conservation, tree plantation, watershed management, health programmes like vaccination, polio drop etc. AIDS awareness, electoral awareness, load safety, human rights, women rights etc.
11. Organization of Literacy programmes in the community
12. Cleanliness drives in the community and awareness about their needs.
13. Character building programmes
14. Developing healthy food habits among the community
15. Conducting Vocational training programmes for self- employment.
16. Promoting peace oriented values in the community.
17. Remedial teaching work for poor and needy in the community.
18. Action Research regarding local problems in consultation with the community.
19. Promoting peace oriented values in the community.
20. Conducting Adult Education programmes
21. Assistance and working with local community in actual relief work whenever needed.
22. Training of community in First Aid.
23. Helping the children with special needs.
24. Conducting Vocational training programmes for self- employment.

Modes of Learner Engagement:

Proposed activities of the programme will be organized keeping in view the budgetary provision and the time of duration along with the required available facilities at the time of organization of the programme.

Modes of Internal Assessment:

Internal assessment of Punctuality, Regularity, Discipline, Cooperation and Performing Arts will be done through observation of the students and viva-voce will be conducted on their experiences and written report prepared by the student teachers.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-I-201: PHYSICS: RENEWABLE ENERGY SOURCES

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe about the exploration of renewable energy systems and their effective tapping technologies.
- Discuss the source of energy in various renewable energy systems.
- Estimate the amount of energy in different types of renewable energy systems.
- Explain the feasibility of different types of energy sources.
- Apply the concepts learnt in new types of renewable energy.

Course Contents

Unit I: Solar Energy

Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment. Various Methods of using solar energy–Photothermal, Photovoltaic, Photosynthesis, Present &Future Scope of Solar energy. Hybrid wind energy systems-wind & diesel power, wind+ conventional grid, wind & Photovoltaic system etc.

Unit II: Wind Energy

Wind Energy: Basics &Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of windturbine blade ,various aspects of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V&F and variable V&F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.

Unit III: Geothermal, Tide and Wave Energy

Availability of Geothermal Energy – size and Distribution, Recovery of Geothermal Energy, Various Types of Systems to use Geothermal Energy, Direct heat applications, Power Generation using Geothermal Heat, Sustainability of Geothermal Source, Status of Geothermal Technology ,Economics of Geothermal Energy.

Unit IV: Hydrogen Energy and Nuclear Energy

HydrogenProduction: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production.

Hydrogen Energy: Hydrogen as a renewable energy source, Sources of Hydrogen, Fuel for Vehicles.

Nuclear Energy: Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies–Fuel enrichment, Different Types of NuclearReactors, Nuclear Waste Disposal and Nuclear Fusion.

Suggested Readings:

1. L L Freris, Wind energy Conversion Systems (PrenticeHall, 1990).
2. D A Spera, Wind Turbine Technology: Fundamental concepts of wind turbine technology(ASMEPress,NY,1994).
3. G L Johnson, Wind Energy Systems(PrenticeHall,1985).
4. J F Manwell, J GMcGowanandA LRogers, Wind Energy Explained(John Wiley & SonsLtd., 2010)
5. N K Bansal, et al., Renewable Sources of Energy and Conversion Systems (Tata McGraw-Hill, 1990)
6. Kreith and Kreider, Solar Energy Handbook (McGraw Hill, 1982)
7. M A Green, SolarCells,(Prentice Hall, 1981)
8. T Ohta, Solar Hydrogen Energy Systems (Pergamon Press, 1979)
9. D Methis, Hydrogen Technology for Energy(Knowledge Pubns, 2007)

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-II-201: PHYSICS: NANO SCIENCE

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Nano Science.
- Know about synthesis and characterization of nano materials.
- Understand various applications of nano science.
- Establish multi-disciplinary links.

Unit I: Overview

Size effects and crystals, nanoscopic scale and quantum confinement, one dimensional, two dimensional and three dimensional nanostructured materials, quantum Dots, types of nanostructure and properties of nanomaterials: shell structures, metal oxides, semiconductors, composites, mechanical, physical, chemical properties, carbon age, new form of carbon (CNT to Graphene), influence of nano over micro/macro,effects of nano scale dimensions on various properties –structural, thermal, chemical, magnetic, optical and electronic properties, effect of nano scale dimensions on mechanical properties - vibration, bending, fracture, emergence and challenges of nanoscienceand nanotechnology.

UnitII: Synthesis of Nano materials

Top-down and bottom-up approaches, Mechanical alloying and Ball milling, Plasma synthesis, Sol-Gel Synthesis, Inert gas Condensation, Electro deposition and other techniques,chemical vapour deposition, physical vapour deposition, Laser ablation, pulsed laser deposition.

Unit III: Characterization tools

X-ray powder diffraction, Single crystal diffraction techniques, Thermogravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry, Electron Energy Loss Spectroscopy, High Resolution Imaging Techniques- Scanning Electron Microscopy, Atomic Force Microscopy and Transmission Electron Microscopy,Optical characterization techniques- Raman spectroscopy and Ultra Violet-Visible (UV-Vis) spectroscopy

Unit IV: Applications

Functional materials, Biomedical applications, Molecular Electronics and Nanoelectronics, Nano coating, Nanomaterials for renewable energy, Nanobots, Molecular electronics and Nanoelectronics, Environment related application, Membrane based application, Polymer based application.

Suggested Readings:

1. W R Fahrner,Nanotechnology and Nanoelectronics, (Springer (India) Private Ltd., 2011).
2. MMadou, Fundamentals of Microfabrication, (CRC Press, New York, 1997).
3. N Taniguchi, Nano Technology, (Oxford University Press, New York, 2004).
4. W Ahmed and MJ Jackson, Emerging Nanotechnologies for Manufacturing, (Elsevier Inc.,2014).
5. C P Poole, F J Owens, Introduction to Nanotechnology, (John Wiley and Sons, 2004).
6. CN R Rao and A K Sood, Graphene synthesis, properties and Phenomena (Wiley VCH, 2010).
7. A Krueger, Carbon Materials and Nanotechnology (Wiley-VCH, 2010).

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCCH-I-201: CHEMISTRY: GREEN CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Green Chemistry.
- Know about green synthesis.
- Understand various applications of green materials.
- Understand Future trends in Green Chemistry.

Unit I:

Green Chemistry: History, need, and goals. Green chemistry and Sustainability.Dimensions of sustainability, Limitations/Obstacles in pursuit of the goals of Green Chemistry.Opportunities for the next generation of materials designers to create a safer future.

Unit II:

Examples of green synthesis/reaction:

Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, Traditional processes and green ones), Synthesis of Ibuprofen, Adipic acid etc and selected examples from US Presidential, Green Chemistry Challenge Award Winners.Basic principles of Green Chemistry and their illustrations with examples.Prevention of waste/by-products.Maximum incorporation of the materials used in the process into the final product (Atom Economy): Green metrics, Prevention/Minimization of hazardous/toxic products.Designing

safer chemicals - different basic approaches, Selection of appropriate auxiliary substances (solvents, separation agents etc.), Energy requirements for reactions—use of microwave, ultrasonic energy, Selection of starting materials—use of renewable starting materials. Avoidance of unnecessary derivatization—careful use of blocking/protection groups.Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents. Designing biodegradable products.Prevention of chemical accidents. Strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.Development of accurate and reliable sensors and monitors for real time in process monitoring.

Unit III:

Examples of green synthesis/reaction: Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, (Traditional processes and green ones) Synthesis of Ibuprofen, Adipic acid etc. and selected examples from US Presidential Green Chemistry Challenge Award Winners.

Unit IV:

Future trends in Green Chemistry: Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; Non-covalent derivatization. Biomass conversion, emission control. Bio catalysis.

Text Books and Reference Books:

1. Green Chemistry: Theory and Practice. P.T. Anastas and J.C. Warner.Oxford University Press.
2. Green Chemistry: Introductory Text. M. Lancaster Royal Society of Chemistry (London).
3. Introduction to Green Chemistry. M.A. Ryan and M.Tinnesand, American Chemical Society (Washington).
4. Real world cases in Green Chemistry, M.C. Cann and M.E. Connelly. American Chemical Society (Washington).
5. Real world cases in Green Chemistry (Vol. 2) M.C. Cann and T.P.Umile. American Chemical Society (Washington)

PRACTICUM/ PROJECT WORK:

Candidate will be given a topic of project at the beginning of Semester III. The candidate is expected to collect pertinent literature and make a presentation based on the literature and the proposed plan of work at the end of Semester III.

Assignments will also be given based on different aspects of green chemistry.
A committee of faculty members of chemistry section will evaluate the projects and assignment.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCZO-I-201: ZOOLOGY: BIODIVERSITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Biodiversity.
- Understand the faunal Biodiversity.
- Understand the Duties of the central and the State Government, Biodiversity management committees in conservation.

Course Contents

Unit I: Biodiversity General Account

1. Introduction to Biodiversity (Elements and concept of biodiversity).
2. Types of Biodiversity
3. Climatic Zones or zoogeographic zones of India
4. Indian Biodiversity, Vegetational Zones, Zones of Faunal distribution
5. Major Biodiversity areas of the world and India
6. Biodiversity Hot Spots
7. National Parks and Sanctuaries of Rajasthan and their biodiversity

Unit II: Faunal Biodiversity

1. Mammalian morphology, Adaptations in various groups of mammals.
2. Behavior and social organization in mammals; social and mating systems; territories; communication.
3. Bird's morphology, Adaptations in various groups of birds, morphological and physiological adaptations.

4. Bird migration, breeding behavior, parental care.
5. Biology of major Indian amphibians, fresh water and marine turtles, crocodilians, lizards and snakes.
6. Identification and study of venomous snakes, action of their venom and first aid for snake bites.

Unit III: Conservation Biology

1. Introduction to conservation biology, values of biodiversity and conservation ethics.
2. Patterns and process of biodiversity, losses and threats to biodiversity.
3. Significance of ecological restoration in conservation.
4. Duties of the central and the State Government, Biodiversity management committees.
5. Red Data Book and its significance. Role of NGOs in conservation, International NGOs; UNEP, GEF, WCS, Bird Life International, Important NGOs in India& their contributions WWF, ATREE, BNHS, WTI, Kalpavriksha etc.
6. Important NGO movements, Chipko movement, Narmada BachavoAandholan, PaniPanchayats, Seed Movement etc.
7. Wildlife Protection Act, Biodiversity Act, Forest Act and other Rules and Acts for Biodiversity protection and conservation.

Unit IV: Tools and Techniques

1. Counting Methods or Population assessment (Total Count, Road Side Count, Waterhole Count, Nest Count, Camera trap Methods, Pugmark Census, Call Census, Radio tagging, Line transect, Quadrate Method, Mark-Recapture)
2. Sampling techniques and strategies (random, stratified and systematic).
3. Concept of species richness, evenness and diversity and their measures, Diversity indices.
4. Basic introduction of GPS and GIS

Suggested Readings:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Coexistence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences

5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

Practicals:

- Identification of mammalian fauna, avian fauna, herpeto-fauna
- Identification of Venomous and Non venomous snakes
- Demonstration of basic equipment needed in biodiversity studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
- Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
- Demonstration of different field techniques for flora and fauna
- Visits to nearby Zoo, Museum, Forest, sea-shore, Nursery, Aquaria or any other relevant site must be arranged. The report of these visits will be submitted as part of the Practical work.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCBO-I-201: BOTANY: BIODIVERSITY

Time: 3 Hours Max. Marks: 80
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the plant biodiversity and its significance in human lives
- Understand the threats to plant biodiversity
- Understand about biodiversity conservation.

Course Contents

Unit I: Biodiversity

Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Uses of plants.

Unit II: Biodiversity Management

Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss.

Management of Plant Biodiversity**:** Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR;

Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit III: Biodiversity Conservation

Conservation of Biodiversity- ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit IV: Importance of Forestry

Role of plants in relation to Human Welfare; Importance of forestry in relation to medicine, timber, gums and resins.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and
   Practices.Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Sharma P.D., 2010 Ecology and Environment. Rastogi Publications, Meerut

Practicals:

- Visit to nearby botanical gardens, biological park. The report of this needs to be submitted.
- Study of aquatic biodiversity by visit to some pond or lake.
- Study of aquatic biodiversity by making temporary micropreparations of the phytoplanktons, algae etc.
- Herbarium sheets preparation.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCMT-I-201: MATHEMATICS: DISCRETE MATHEMATICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: At the end of the course students will be able to:

(i) Understand the concepts of Set Relation and function
(ii) Understand the concept of Graphs and planar graphs apply these in problem solving.
(iii) Explain the concept of Boolean algebra and lattices.

Course Contents

Unit I:

Set Relation and function, binary relations, equivalence relations and partitions, partial order relation and lattices chains and anti chains, pigeon hole principle, principle of inclusion and exclusion.

Unit II:

Computability and formal languages ordered sets languages, phase structure grammars types of grammars and languages permutations, combinations' and discrete probability

Unit III:

Graphs and planar graphs; basic terminology, multigraphs, weighted graphs paths and circuits travelling sales person problem, plannar graphs, trees.

Unit IV:

Boolean algebra: lattices, algebraic structures, duality, distributive and complemented lattices, boolean lattices, and boolean algebras, boolean functions as expressions.

Suggested Readings:

1. Elements of Discrete mathematics: C.L. Liu, McGraw Hill, International editions, 2008.
2. Graph Theory: NarsinghDeo, Prentice Hall of India, 2004.
3. Discrete Mathematics: N.L. Biggs, Oxford Science Publication, 1985.
4. Discrete Mathematics and its Applications: Kenneth H. Rosen, McGraw Hill, 1999.
5. Discrete Mathematics with Applications: T. Koshy, Academic Press, 2005.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-I-201: EDUCATION: GUIDANCE & COUNSELLING IN SCHOOL

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Develop an understanding of the concepts of guidance and counselling.
- Develop an understanding of educational, vocational and personal guidance.
- Acquaint the students with the testing devices and techniques of guidance.
- Develop an understanding of collection and dissemination of occupational guidance.
- Sensitize student-teachers to the problems faced by students in the contemporary world.
- Create an awareness of the working of guidance centers.
- Provide guidance &counseling for school level students.

Course Contents

Unit I: Concept of Guidance and Counseling

- Meaning, Nature & Functions of Guidance.
- Principles of Guidance.
- Need of Guidance at various stages of life.
- Types of Guidance:
  (i) Educational Guidance – Meaning and need at Secondary level.
  (ii) Vocational Guidance – Meaning and need at Secondary level.

(iii) Personal Guidance – Meaning and need at Secondary level.

Unit II: Concept of Guidance and Counseling

- Meaning, Nature and Functions of Counseling
- Theories of Counseling:
    - Theory of Self (Rogers)
    - Rational Emotive Behavioural Therapy (Albert Ellis).
- Types of Counseling: Directive, Non directive, Eclectic.
- Process of Counseling (Initial disclosure, in depth exploration and commitment to action).

Unit III: Testing and Non- testing devices for the study of an Individual

- Tests: Aptitude, Attitude, Interest, Achievement, personality, IQ and Emotional, Mental ability, Intelligence etc.
- Techniques used in guidance: Questionnaire, Interview schedule, Case study, Diary and Autobiography.
- Professional efficacy and interest.

Unit IV: Contemporary issues and Skills in Guidance & Counselling

- Dealing with depression and academic stress (with regard to their identification and intervention). Guidance Implication in (Current Indian scenario, Education and Guidance: Democracy and Guidance, Individual Differences and Guidance, planning of Guidance cell in school.
- Skills in Counseling (Listening, Questioning, Responding, Communicating.
- Role of Teacher as a counselor and professional ethics associated with it.
- Career Counseling and Dissemination of Occupational Information.

Practicum / Tutorials:

- Organize a workshop in school on guidance for secondary level students.
- Group discussion among pupil teachers on types of guidance.
- Pupil Teacher should guide at least one school student in any area of guidance and prepare a report to this effect.
- Organize an orientation program for student teacher on skills in counseling (listening, questioning, communicating etc.)
- Organize a Counseling program for the student who is guided by teacher student in the area/type of Guidance.Student teacher would practice on Counseling skill (at least three Time duration with 5-7 Minute per skill)
- Apply “Professional Interest test” on secondary student on the basis of interprelation, and give professional guidance to the students.
- Prepare a case study of one student with special needs at school level and give suggestions for remedial measure, too.
- Make a flow chart on Job Analyze opportunities and present it in school

among secondary students.

- Organize a programme on occupational detail Information (like area, agencies and future etc.) for school level
- Prepare a plan and establish a guidance and Counseling cell in school.
- Make a stress releasing strategy for school students and find out its effectiveness.

Suggested Readings:

1. Sharma, Shati Prabha. Career Guidance and Counselling: principles and techniques. Kanihka publisher. 2005
2. Sharma, RN & Sharma, Rachana. Guidance and Counselling in India. Atlantic Pub. & Distributors, New Delhi, 2004
3. Singh, Y.K. Guidance and Career Counselling. APH Publishing New Delhi. 2007 4. Nayak, AK. Guidance & Career Counselling. APH Publishing corp. 2007
4. Abraham, Jessy. Guidance & Counselling for Teacher Education. Sarup & sons. New Delhi. 2003
5. vLFkkuk] fofiu] ijke'kZ ,oa funsZ'ku- vxzoky izdk'ku] 2014
6. vLFkkuk] fofiu ,oa vLFkkuk fuf/k funsZ'ku vSkj micks/ku] vxzoky izdk'ku] 2013&14
7. HkVukxj] lqjs'k ,oa oekZ] jkeiky- o`frd lwpuk ,oa o`frd funsZ'ku] vxzoky izdk'ku 2012
8. t;loky] lhrkjke f'k{kk esa funZs'ku ,oa ijke'kZ vxzoky izdk'ku 2014
9. mik/;k;] jke oYyHk ,oa t;loky]lhrkjke f'k{kk esa funsZ'ku ,oa ijke'kZ dh Hkwfedk vxzoky izdk'ku 2014

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-II-201: EDUCATION: PEACE ORIENTED VALUE EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhha and logic.
- Understand the co-ordination with Indian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute values in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that make them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

Course Contents

Unit I: Understanding Education for Peace

- Meaning, aims, objectives of Peace and Peace Education.
- Need and Importance of Peace Education.
- Barriers: Psychological, Cultural, Political.
- Peace promoting values: compassion, cooperation and love.
- Empowerment of self through critical self- reflection.
- Reducing prejudices and nurturing ethical behaviour.

Unit II: Nature andsources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

Unit III: Values in religious scriptures

- Bhagwadgita- Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastya and Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran – Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

Unit IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacher as teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty towards self and society

Practicum/Tutorials:

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a school from the point of view of value education.

- Analysis of a text book of a school subject from the point of view of values hidden.
- Practice of role- play in two situations and preparation of report.
- Report on value conflict resolution in a situation.

Suggested Readings:

1. voLFkh 'kf'k & izkphu Hkkjrh; lekt] fgUnh ek/;e dk;kZUo;u funs'kky;] fnYyh fo'ofo/kky;] fnYyh 1993
2. moZ'kh] ljrah & uSfrd f'k{kk ,oa ckyfodkl] izHkkr izdk'ku] pkoMh cktkj] fnYyh] 1979
3. dk.ks ih-ch- & /keZ'kkL=h dk bfrgkl] m-iz- fgUnh laLFkku] fgUnh Hkou] egkRek xk/akh ekxZ] y[kuÅA
4. xqIrk uRFkwyky & ewY;ijd f'k{kk i)fr] t;d`".k vxzoky] egkRek xk/akh ekxZ] vtesj 1989
5. xks;udk t;n;ky & egRoiw.kZ f'k{kk] xhrkizsl xkjs [kiqjA
6. ik.Ms; xksfoUnpUn & ewY; ehekalk & jktLFkku fgUnh xzUFk vdkneh] fryd uxj] t;iqj] 1973A
7. iz lglz cq)s % thou ewY;] lq:fp lkfgR;] ds'kodqat] >.Ms okyku] ubZ fnYyh]
8. Hkkjrh /keZohj & ekuo ewY; vkSj vkSj lkfgR;] Hkkjrh; KkuihB] dk'kh] 1972
9. ekuo lsok la?k] o`ankou & ekuork ds ewy fl)kUr 1981
10. feJ fo/kkfuokl & v/;kiu] Hkkjrh; n`f"V] ,ulhVhbZ] ubZ fnYyh 1988
11. foey dqekj & ewY; ehekalk] jktdey izdk'ku] fnYyh
12. Acharya Mahaprija : Towards Inner Harmony, New Delhi, B. Jain Publishers, 1999
13. Dutt, N.K. and Ruhela S.P. : Human Values and Education, Sterling Publishers Pvt. Ltd., New Delhi, 198
14. Gandhi K.L. : Value Education, Gyan Publishing House, New Delhi, 1993
15. Gupta, Nathu Lal : Value Education : Theory and Practice : Jaikrishan Agarwal,Mahatma Gandhi Road, Ajmer – 2000
16. I.A. Lolla : Value Certification : An advanced Handbook for trainers and Teachers, Calif, University Associate Press, Krischan Boum, Howard 1977
17. Prem Kripal : Value in Education, NCERT, New Delhi 1981
18. Rajput, J.S. (2001). Values in Education, New Delhi, Sterling Publishers, 2005
19. Rokeach M. : The Nature of Human Values, The Free Press , New York 1973
20. Sharma R.S. : The Monk who sold his Ferrari, Mumbai, Jaico Publishing House, 2003

21. Swami Ragunath Anand: Eternal Values for a Changing Society, BVB Bombay 1971.
22. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
25. Sheshadri, C., Khadere, M. A., & Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
28. Khan, Intakhab Alam (2007). Peace, Philosophy and Islam, Academic Excellence. Delhi- 31.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCLH-201: LANGUAGE: jpukRed ys[ku ,ao vuqokn

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCLE-201: LANGUAGE: LANGUAGE LITERATURE & EDUCATION

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint themselves with literary creations in other Indian language.
- Appreciate literary pieces from other languages of India.
- Understand the literary and cultural ethos of the country.

Unit I: Language, Society & Culture

- Language and Society

- Language and Culture
- Language and Identity
- Language and Gender

Unit II: Literature, Society & Culture

- Concept and Scope of Literature
- Literature and Society
- Importance of Literature for Society
- Impact of Literature on Society and Vice Versa

Unit III: Language and Education

- Language for Education
- Role of Language in Education
- Relationship between Language and Education
- Impact of Language on Education

Unit IV: Literature and Education

- Literature for Education
- Role of Literature in Education
- Relationship between Literature and Education
- Impact of Literature on Education

Suggested Readings:

1. Hall, G. *Literature in Language Education*. London: Palgrave Macmillan. 2005.
2. Aldama, Frederick Luis. *Why the Humanities Matter: A Commonsense Approach.* Austin: University of Texas Press. 2008.
3. Yadav, Saryug. *Language, Literature and Education*. New Delhi: Academic Excellence. 2008.
4. Mishra, A. K. *Literature, Culture and Language Education*. New Delhi: Lakshi Publishers. 2012.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCGE-201: GEOGRAPHY: BASICS OF GEOGRAPHICAL INFORMATION SYSTEM- GIS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- To introduce elementary concepts of GIS
- To explain main characteristics of geographical data

- To understand the application of GIS in solving problems of spatial nature.

Unit I:

Definition and components of GIS – hardware, software, data, people or 'liveware'; Structure of GIS

Unit II:

Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS;
Implications of earth's shape and datum in geo-referencing,

Unit III:

Digital representation of geographic data: Data structure, Spatial data model, Raster and Vector models;
GIS data standards: concepts and components; Digital Elevation Model (DEM).

Unit IV:

Recent trends in GIS; Mobile GIS; Global Position System; Integration of Remote sensing and GIS; GIS data base management systems; GIS information products; Applications of GIS.

Suggested Readings:

1. Burrough, P.A. and McDonnell, R. (1998): Principles of Geographic Information Systems. Oxford University Press, Oxford.
2. Chang, K.T. (2003): Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
3. Chauniyal, D. D. (2004): Remote Sensing and Geographic Information Systems, Sharda Pustak Bhawan, Allahabad. (in Hindi).
4. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
5. ESRI (1993): Understanding GIS. Redlands, USA
6. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
7. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
8. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
9. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
10. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.
11. Korte, G. M. (2002): The GIS Book. On Word Press: Thomson Learning, New York and Singapore.

12. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
13. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): Geographic Information Systems.
14. Principles, Techniques, Management, Applications. John Wiley and Sons, New York.
15. Martin, D. (1996): Geographic Information Systems: Socioeconomic Implications. Routledge, London.
16. Michael F. G. and Karan K. K. (ed.) (1990): Introduction to GIS. NCGIA, Santa Barbara, California.
17. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
18. ESRI (1993): Understanding GIS. Redlands, USA
19. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
20. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
21. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
22. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
23. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.

Practical: Basics of Geographical Information System

- Principles of GIS; Properties of EMR
- Geographical data: types and characteristics;
- Spherical and plane coordinate systems in GIS;
- Implications of earth's shape and datum in geo-referencing
- Preparation of choropleths maps

Practical Record File: Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination may carry:
  - o Lab Work (Any 2 out of 3 exercise)
  - o Record File
  - o Viva

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCHS-201: HISTORY: HERITAGE & TOURISM

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- Understand the different facets of heritage, Tourism and their significance.
- Highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it.

- The implications of the rapidly changing interface between heritage and history will also be examined.
- The course will be strongly project- based on visits to Museum/Heritage Sites

Unit I:

- Heritage- Meaning and Significance,
- Types- Cultural Heritage, Natural Heritage, Living Heritage (Folk Art, Festivals, Living Styles etc.)
- Tangible and Intangible Heritage

Unit II:

- Heritage Organization/ Structure: Forts, Palaces
- Museums, Natural Reserves.
- Role and Significance of Heritage in tourism, Heritage Tourism, Cultural Tourism and Eco Tourism

Unit III:

- Museum and the Cultural Heritage: India's Cultural Policy
- Policy of Government of Rajasthan
- General Principles and Societies role for maintenance of Rajasthan

Unit IV:

- World Heritage sites of India with special reference to Rajasthan
- Role of UNESCO in Heritage
- Guidelines of UNESCO

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials. Visit to Tourist site and Preparation of report (Practical).

Suggested Readings:

- x<+ohj- ekFkqj- i;ZVu% n'kkofn'kk – fyVjsjhlfdZy- t;iqj
- lgk;] f'koLo:i- i;ZVu fl/kkUr vkSj çca/ku rFkk Hkkjr esa i;ZVu- eksrh yky cukjlh nkl
- lgk;] f'ko Lo:i- i;ZVdksa dk ns'k Hkkjr- eksrh yky cukjlh nkl
- Roy Chowdhury, Maduparna. Diplaying India's Heritage. Orient Blackswan
- David Lowenthal. The past :The Heritage Crusade and the Spoils of History.Cambridge,2010
- Layton R.P. Stone and J. Thomas. Destruction and conservation of cultural property, London :Rutledge,2001

- Lahiri N. Marshaling .The Past –Ancient India its Modern Histories, Ranikhet: Permanent Black.2012, Chapter 4 and 5
- S S Biswas. Protecting the cultural heritage (National Legislations and International Conventions). New Delhi : INTACH, 1999
- Agarwal O.P. Essentials of conservation and Museology, Delhi, 2006

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCPS-201: POLITICAL SCIENCE: DEMOCRACY AT WORK

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – teacher will be able to:

- Acquire knowledge about the working of democracy in India.
- Understand the societal basis of democracy as providing opportunities to flourish diversity through civil liberties.

- Understand Democracy as Representative, Responsible and Participatory.
- Appreciate the Democratic process as not merely a rule of Majority but Tolerance to words dissent.
- Acquaint themselves with the dividends of Democracy in India.

Unit I:

Democratic society: Understanding of Diversities, Fundament Rights, Fundamental Duties, Mass Media, Political Parties, Pressure Groups.

Unit II:

Democratic Government: Universal Adult Franchise, Representation, Parliamentary Government, Federal system, Local government at Rural and Urban areas.

Unit III:

Democratic Process: Accommodation of Social, Economic and Cultural diversities, Rule of law, Independent Judiciary

Unit IV:

Redressal of Public Grievances, Right to Information, Right to Education, MGNREGA.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. D.D. Basu : An Introduction to the Constitution of India, New Delhi. Prentice Hall, 1994.
2. G. Austin : Working a Democratic Constitution the Indian Experience. Delhi, Oxford University Press, 2000.
3. R. C. Agarwal :Indian Government and Politics (India Political System) 5th ed. S.Chand and Co., New Delhi 2000
4. N.G. Jayal (ed.), Democracy in India, Delhi, Oxford University Press. 2001.
5. A.G.Noorani, Constitutional Questions in India : The President, Parliament and the States Delhi, Oxford University Press, 2000.
6. Payl, Flather : Recasting Indian Politics – Essays on a Working Democracy Palgsave 2002.
7. Niraja Gopal Jayal. Democratic Governance in India : Challenges of Poverty Development and identity. Sage Publications, New Delhi

8. S.N.Singh, Caste Tribe and Religion in Indian Politics, Sai, New Delhi, 2006
9. MkW t;jke mik/;k; & Hkkjr dk lafo/kku] lsUVªy ykW ,tsUlh] bykgkckn] 2007
10. ch- ,y- QM+h;k & Hkkjrh; 'kklu ,oa jktuhfr] lkfgR; Hkou ifCyds'kul] vkxjk] 2007
11. MkW , ih voLFkh & Hkkjrh; 'kklu o jktuhfr] y{eh ukjk;.k vxzoky] vkxjk 2006
12. ,l ,e lbZn & Hkkjrh; jktuhfrd O;oLFkk] lqyHk izdk'ku]y[kuÅ 2004

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCEC-201: ECONOMICS: RECENT TRENDS & PRACTICES IN ECONOMICS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

The objective of this course is the make the students aware of the fundamentals of economics and also the contemporary issues

Unit I: Educational Economics

- Review of Economic Principles
- Human Capital Theory
- Job Signalling
- Educational Production Functions
- The Market for Teachers
- Teacher Incentives
- Market Dimensions of Higher Education
- Student Aid Policy and Collegiate Outcomes
- Financial Issues in Higher Education

Unit II: Social Economics

- Discrimination, the market, statistical discrimination, minimum wage, gender
- Discrimination, exclusion
- Income inequality and poverty, causes of income inequality and poverty (inflation)
- Income distribution over time, the official poverty rate
- Unemployment, measurement, types and cost of unemployment, interpreting theunemployment rate, social security

Unit III: Entrepreneurship and development

- The critical roles played entrepreneurship in Innovation systems.
- The differences between industrial and agricultural start-ups?
- Role of government in fostering entrepreneurship

Unit IV: Technology and globalization

- The importance of foreign technology in national innovation systems.
- Role played by global value chains play in evolution of innovation systems.
- Contribution of Policy approaches by emerging economies to tap into global value chains.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*:

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. Cohn and Geske, The Economics of Education, Chapter 1.
2. Hirshleifer, Jack (1985). The Expanding Domain of Economics. The American Economic Review, 75(6): 53-68. http://catalog.flatworldknowledge.com/catalog/editions/rittenberg-principles-ofmicroeconomics-1-0
3. Cohn and Geske, The Economics of Education, Chapter 2-4.
4. Ashenfelter, O. and Krueger, A. (1994). Estimates of the Economic Return to Schooling From A New Sample of Twins. American Economic Review, 84(5): 1157-1173.
5. Acemoglu, D., Introduction to Modern Economic Growth, Princeton University Press, 2009
6. Spence, M. (1973). Job Market Signalling. Quarterly Journal of Economics, 87(3): 355-374.
7. Cohn and Geske, The Economics of Education, Chapter 9.
8. Bound, J., Hershbein, B., and Long, B. (2009). Playing the Admissions Game: Student Reactions to Increasing College Competition. Journal of Economic Perspectives, 23(4): 119-146.
9. Deming, D., Goldin C., and Katz, L. (2012). The For-Profit Postsecondary School Sector:Nimble Critters or Agile Predators? Journal of Economic Perspectives, 26(1): 139-164.
10. Avery, C. and Turner, S. (2012) “Student loans: Do College Students Borrow too Much - or Not Enough?” Journal of Economic Perspectives, 26(1): 165-192.
11. Cohn and Geske, The Economics of Education, Chapter 12.
12. Heller, D. (1997). Student Price Response in Higher Education: An Update to Leslie andBrinkman. Journal of Higher Education, 68(6): 624-659.
13. Fu, X., Pietrobelli, C. and Soete, L. 2011. “The Role of Foreign Technology and Indigenous Innovation in the Emerging Economies: Technological Change and Catching-up,” World Development, Vol. 39 No. 7, pp. 1204-1212, http://www.sciencedirect.com.ezp-prod1.hul.harvard.edu/science/article/pii/S0305750X11000647
14. Pietrobelli, C. and Rabellotti, R. 2011. “Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?” World Development, Vol. 39, No. 7, pp. 1261-1269.

15. Mazzoleni, R. 2008. “Catching Up and Academic Institutions: A Comparative Study of Past National Experiences,” Journal of Development Studies, Vol. 44, No. 5, pp. 678-700.
16. Mok, K.H. 2012. “The Quest for Innovation and Entrepreneurship: The Changing Role of University in East Asia,” Globalisation, Societies & Education, Vol. 10, Vo. 3, pp. 317-335.
17. Borros, M. 1997. Technology policy and Economic Growth. [Online]. Available at: http://brie.berkeley.edu/publications/WP%2097.pdf
18. Mokyr, J. 2005. Long term Economic Growth and the History of Technology. [Online]. Departments of Economic and History, Northwestern University. Available at: http://faculty.wcas.northwestern.edu/~jmokyr/ AGHION1017new.pdf
19. Cortright, J. 2001. New growth theory: technology and learning. [Online]. Reviews of economic development literature and practice. No. 4. Available at: http://www.eda.gov/ImageCache/EDAPublic/ documents/pdfdocs/ 1g3lr_5f7_5fcortright_2epdf/ v1/1g3lr_5f7_5fcortright.pdf

B. Sc. B. Ed. (CBCS) Semester- IV
GROUP B: GENERIC COURSE (GC)
GCIR 202: INDIAN CONSTITUTION AND HUMAN RIGHTS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of this course, the student teacher will be able to

- Know the importance, preamble and salient features of Indian Constitution
- Appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.
- Develop an understanding of the strength of the Union Government.
- Understand the functioning of the State Government for the unity and the strength of the Democracy.
- Know the importance of local self-Government and Panchayati Raj Institutions in India.
- Know the meaning, significance, the growing advocacy of Human Rights.

Transaction Mode: Through Lectures, Group discussions, Interactive sessions, field activities and use of Education Technology.

Course Contents

Unit I: Meaning and Importance of the Constitution

Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

Unit II: Fundamental Rights, Duties and Directive Principles

Fundamental Rights, Fundamental Duties, and the Directive Principles of the state policy of the Indian Constitution.

Unit III: Union, State and Local Self Governments

Union Government: Parliament, the President and Prime Minister: State Government: Governor and the Council of Minister: Judiciary: Functions and Powers: Panchayat Raj System.

Unit IV: Human Rights

Origin and Development of Human Rights, Growing Advocacy and Declining Trends of Human Rights, Rights of Scheduled Casts, Scheduled Tribes, Minorities, Children and Women, Human Rights Defenders, Human Rights Violation and Human Rights Organizations.

Suggested Readings:

1. M.V.Pylee, Indian Constitution, OUP, New Delhi
2. Granveille Austin, Indian Constitution, OUP, New Delhi
3. RajaniKotari, Politics in India, OUP, New Delhi
4. Johari, J C, Indian Government and Politics.
5. S R Maheswari, Local Governments in India (Latest Edition)
6. R K Arora and RajaniGoyal, Indian Public Aministration 1995.
7. C P Bhambri, Introduction to Indian Constitution.
8. Subash C Kashyap, The Working of Indian Constitution, NBT, New Delhi
9. Subash C Kashyap,Our Parliament, NBT, New Delhi
10. Granveille Austin, Functioning of the Indian Constitution, NBT, New Delhi.
11. Bipan Chandra, India after Independence. Roopa, New Delhi 2000.
12. Arjun Dev, Source Book on Human Rights, NCERT, New Delhi.
13. Human Rights in India: Theory and Practice, National Book Trust, 2001.

GROUP C: CORE COURSE (CC) 1(IV)
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Know the fundamental concepts of Optics and Laser.
- Understand the design and working of Laser.
- Apply the concepts in understanding the various optical phenomena.
- Solve the problems related to optics.
- Analyze the optical phenomena in experiments of optics.

Course Contents

Unit I:

Interference of a light:

Division of wave front and division of amplitude, The principle of superposition, two-slit interference, Fresnel biprism, thin film interference, Newton's rings, application of interference in determination of wavelength and precision measurements.

Haidinger fringes:

Fringes of equal inclination, Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines, Intensity distribution in multiple beam interference, Fabry-Perot interferometer.

Unit II:

Fresnel diffraction:

Fresnel half-period zones, Types of zone plates, Circular aperture, Circular disc, Diffraction at a straight edge, Construction and working principle of Zone plate and its application as a lens.

Fraunhofer diffraction:

Diffraction at a single slit, double slits & N parallel slits and their intensity distribution, plane transmission diffraction grating, reflection grating and blazed

grating, Concave grating and different mountings, diffraction at a circular aperture. Rayleigh criterion of Resolution, Resolving power of Telescope, Microscope, Grating and Prism.

UnitIII:

Polarization and Optical Rotation:

Meaning and representation of Polarized light, Types of polarized light, Production of Polarized light, Brewster law, Malus law, double refraction, Phase retardation plates, Analysis of Polarized light as plane polarized, circularly polarized and Elliptically polarized light, Rotation of plane of polarization, Specific rotation and its experimental determination, Polarimeter (Laurent and Biquartz).

Unit IV:

Lasers: Laser system, Radiative and Non-radiative Transition mechanisms, Basic necessity for a Lasing device, Einstein's A and B coefficients, Spontaneous and Induced emissions, conditions for laser action, population inversion, Construction, Working principle and Applications of Ruby laser, He-Ne Laser and Semiconductor lasers. Basic concepts of Holography, Construction of a Hologram and reconstruction of the image.

Suggested Readings:

1. A K Ghatak, Physical Optics (Tata McGraw-Hill Publishing Co. Ltd, New Delhi).
2. D P Khandelwal, Optics and Atomic Physics (Himalaya Publishing House, Bombay, 1998).
3. F Smith and J Thomson, Manchester Physics series; Optics (English Language book Society and John Wiley, 1977).
4. Bom and Wolf, Optics.
5. K D Moltev, Optics (Oxford University Press)
6. Sears, Optics.
7. Jenkins and White, Fundamental of Optics (McGraw-Hill)
8. Smith and Thomson, Optics (John Wiley and Sons).
9. A K Ghatak, Physical Optics
10. B B Laud, Lasers and Non-linear Optics (Wiley Eastern 1986)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine the wavelength of sodium light by Newton's Ring Method.
2. To determine the wavelength of three colours using diffraction grating.
3. To determine the wavelength of sodium light using Biprism.

4. To determine the specific rotation of sugar solution by polarimeter.
5. To find out the wavelength of a given monochromatic (Sodium light) source using Michelson's interferometer and determination of D_1& D_2.
6. To determine the thickness of carbon paper by interference method.
7. To determine the wavelength of light using Helium-Neon Laser in I & II order diffractions.

GROUP C: CORE COURSE (CC) 2 (IV)
CHM 202: CHEMISTRY: INORGANIC CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To gain an understanding of the chemistry of transition and inner transition metals, coordination compounds, organometallic compounds, metal carbonyls of Transition Elements, Coordination chemistry and magnetic behaviour of complexes, Chemistry of Lanthanide and Actinides, concepts of Oxidation and Reduction and Principles involved in the extraction of the elements.

Course Contents

Unit I:

Transition Elements

General group trends with special reference to electronic configuration, variable valency, magnetic and catalytic properties, colour and spectral behaviour, ability to form complexes, stability of various oxidation states and e.m.f. comparative studies of Chemistry of the first, second and third transition series.

Inorganic Reaction Mechanism

Thermodynamic and Kinetic stability. Introduction to inorganic reaction mechanisms. Substitution reactions in square planar Complexes, Trans-effect, theories of trans effect. Determination of binary formation constant by pHmetry and spectrophotometry

Unit II:

Chemistry of Lanthanide and Actinides

Chemistry of Lanthanide: Occurrence and separation, electronic structure, oxidation states and ionic radii and lanthanide contraction, spectral and magnetic properties, complex formation and applications.

Chemistry of Actinides: Electronic configuration, oxidation states, actinide contraction, complex formation, spectral and magnetic properties, applications. Chemistry of separation of Np, Pu and Am from Uranium, similarities between the later actinides and later lanthanides.

Unit III:

Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Limitations of valance bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

Oxidation and Reduction

Use of redox potential data- analysis of redox cycle, redox stability in water-Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.

Unit IV:

Organometalic Compounds, Metal Carbonyls &Nitrosyls

A. Organometallic compounds

Definition, nomenclature and classification of organometallic compounds, preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes and homogenous hydrogenation.

B. Carbonyls and Nitrosyls

a) **Metallic Carbonyls**: Metallic carbonyls General methods of Preparation, general properties, structure and nature of Metal carbonyls, bonding in carbonyls, Effective atomic number (EAN) rules as applied to metallic carbonyls. 18-electron rules applied to metallic carbonyls. Preparation, properties and structure of nickel tetracarbonyl, iron penta carbonyls, chromium hexa carbonyls, dimanganesedeca carbonyl, dicobaltocta carbonyl.

b) **Metallic Nitrosyls:** Some metallic Nitrosyls: Metal nitrosyl carbonyls, metal nitrosyl halides, sodium nitroprusside (Preparation properties, structures and uses) structure and nature of M-N bonding in nitorsyl. Effective atomic number (EAN) rules as applied to metallic nitrosyls.

Suggested Readings:

1. R. C. Mehrotra and A. Singh Organometallic Chemistry :A Unified Approach, Wiley
2. A. G. Sharpe: Inorganic Chemistry, Pearson
3. Bell and Lott: Modern approach to Inorganic chemistry, Van Nostrand
4. Emelns and Anderson Principles of Inorganic Chemistry
5. G. L. Miessler and D. A. Tarr: Inorganic Chemistry, Prentice Hall
6. Cotton and Wilkinson, Advanced Inorganic Chemistry, 6th Edition, Wiley
7. Lee, J.D. Concise Inorganic Chemistry, ELBS.

8. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry
9. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications
10. Shriver and Atkins Inorganic Chemistry, W. H. Freeman and Company
11. James Huheey, Inorganic chemistry: Principles of Structure and Reactivity, Pearson Education India
12. Shriver and Atkins' Inorganic Chemistry, Oxford Press
13. Green wood, Chemistry of The Elements, Elsevier

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Synthesis and analysis

a. Preparation of sodium trioxalatoferrate (III), Na_3 [Fe $(C_2O_4)_3$] and determination of its composition by permanganometry.
b. Preparation of copper tetraammine complex. $[Cu(NH_3)_4]SO_4$.
c. Preparation of Ni-DMG complex, $[Ni(DMG)_2]$.
d. Preparation of *cis*- and *trans* – bisoxalatodiaqua chromate (III) ion.

Gravimetric Analysis

a. Cu as Copper thiocyanate.
b. Ni as Nickel dimethylgloxime

pH metry

a. To determine normality of xN HCl by pH metry.
b. To determine normality and dissociation constant of weak acid (xN CH_3COOH) by pH metry.
c. To determine normality and dissociation constant of dibasic acid (xN oxalic acid / malonic acid / maleic acid) using 0.1N NaOH solution

GROUP C: CORE COURSE (CC) 3(IV)
ZOO 202: ZOOLOGY: ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objective:
To enable students to comprehend the modern concepts of physiological aspects on various organs and systems of animals and human being to comprehend chemical nature, biological molecules and physiological roles.

Course Contents

Unit I:

- Physiology of digestion: Chemical nature of food stuff (including micronutrients), various types of digestive enzymes and their digestive action in the alimentary canal, role of GI hormones in digestion, mechanism of absorption of digested food.
- Physiology of respiration: Mechanism and control of breathing, exchange of gases transport of respiratory gases (oxygen and carbon dioxide)

Unit II:

- Physiology of blood circulation
- Composition and function of blood.
- Blood groups (ABO and Rh)
- Blood coagulation – factors, mechanism, theories and anticoagulants.
- Origin, conduction and regulation of heart beat in mammals.
- Cardiac cycle, ECG
- Nerve physiology: structure and types of neuron, origin and conduction of nerve impulse,
- Synapse-structure, types, properties and signal transmission through synapses.

Unit III:

- Muscle physiology: Ultra-structure and mechanism of contraction of skeletal muscle, summation and fatigue.
- Physiology of Excretion: Nitrogenous wastes, anatomy of mammalian kidney, structure of nephron, mechanism of urea and urine formation (including hormonal regulation)osmoregulation
- Physiology of Reproduction:hormonal control of male and female reproduction, implantation, parturition and lactation in mammals
- Female Reproductive cycle.

Unit IV: Endocrinology

- Hormones: Classification, properties of hormones.
- Mechanism of hormone action (peptide and sterioid hormones)
- Endocrine glands:Pituitary gland: Location, anatomy and functions of hormones with hypothalamic regulation
- Thyroid gland: Location, anatomy, synthesis and function of T3 & T4
- Adrenal gland, Islets of Langerhans, Testes and Ovaries

Suggested Readings:

1. A text book of Medical physiology, Guyten and hall, Elsvier Pub (South Asia) 2013.
2. Animal Physiology, K Schmidt – Nielson, 5thed, Cambridge Pub 2013.
3. Biochemistry D Voet& JG Voet, Wiley 2011
4. Animal Physiology by A. MariaKutikan&N. Arumugam – (Saras Publication, Nagercoil, Tamil Nadu).
5. Animal Physiology and biochemistry by K.V. Sastry – (Rastogi Publications, 2008).
6. Regulatory mechanism in Vertebrates by Kamleshwar Pandey and J.P. Shukla- (Rastogi Publications, 2008)
7. Animal Physiology by K.A. Goyal and K.V. Sastry –(Rastogi Publication 2008)
8. Endocrinology and Reproductive Biology by K.V. Sasyry - (Rastogi Publication 2008)
9. Animal Physiology by Arora M.P. (1989)- Himalaya Pucations House.
10. Textbook of medical Physiology by Guyton A.C. & Hall J.E (1996)- (W.B. Saunders & Co.)
11. General and Comparative Physiology by Hoar W.S. (1983) – Prentice Hall Publication)
12. A textbook of Animal Physiology by Hurtkar P.C. &Mathur P.N. (1976) – S Chand & Co.
13. General Endocrinology by Turner C.D. &Gangara J.T. (1971) - W.B. Saunders & Co.
14. Animal Physiology , Biochemistry and Immunology, Dr KC Soni Hindi Edition , College book centre, Chaura Rasta , Jaipur
15. Animal Physiology and Immunology , Dr KC Soni Hindi Edition, College book centre , Chaura Rasta, Jaipur

16. Mammalian Endocrinology and Animal Behavior , Dr VS Pawar, Hindi Edition , College book centre, Chaura Rasta, Jaipur

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Effect of temperature and pH on the salivary amylase enzyme activity.
2. Preparation of Blood smears of frog / lizard/ bird / mammals.
3. Identification of blood groups (ABO) and Rh factor in man.
4. Estimation of Hemoglobin by Sahils method.
5. Enumeration of RBC in blood samples.
6. Enumeration of WBC in blood samples.
7. Preparation of Haemin Crystals.
8. Effect of different concentrations of NaCl on RBC.
9. Measurement of blood pressure, Heart beat and Pulse rate.
10. Study of bleeding time, Coagulation time of blood.
11. Dissect and demonstrate the endocrine glands in rat and man (Chart or model).
12. Study of Histological slides of the following endocrine gland of mammal testis, ovary, thyroid, adrenal, pitutary, Islets of Langerhans.

GROUP C: CORE COURSE (CC) 1(IV)
BOT 202: BOTANY: PLANT TAXONOMY AND UTILIZATION OF PLANTS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understand the principles of plant nomenclature;
- Understand the evolution of taxonomic thought and the various systems of classification;
- Understand the diversity that exists among angiosperms;
- Make detailed study of selected families;
- Understand the utility of plants and plant products in human welfare.

Course Contents

Unit I:Angiosperm taxonomy: Brief history, aims and fundamental concepts of artificial, natural and phylogenetic system of classification, Bentham & Hooker, Engler & Prantl and Hutchinson, system of classification.
Herbarium; Tools and techniques, important herbaria and botanical gardens of India and their importance.

Unit II: Botanical Nomenclature: Principles and rules of ICBN, type of concept, taxonomical categories, principle of priority, identification keys, floras.
Diversity of flowering plants as illustrated by members of the families – Annonaceae, Fabaceae, Brassicaceae, Malvaceae, Apiaceae.

Unit III: Diversity of flowering plants as illustrated by members of the families –Acanthaceae, Apocynaceae, Asteraceae, Solanaceae, Lamiaceae; Amaranthaceae, Euphorbiaceae, Liliaceae and Poaceae.

Unit IV: Origin, Cultivation and value added products of following:

Cereals: Rice, Wheat and Maize Oil Yielding Plants: Mustard, Groundnut and CoconutFibre Yielding Plants: Cotton, Sun-hemp. Spices: Cardamom, Fennel, Cumin, Coriander.Medicinal plants: Opium, Cinchona, Sarpagandha. Beverages: Tea & Coffee. Rubber: General Account

Suggested Readings:

1. Jones, A.B. and A.Luchsinger, 1979, Plant Systematics, McGrow Hill Book Co., New York.
2. Priti Shukla and Misra, 1988, Taxonomy of Angiosperms, Vikas Publishing House, New Delhi.
3. Hutchinson, J., The families of Flowering Plants, Clarendon Press,Oxford.
4. Davis, P.H. and V.H.Heywood, 1963, Principles of Angiosperm Taxonomy, Oliver and Boyd,London.
5. Heywood, V.H. and D.M.Moore (Ed.)1984, Current concepts in Plant Taxonomy, Academic Press,London.
6. Singh, G.1999, Plant Systematics:Theory and Practice, Oxford and IBH Pvt. Ltd., New Delhi.
7. Stace, C.A. 1989, Plant Taxonomy and Biosystematics (2nd Ed.), Edward Arnold,London.
8. Singh V. and D.K.Jain, 2005, Taxonomy of Angiosperms, Rastogi Publications,Meerut.
9. Kochhar S.L.1981, Economic Botany in the Tropics, MacMillan IndiaLtd.Delhi.
10. Vashista P.C. 1980, Taxonomy of Angiosperms, Sultanchand & Co., NewDelhi.
11. Lawrence, G.H.M. 1950 Taxonomy of Vascular Plants, MacMillan,London.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Study of selected technical terms and their definitions (used in the description of plant).
- Detailed study of at least one plant specimen per family as given in theorysyllabus.
- Field study (3-5 days) to a nearby forest, for collection, identification and submission of herbariumsheets;
- To recognize the botanical name, family, part used and products of economic

importance as per theorysyllabus;

- Preparation and submission of an illustrated inventory of 5 medicinal plants used in indigenous systems of medicine and allopathy (Write their botanical name, family, part used, active principle and diseases/disorders for which they areprescribed).

GROUP C: CORE COURSE (CC) 3(IV)
MTH 202: MATHEMATICS: ABSTRACT ALGEBRA

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:
By the end of the semester the students will be able to develop understanding of the abstract concepts of groups, rings, special classes of rings which in turn make them appreciate modern mathematical concepts.

Unit I:

Sets, Relations, functions and binary operations, binary operations in contrast to unary and ternary operations, equivalence relation, Group: Definition, examples and simple properties of groups and subgroups.

Unit II:

Permutation groups, cyclic groups, cosets, Lagrange's theorem, homomorphism and isomorphism of groups, Cayley's theorem, Normal subgroups and Quotient groups, fundamental theorem of homomorphism of groups.

Unit III:

Rings: Definition and examples. Residue classes of rings, Special classes of rings, integral domain,field,division ring, simple properties of ring, sub ring, sub field, ring homomorphism and ring isomorphism.

Unit IV:

Ideal, principal ideal, principal ideal ring, quotient ring, prime ideal, maximal ideal, Euclidean rings and its properties, polynomial rings.

Suggested Readings:

1. Topics in Algebra: I.N. Herstein, Wiley Eastern, New Delhi, 2nd ed. 1975.

2. A Course in Abstract Algebra: V.K. Khanna and S.K. Bhambri, Vikas Pub. House, New Delhi, 2nd rev. ed. 1998.

3. Modern Algebra: A.R. Vashistha, Krishna PrakashanMandir, Meerut, 2nd rev. ed., 1971.

4. Algebra: M. Artin (1991) Prentice Hall.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
PEIS 202: INCLUSIVE SCHOOLING

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Demonstrate knowledge on different perspectives in the area of education of children with disabilities;
- Reformulate attitudes towards children with special needs;
- Identify needs of children with diversities;
- Plan need-based programmes for all children with varied abilities in the classroom;
- Use human and material resources in the classroom;
- Use specific strategies involving skills in teaching special needs children in inclusive school;
- Plan and execute appropriate learner-friendly evaluation procedures;
- Incorporate innovative practices to respond to education of children with special needs;
- Contribute to the formulation of policy
- Implement laws pertaining to education of children with special needs.

Course Contents

Unit I: Paradigms in Education of Children with Special Needs

- Historical perspectives and contemporary trends.
- Defining Special Needs: ways of looking of Educational Difficulties -individual deficit view vs. curriculum view.
- Approaches of viewing disabilities:The charity model, the bio-centric model, the functional model and the human rights model.

- Concept of special education, integrated education and inclusive education.

Unit II: Legal and Policy Perspectives

- Recommendations of the Salamanca Statement and Framework of Action, 1994, Educational Provisions in the UNCRPD, 2006.
- Constitutional Provisions; Persons with Disabilities Act, 1995, (PWD Act); Rehabilitation Council of India Act, 1992, National Trust Act 1999 and RTE Act, 2009, Rights of Persons with Disability Act 2016, National Institutes.
- National Policy - Education of Students with Disabilities in the National Policy on Education, 1986, POA 1992.
- Integrated Education for PWD, Children (IEDC, 1974), Scheme for Inclusive Education for PWD (IEDC, 2000) and Education of Special Focus Groups under the Sarva Shiksha Abhiyan (SSA, 2000); Scheme of Inclusive Education for PWD at secondary School (IEDSS, 2009).

Unit III: Inclusive practices in schools

- Visual impairment, Hearing impairment, Locomotor and Neuromuscular disorders, Mental Retardation, Specific learning disabilities.
- Concept and philosophy of inclusive education.
- Teaching competencies required for inclusive classroom.
- Peer tutoring, Cooperative learning, social learning, system approvals Multisensory teaching, reflective teaching.
- Supportive services required for meeting special needs in the classroom.
- Duty of educational institutions, appropriate governments and local authorities to provide, promote and facilitate inclusive education and towards creation of barrier-free environment for persons with disabilities.

Unit IV:Assessment, teaching and development of supportive services for CWSN

- Concept and techniques of assessment.
- Identification and functional assessment of children with special needs.
- Implication of assessment for instructional planning and placement.
- Developing lesson plan and TLM for children with special needs.
- Involving community resources as source of support to Inclusive school.

Modes of Learning Engagement:

- The study materials must be presented to the trainees and discussions and reflections should be encouraged.
- The students should be exposed to good practices of dealing with special needs either through videos or through actual visits.
- It is important to engage the participants in a lot of cooperative group work so that they start valuing alternative points of view and significance of collaboration.
- The student trainees can also be asked to write their reflections on various topics.

- Presentation of case studies and discussion.
- Interaction with children with disabilities studying in schools and spending quality time with them is of great help in changing attitudes and developing empathy.
- Projects on various topics can help the students to acquire in depth knowledge.
- Audio- Visual presentations and demonstrating various practices.

Practicum/ Tutorials:

1. Reflective written assignments
2. Conducting seminar on chosen topics
3. Group reports
4. Field visit reports/ project report
5. Case studies on different disabilities

Suggested Readings:

1. Farrell, M. (2004). Special Educational Needs: A Resource for Practitioners. New Delhi. Sage Publications.
2. Hallahan & Kanffman J.M. (1984). Exceptional Children. Prentice Hall.
3. Hegarty S. & Mithu Alur (2002). Education and children with Special need. New Delhi. Sage Publication.
4. The Persons with Disability Act (1995). Ministry of Social Justice and Empowerment. Government of India, India, MSJE.
5. Chadha, A. (1999). A Handbook for Primary School Teacher of Children with learning Disabilities. New Delhi. Education Consultant of India Limited.
6. UNESCO (1994). The Solamanca Statement and Framework for Action on Special needs Education. Paris. UNESCO.
7. Koul,V.(1993). Early Childhood Education Programme. New Delhi. NCERT.
8. Muralidharan, R. (1990). Early Stimulation Activities for Young Children. New Delhi. NCERT.
9. Panda, K., C. (1990). Education of Exceptional Children. New Delhi. Vikas Publications.
10. Arora, K, Dave, P & Sinclair, S. (1987). Detection and prevention of mentally Handicapped. New Delhi. NCERT.
11. NCERT and UNESCO (2004). Inclusive Education: An Orientation package for Teacher Educators. Department of Education of Groups with special needs. NCERT and UNESCO.
12. NCERT and UNESCO (2000). Assessment of Needs for Inclusive Education. Report of the First Regional Workshop. NCERT and UNESCO.
13. Mani, M., N., G. (2001). Inclusive Education in Indian context. INRDC.
14. Banine, D (1988). Handicapped children in Developing countries: Assessment, Curriculum and Instruction - Edmonton (Alberta). University of Alberta.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)

Semester IV

PELT 202: LEARNING AND TEACHING

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: The student teacher will be able:

- To develop scientific attitude for the process of teaching & learning.
- To develop understanding about the relationship of cognitive, social and emotional development with learning process
- To provide an overall view on teaching & learning style and ideas to enhance these activities
- To introduce student – teachers with teaching skill, component and parameters of effective teaching
- To develop insight for perfect teaching by its overall perspectives in detail**.**

Course Contents

Unit I: Psychological Domains of Learning and Teaching

- Meaning and principles of development, relationship between development and learning.
- Meaning of cognition and its role in learning, socio-cultural factors influencing cognition and learning.
- Social development – Meaning, Importance, Social process and its effect on Teaching & Learning, theory of social construction(Bruner)
- Emotional development: - Meaning, Process, Need to Study its effect on Teaching and Learning Process.

Unit II: Effective Teaching and Learning

- Effective Teaching: Meaning, Component and Parameters of Effective Teaching, Identification of Teaching Skills, Principles of Teaching, Classroom instruction strategies, Teacher as a Learner, Modernising the classroom, Teacher behaviour and classroom climate (Flanders' interaction analysis system).

- Teaching for culturally diverse students, theory of culturally relevant pedagogy.
- Creative Teaching: Meaning, concept and ways of teaching creatively.
- Unlearning to learn
- Learning- Meaning, and characteristics, factors influencing learning, Types of learning (Insight, Constructivist and Social), Tradition and changes in view of the learning process a shift from teaching to learning.
- Principles of learning, Quality of learning.
- Role of teacher in teaching-learning situations: (a) Transmitter of knowledge (b) Teacher as a Role Model (c) Facilitator for Encouraging Children to Construct knowledge (Constructivist Approach) (d) Co-learner, concept mapping
- Classroom Instruction Strategies (General Introduction)
- Role of motivation in learning- Concept, Motivational Strategies to be used in classroom teaching.

Unit III: Learning Style and Teaching Style

- Diversity among learners and learning needs (with reference to special needs).
- Multilingual background: Concept, Multilingual background of children and its classroom implications.
- Learning Style: - concept, Types and importance in Teaching –Learning process, factors affecting learning style.
- Introduction of teaching Models: Concept attitude, advance organization and inquiry model.
- Teaching Style: - Concept, Types and effect on learners' learning process, factor affecting teaching Style.
- Teacher behaviour, effect of Verbal and Non-Verbal behaviour of Teacher on students' learning.
- Use of out of class experiences of children in classroom teaching, Organisational climate and teaching.

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':
  (i) Experiential learning and reflection
  (ii) Social mediation
  (iii) Cognitive negotiability
  (iv) Situated learning and cognitive apprenticeship
  (v) Meta-cognition.
- Creating facilitative learning environment.
- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated

learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Practicum / Tutorials:

- Analysing the behaviour of your fellow student-teachers, find out how socio-cultural factors have influenced & shaped their learning.
- Write a report about some best teachers in your past experiences & write some special features of their ways of teaching.
- Conduct a case study of an individual (Educationally exceptional – Differently-abled).
- Conduct and interview of 02 students of multilingual background and list the problems face by them in classroom conditions.
- Trace out some of the odd Non-Verbal behaviour of any 05 fellow student teachers.

Suggested Readings:

1. PkSkcs ,l-ih] 2005]cky fodkl o euksfoKku ds ewy rRo
2. Concept Publishing Company Private Ltd, Mahan Garden, New Delhi.
3. Hkw"k.k 'kSysUnz] 2007&08] 'kSf{kd rduhdh]vxzoku ifCyds'ku] vkxjk&7
4. 'kekZ MkW- vkj-,-] 2008] f'k{kk ds euksfoKku vk/kkj]baVjus'kuy ifCyf'kax gkml]esjBA
5. dqyJs"B ,l-ih-] 2007&08] 'kSf{kd rduhdh ds ewy vk/kkj] vxzoky ifCyds'ku] vkxjk
6. vkWosjkW; MkW- ,l- lh] 1999] f'k{kd rduhdh ds ewy rRo] vk;Z cqd fMiks] djksy ckx] ubZ fnYyh
7. 'kekZ MkW- vkj-,-] f'k{k.k vf/kue esa uohu izorZu 2005] vkj- yky cqd fMiks] esjBA
8. O;kl gfj'pUnzz ,oa 'kekZ vf/kxe vkSj fodkl ds eukslkekftd vk/kkj] jktLFkku fgUnh xzaFk vdkneh t;iqj & 4
9. flag]jkeiky ,oa flag] uxsUnz ¼2013½f'k{k.k ,oa vf/kxe ds eukslkekftd vk/kkj] vxzoky ifCyds'ku] vkxjk
10. flag uxsUnz ,oa lsokuh v'kksd] ¼2013½% vf/kxe dk euksfoKku] vxzoky ifCyds'ku] vkxj
11. flag jkeiky ,oa lsokuh v'kksd] ¼2013½%'kSf{kd rduhdh ,oa d{kk d{k izca/ku] vxzoky ifCyds'ku] vkxj
12. Sharma R. A., Arya- 2008, mega trends in instructional technology, (Programmed instruction E-learning, local book depot, Meerut (up)
13. 'kekZ] MkW- vkj-,- 2005] f'k{k.k vf/kxe esa uohu izorZu] vkj-yky cqd fMiks] esjBA
14. Siddiqui, Mujebul Hasan, 2009, teachings of teaching (classroom teaching). APH publishing, New Delhi.
15. Mathur, Dr. S.S, Mathur, Dr. Anju. 2007-2008 development of learner and teaching learning process, agrawal publication Agra.
16. Rao. V.K, Reddy, R.s.1992, learning and teaching commonwealth publishers, New Delhi.
17. Bhatnagar, A.B, Bhatnagar, M., Bhatnagar, A 2008, Development of learner and teaching learning process, R.lal book depot, Meerut.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester IV
CPSKC 202: KNOWLEDGE AND CURRICULUM

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: on the completion of course, the student teacher will be able to:

- Gain insight into the various forms of knowledge and disciplines and their implications to school subjects.
- Develop an understanding about how knowledge is organized into curriculum.
- Develop an understanding of the concept of curriculum, curriculum framework and the related concepts.
- Develop an understanding of the various foundations of curriculum planning.
- Acquaint the student with the existing approaches to curriculum design.
- Reflect on various trends in curriculum development.

Course Contents

UnitI: Concept of Curriculum

- Meaning and nature of curriculum, need and importance of curriculum in schools.
- Differentiating curriculum framework, curriculum and syllabus, their significance in school education.
- Facets of curriculum- core curriculum, hidden curriculum, activity based curriculum, interdisciplinary curriculum, spiral curriculum and integrated curriculum.
- Curriculum visualized at different levels: national level, state level, school level, class level and related issues.

Unit II: Curriculum Determinants and Considerations

- Determinants of curriculum (philosophical, psychological, sociological, political).
- Considerations in curriculum development: (at school level)
- Forms of knowledge and its characterization in different school subjects.
- Socio-cultural context of students –multi-cultural, multilingual aspects.
- Learner characteristics.
- Teachers' experiences and concerns.
- Critical issues: environmental concerns, gender differences, inclusiveness, value concerns and issues, social sensitivity.
- Curriculum and school subject knowledge selection process and purpose.
- Selection of school subject knowledge: criteria and agencies.
- Legitimization of knowledge selection: socio-cultural and politico-economic forces.
- Problematizaiton of school knowledge selection: debates to identify change and continuity:
- Constitutional ideals and national priorites.
- Global concerns.

UnitIII: CurriculumDevelopment

- Process of curriculum development
- Formulating aims and objectives.
- Criteria for selecting knowledge and representing knowledge in the form of different subjects.
- Organizing fundamental concepts and themes vertically across levels and integrating themes within (and across) different subject.
- Selection and organization of learning situations.

Unit IV: Curriculum Implementation and Evaluation

- Role of state and national agencies in implementing curriculum.
- Teachers' role in generating dynamic curricular experiences through-
    - Flexible interpretation of curricular aims.
    - Contextualization of learning.
    - Varied learning experiences.
    - Learning resources.
    - Translating curricular objectives into instructional planning.
- Need and evaluation of effective curriculum construction with reference to existing pedagogies and instructional approaches, teacher training, textbooks and instructional materials.
- Approaches and criteria to curriculum evaluation and text-book analysis.
- Role of MHRD, NCERT and the states in curriculum reform.

Modes of Learning Engagement:

A set of readings need to be compiled, which includes those which clarify key concepts, trace the evolution of alternative conceptions of curriculum, contextualize the problem of curriculum, indicate ways of developing, implementing and reviewing curriculum. In addition, national curriculum documents and relevant secondary school syllabi should also be made available.

The following modes of learning engagement are suggested:

- Introductory lectures on key themes and concepts
- Study and discussions on the process of curriculum development at various levels
- Study of the NCF 2005 as well as the earlier curriculum frameworks and a prescribed syllabus;
- Discussion on purpose of curriculum framework;
- Critical evaluation of the extent to which the curriculum framework is reflected in the syllabus (in small groups)
- Interactions with school teachers and principal about how they operationalize the prescribed curriculum into an action plan; how curriculum is evaluated and revised
- Observing the kinds of curricular experiences, a school provides apart from classroom teaching and discern their relevance vis a vis learner development; for this interactions with teachers and students could be held
- Study of selected readings and presentations based on these

Practicum/ Tutorials:

1. Preparation of any topic from the course content and presenting in the classroom.
2. Analytical study of school- curriculum implementation.
3. Development of a unit test and its try out.
4. Evaluation of a school textbook.
5. Nature and level of participation in discussions.
6. Presentations based on readings.
7. Field notes on observations and interviews in schools, and linking these with concepts introduced.
8. Analysis of curriculum development/implementation processes within a school, based on field notes and observations.

Suggested Readings:

1. Bob moon and Patricia murphy (Ed). (1999). Curriculum in context. London. Paul chapman publishing.
2. Chryshochoos, N.E. (1998). Learner needs and syllabus design. M.A. Dissertation. England. School of english. University of Durham.
3. D.j. Flinders and S.J. Thorton (eds). (1997). My pedagogic creed. New York. The curriculum studies reader, routledge.
4. G.w. Ford and Lawrence pungo. (1964). The structure of knowledge and the curriculum. Chicago. Rand mcnally & company.

5. Groundland, N.E. (1981). Measurement and evaluation in teaching. New York. Macmillan.
6. Kelley, a.b. (1996). The curricular theory and practice. Us. Harper and row.
7. Kumar Krishna. (1997).What is worth teaching. New Delhi. Orient longman.
8. Taba, Hilda. (1962). Curriculum development. Theory and practice. New York. Har court, brace and Wald.
9. Tyler, R.W. (1949). Basic principles of curriculum and instruction. Chicago. University of Chicago press.
10. Kochhars.k. (1970). Secondary school. New Delhi. Sterling Publishers administration.
11. The report of education commission. (1964-66). MHRD govt. ofIndia.
12. HkVukxj] lqjs'k- ¼1996½- 'kSf{kd izcU/k vkSj f'k{kk dh leL;k,sa- esjB- lq;kZ ifCyds'kuA
13. xqIrk ,y- Mh- ¼1990½- mPp 'kSf{kd iz'kklu- gfj;k.kk lkfgR; vdkneh p.Mhx<-A
14. lqf[k;k ,l- ih- ¼1965½- fo|ky; iz'kklu ,oa laxBu- vkxjk- fouksn iqLrd eafnjA
15. of'k"B ds d-s ¼1985½- fo|ky; laxBu ,oa Hkkjrh; f'k{kk dh leL;k,sa] esjB- yk;y cqd fMiksA
16. nso vkpk;Z egsUnz- ¼1998½- fo|ky; izcU/k]jk"Vªok.kh- fnYyh- izdk'kuA
17. 'kekZ vkj-,- ¼1995½- fo|ky; laxBu rFkk f'k{kk- esjB- iz'kklulw;kZ ifCyds'kuA
18. O;kl gfj'pUnz- ¼2003½- 'kSf{kd izcU/k vkSj f'k{kk dh leL;k,sa- ubZ fnYyh- vk;Z cqd fMiks] 30 ukbZokykdjkSyckxA

Semester V

Group C: Core Course (CC) 1 (V)

PHY 301: PHYSICS: KINETIC THEORY AND THERMODYNAMICS

Time: 3 Hours Max. Marks: 100

Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: the student teacher will be able to:

- Comprehend the key points of thermodynamics.
- Apply the concepts in understanding the various transport phenomena.
- Solve the problems related to the thermodynamics.
- Understand and appreciate the application of thermodynamics in engines of motor vehicles.
- Perform the experiments related to thermodynamics.

Course Contents

Unit I: Ideal and real gas

Ideal gas: kinetic model, deduction of boyle's law, interpretation of temperature, estimation of rms speeds of molecules, brownian motion, estimate of the Avogadro number, equipartition of energy, specific heat of monoatomic gas, extension to di- and triatomic gases, behaviour at low temperatures, adiabatic expansion of an ideal gas, applications to atmospheric physics.

Real gas: Van der Waals' equation of state, nature of Van der Waals'forces, comparison with experimental P-V curves, the critical constants, gas and vapour, Joule expansion of ideal gas and of a Van der Waals'gas, Joule coefficient, Joule-Thomson effect.

Unit II: Liquefaction of gases

Boyle temperature and inversion temperature, principle of regenerative cooling and of cascade cooling, liquefaction of hydrogen and helium, refrigeration cycles, meaning of efficiency.

Transport phenomena in gases: molecular collisions, mean free path and collision cross sections, estimates of molecular diameter and mean free path, transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure

Unit III: Thermodynamics

The laws of thermodynamics: The zeroth law, various indicator diagrams, work done by and on the system, First law of thermodynamics, internal energy as a state function, reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics, different versions of the second law, practical cycles used in internal combustion engines, entropy, principle of increase of entropy, the thermodynamic scale of temperature, its identity with the perfect gas scale, impossibility of attaining the absolute zero temperature, third law of thermodynamics.

Unit IV: Thermodynamic relationships

thermodynamic variables- extensive and intensive, Maxwell's general relationships, application to Joule–Thomson expansion and adiabatic cooling in a general system, Van der Waals' gas, Clausius-Clapeyron heat equation, thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables, cooling due to adiabatic demagnetization, production and measurement of very low temperatures.

Blackbody radiation: pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, spectral distribution of blackbody radiation, Wein's displacement law, Rayleigh-Jean's law, Planck's quantum postulates, Planck's law, complete fit with experiment, interpretation of behaviour of specific heats of gases at low temperature.

Textbooks and references

1. M WZemansky, Heat and Thermodynamics (Mcgraw-Hill Book Company)
2. M NSaha, BNSrivastava, a Treatise on Heat (The Indian Press, (Publication) pvt. Ltd. Allahabad)
4. M NSaha, BNSrivastava, a Textbook of Heat (Science Book Agency, Calcutta)
6. A N Matveev, Molecular Physics (Mir Publishers, Moscow, 1986)
6. Joseph OHirschfelder et al, Molecular Theory of Gases and Liquids (John Wiley &Sons, NewYork)
6. K SPitzer, l. Brewer, Thermodynamcs (Mcgraw Hill Book Company)
7. S CGarg, RMBansal, CKGhosh, Thermal Physics (Tata Mcgraw Hill Publishing Company ltd.)
8. Samuel Glasston, Thermodynamics for Chemists (Affiliated East West Press Pvt. Ltd., New Delhi)
9. YU. B. Rumer, M. Sh. Ryvkin, Thermodynamics, Statistical Physics and Kinetics (Mir Publishers, Moscow)
10. S S Singhal, JPAgarwal, Satyaprakash, Heat and Thermodynamics (Pragati Prakashan, Meerut).
11. **Lkdluk] flg] jkor *m"ekxfrdh lkf[;dh; Òkfrdh* ¼dkyp cdgkml] t;ij ½**
12. **Hk.mkjh] f'k'kkfn;k] ijkt i] ohjund ekj] *lkf[;dh; ,o m"ekxfrdh; Òkfrdh* ¼je'k cdfmik] t;ij½**

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine the thermal conductivity of bad conductor by lee's method.
2. To determine the melting point of wax using platinum resistance thermometer.
3. To find 'j' by call ender and barne's method.
4. To study the temperature dependence of resistance for thermistor and find temperature coefficient of resistance and material constant.
5. To study the temperature dependence of resistance of a torch bulb's filament.
6. Determine the heat capacity of a brass.

GROUP C: CORE COURSE (CC) 2 (V)
Semester V
CHM 301: CHEMISTRY: PHYSICAL CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To learn the basic principles of phase equilibrium, Electrochemistry and phase equilibrium, chemical equilibrium and its relationship with thermodynamic quantities, basic concepts of electrochemistry and its applications, chemical bonding from the valence bond model and molecular orbital theory, the limitations of classical mechanics at molecular length scales, the differences between classical and quantum mechanics, the connection of quantum mechanical operators to observables, probabilities, amplitudes, averages, expectation values, and observables. The connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals).

Course Contents

Unit I: Electrochemistry

- Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.Applications of conductivity measurements; determination of degree of dissociation,

determination of $K_a$of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

- Types of reversible electrodes-gas-metal ion, metal-insoluble salt anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes-standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells.EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH, and K), polarization, over potential and hydrogen overvoltage. Concentration cell with and without, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and pK_a determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.Buffers-mechanism of buffer action, Handerson-hazel equation.Hydrolysis of salts. Corrosion-types, theories and methods of combating it.

Unit II: Chemical Equilibrium

- **Chemical Equilibrium:** Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction isotherm and reaction isochore – Clapeyron equation and Clausius – Clapeyron equation, applications.
- **Phase Equilibrium:** statement and meaning of the terms – phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems.Phase equilibria of two component system – solid – liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead.Solid solutions – compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ($NaCl-H_2O$), ($FeCl_3-H_2O$) system. Freezing mixtures, acetone-dry ice.Liquid-liquid mixtures-Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system-azeotropes-$HCl-H_2O$ and ethanol – water systems.Partially miscible liquids – Phenol-water, trimethylamine-water, nicotine-water systems.Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation, applications.

Unit III: Chemical Kinetics

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light catalyst, concentration dependence of rates, mathematical characteristics of simple chemical reactions – zero order, first order, second order, pseudo order, half-life and mean life, Determination of the order of reaction – differential method, method of integration, method of half-life period and isolation method.

- Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometer. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis), Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
- Characteristics of catalyzed reactions, classification of catalysis homogeneous and heterogeneous catalysis, enzyme catalysis, miscellaneous examples.

Unit IV: Elementary Quantum Mechanics

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

Suggested Readings:

1. S Lewis and D Gladstone, Elements of Physical Chemistry, Macmillan.
2. Moudgil, H. K. Textbook of physical chemistry second edition, PHI
3. B S Bahl, G D Tuli&ArunBahl, Guide to Essentials of Physical Chemistry S. Chand Publishing.
4. Alberty&BawendiSilbey, Physical Chemistry 4th Economy Edition, Wiley.
5. Christopher M. A. Brett, Ana Maria Oliveira Brett, Electrochemistry: Principles, Methods, and Applications, Oxford science publications
6. Keith J. Laidler, Chemical Kinetics, 3rd Edition, Prentice Hall
7. Michael J. Pilling and Paul W. Seakins, Reaction Kinetics 2nd Edition, Oxford Science Publications.
8. Puri, Sharma &Pathania,Principles of Physical Chemistry.
9. Ira N Levine, Physical Chemistry 6 edition McGraw-Hill Higher Education.
10. A K Chandra, Introductory Quantum Chemistry, Tata McGraw-Hill Education.
11. Ira N Levine 7 edition Quantum Chemistry Pearson.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Note: The students should be given exposure of any research labs and instrumentation center/ reputed university lab/ industry/ government labs of northern region.

1. Electrochemistry

a. pH metric: Acid-Base Titration.
b. To determine the strength of the given acid conductometrically using standard alkali solution.
c. To determine the solubility and solubility product of a sparingly solubility product of a sparingly soluble electrolyte conductometrically.
d. To determine the ionization constant of a weak acid conductometrically.
e. To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMnO_4$/ $K_2Cr_2O_7$ as titrant and calculate the redox potential of Fe^{2+}/Fe^{3+}system on the hydrogen scale.

2. Chemical Kinetics

a. To study the saponification of ethyl acetate kinetically.
b. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
c. To study the effect of acid strength on the hydrolysis of an ester.
d. To compare the strength of HCI and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.
e. To study kinetically the reaction rate of decomposition of iodide by H_2O_2

GROUP C: CORE COURSE (CC) 3(V)
Semester V
ZOO 301: ZOOLOGY: DEVELOPMENTAL BIOLOGY

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to comprehend the modern concepts of developmental biology to understand the developmental sequences in vertebrates; to compare the developmental of organs and systems.

Course Contents

Unit I: Developmental Biology
- Concepts and scope of developmental biology
- Gametogenesis: i) structure and types of spermatozoa, spermatogenesis.ii) structure and types of eggs, oogenesis
- Fertilization: types, mechanism and significance
- Cleavage: types and patterns of cleavage, fate map.
- Gastrulation: morphogenetic movements and significance.

Unit II: Metamorphosis and Embryogenesis
- Development up to the end of neurulation
- Metamorphosis of tadpole larva, hormonal control of metamorphosis
- Development of frog up to formation of advance tadpole.
- Embryogenesis of chick: development up to neurulation, tabulation.
- Development of chick according to the hours of incubation – 18 hours, 21 hours, 24 hours,33 hours, 48hours, 56hours, 72hours, and 96hours.

- Extra embryonic membranes of chick – development and functions.

Unit III: Parthenogenesis

- Placenta and placentation in mammals.
- Parthenogenesis: natural and artificial
- Regeneration mechanism in animals, steps of limb regeneration in amphibians.
- Stem cells and their significance.

Unit IV: Teratogenesis

- Elementary idea of the following developmental process
  i) Embryonic induction
  ii) Organizer concept
  iii) Differentiation
- Teratogenesis : genetic and environmental teratogenesis
- Ageing and senescence.

Suggested Readings:

1. Development Biology by SFGilbert, 10th , (Sinnauerassciate , 2014)
2. Development Biology by K.V. Sastry&Vinita Shukla – (Rastogi publications 2008)
3. Introduction to Embryology by B.I. Balinskly – (W.B. Saunders, Philadelphia, 1976)
4. Foundations of Embryology by B.M. Paten and B.M. Carison.
5. Foundations of Animal Development by A.F. Hopper and N.H. Hart (Oxford University Press, New York, 1980)
6. Vertebrate Embryology by R.S. McEwen (Oxford &I.B.MPublishing co., New Delhi)
7. Development Biology by J.W. Brook Bank.
8. Patterns and Principles of Animal Development by J.W. Saunders.Jr
9. Embryology by Barth IG (1966) – Holt Rinehart & Winston
10. Embryology by Berril N&Karp G (1960) -Holt Rinehart & Winston
11. Fundamentals of Comparative Embryology of Vertebrates by Huettner AF (1967) – McMillan co.
12. Chordate Embryology by Mohan Arora (1985) – Atma Ram &Sons
13. Laboratory Manual of Vertebrate Embryology by Rugh R-Allied Pacific P.Ltd
14. Chordate Embryology by Verma PS & Agarwal VK –Chand &Co.
15. Modern Development Biology, KCSoni Hindi Edition, College Book Centre, Chaura Rasta Jaipur,
16. KCSoni Hindi Edition, College Book Centre, Chaura Rasta, Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Study of types of sperm smears preparation.
2. Study of different types of eggs (insect, frog, hen)
3. Study of life cycle of *Drosophila*.
4. Study of eggs, cleavage, blastula, gastrula, neurula, tail bud, hatching, mature, tadpole larval metamorphic stages of tadpole / forglet.
5. Study of embryological slides of various stages of frog.
6. Study of embryological slides of various stages of chick.
7. Study of development of chick with the help of charts /CD/s /video/ multimedia etc.
   i) Whole mounts: 18 hrs, 24 hrs, 33 hrs, 48 hrs, 56hrs, 72hrs, and 96 hrs, of incubation period embryos.
   ii) Study of primitive streak stage in living embryo after removal of the blastoderm from the egg or through multimedia film etc.
   iii) Study of the embryo at various stages of incubation in vivo by making a window in the egg shell.
8. Frog embryology – study of spawn, identification of different stages through model / charts / multimedia etc.

GROUP C: CORE COURSE (CC) 1 (V)
Semester V
BOT 301: BOTANY: CELL BIOLOGY AND GENETICS

Time: 3 Hours Max. Marks: 100
Credit- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to;

- Understand the structural complexity of eukoryoticcell.
- Understand the functioning of cellorganelles.
- Understandthe structure, significance of nucleus andchromosomes.
- Review Mendelian inheritance in the light of geneinteractions and gene expression.

Course Contents

Unit I:Cell Biology

- Basic principles of microscopy – Light, fluorescent, phase contrast, UV and electronmicroscope.
- Ultrastructure of prokaryotic and eukaryotic cells.
- Cell-organelles: Ultrastructure and functions of cell wall, plasma membrane, Golgi complex, Endoplasmic reticulum,Mitochondrion.

Unit II: Cell Organisation

- Ultrastructure and functions of chloroplast, ribosome, lysosome andmicrobodies.
- Nucleus – Ultrastructure of eukaryoticnucleus.
- Chromosomes – Brief account of morphology and organization of prokaryotic and eukaryotic chromosome; Nucleosome model, concept of karyotype and ideogram (brief).

Unit III: Cytogenetics

- Chromosomal alterations: (i) Structural variations – Deletion, Duplication, Translocation and Inversion. (ii) Numerical Variations – Aneuploidy andeuploidy.
- Mutations – spontaneous and induced, transposable geneticelements.
- Cell Division: Cell-cycle, events of cell division, karyokinesis, cytokinesis, cell-cycle; Mitosis, Meiosis and theirsignificance.

Unit IV: Genetics

- Mendelism – Review of Mendel's laws of inheritance, solving problems related to Mendel'slaws.
- Inheritance of genes: Incomplete dominance, complementary gene action (flower colour in sweet pea), supplementary gene action (coat colour in mice), epistasis (fruit colour in summer squash), multiple factor inheritance (ear size inmaize). Linkage and crossing over.
- Sex determination in plants.
- Cytoplasmic inheritance: Presence and functioning of mitochondrial and plastid DNA, cytoplasmic male sterility.

Suggested Readings:

1. Snustad D.P. and M.J.Simmons 2000, Principles of Genetics, John Wiley & Sons, Inc. USA.
2. Gupta, P.K.1999, A Textbook of Cell and Molecular Biology, Rastogi

Publications, Meerut.
3. Wolfe,S.L.1993, Molecular and Cell Biology, Wadsworth Publishing Co., California, USA.
4. Harris, N. and K.J.Oparka, 1994, Plant Cell Biology: A Practical Approach, IRL Press, Oxford Univ.Press, Oxford,UK.
5. Singh, S.P. and B.S.Tomar, 2006, Cell Biology, Rastogi Publications,Meerut.
6. Gupta, P.K. 2005, Elements of Genetics, Rastogi Publications,Meerut.
7. Gardner, A.,1990, Principles of Genetics (6th Ed.), John Wiley & Sons Inc.,USA.
8. GuptaP.K.2000,Cytology,GeneticsandEvolution,RastogiPublications,Meerut.
9. Atherly, A.G. J.R.Girton and J.F.MacDonald, 1999, The Science of Genetics, Saunders College Publishing, Fortworth,USA.
10. Russel,P.J. 1998, Genetics, The Benjamin/Cummings Publishing Co. Inc.,USA.
11. Gunning, B.E.S. and M.W.Steer 1999, Plant Cell Biology, Structure and Function, Jones & Bartlett Publishers, Boston,Massachusettes.

PRACTICALS

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Comparative study of cell structure in onion cells, *Hydrilla* and *Chara/ Spirogyra*. Study of cyclosis in *Tradescantia* staminal cells.
- Study of plastids to examine pigment distribution in plants (e.g. *Cassia, Lycopersicon*and*Capsicum*)
- Examination of electron micrographs of virus, bacteria, Cyanobacteria. and eukaryotic cells with special reference toorganelles;
- Study of various stages of mitosis and meiosis by preparing slides of suitable plant materials (onion root tips and onion flowerbuds).
- Working out the laws of inheritance using seeds/beads.

- Working out genetic problems related to Mendelian laws of inheritance and interaction ofgenes.

GROUP C: CORE COURSE (CC) 3(V)
Semester V
MTH 301: MATHEMATICS: REAL ANALYSIS

Time: 3 Hours Max. Marks: 100 Credit- 4
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:
By the end of the semester the students will be able to develop understanding of Differentiability, Riemann integral and real sequences & series.

Course Contents

Unit I: Real Numbers and continuous functions
Real Numbers system: completeness axiom, densities of rational/irrational, properties of real numbers, least upper bound axiom of a function, Basic properties of the limits, Continuous functions and classification of discontinuities, properties of continuous functions: boundedness of a continuous function on a closed interval [a,b], existence of a maximum of a continuous function on [a,b], uniform continuity.

Unit II: Differentiability
Differentiability, chain rule, Mean value theorems and their geometrical interpretations, Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders.

Unit III: Integral Calculus
Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus.

Unit IV: Sequence and Series
Real sequence, Definition, Theorems on limits of sequences, Bounded and Monotonic sequences, Sequential Continuity, Cauchy's convergence criterion, Infinite series of non-negative terms, Comparison tests, Cauchy's integral test, Ratio tests, Raabe'stest, Logarithmic test, De Morgan and Bertrand's tests, Alternating series, Leibnit'z theorem, Absolute and conditional convergence, Uniform convergence of series of function.

Suggested Readings:

1. Mathematical Analysis: S.C. Malik,New Age International, New Delhi, 2004.
2. Real Analysis: T.M. Apostol, Narosa Publishing House, New Delhi 1985.
3. Real Analysis: H.L. Royden, Macmillan, 4th edition 1993.
4. Principles of Mathematical Analysis: W. Rudin, McGraw Hill, 3rd edition 1976.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester V
EPCAA 301: ARTS AND AESTHETIC EDUCATION

Time: 2 Hours | Max. Marks: 50
Credit- 2 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

v***) In examination the material required for the components of Unit 3 and Unit 4 (if any) are arranged by the students at their own.***

Objectives of the Course: On completion of the course the student teacher will be able to:

- Express freely their ideas and emotions about different aspects of life through different art forms.
- Learn to appreciate different art forms and distinguish them.
- Develop an insight towards sensibility and aesthetic appreciation and become more creative and conscious about the good and beautiful in their environment, including classroom, school, home and community through an integrated learning approach.
- Integrate the knowledge of art with daily life through learning with different media and techniques by using creative expression and making objects of common use.
- Make learners conscious of rich cultural heritage of their own region as well as that of the nation.
- Get acquainted with the life and work of artists.

Course Components: This course as part of the eight semesters B.Sc. B. Ed. programme should consist of theory, practical, project work and workshop. Also, the arts need to be applied in day to day life from designing classroom materials to notice board, cultural festivals, theme based celebrations, national days, festivals etc. These

occasions will be a forum for students' activities wherein all the art forms will be integrated.

Unit 1

- Concepts and forms of arts and crafts- an introduction: Meaning of arts and crafts, visual and plastic art forms, performing art forms, and heritage crafts.
- Significance of art in education: Importance of art forms in learning.
- Integrating arts and crafts in school curriculum as a pedagogical support/ resource: education through arts and crafts.

Unit 2

- Different ways/methods to integrate arts in education: during the curriculum transaction.
- NCF-2005 and position paper on Arts on Aesthetics.
- Knowing about local art and craft forms: the diversity of India's arts and crafts and its integration in the curriculum.

Unit 3

- Drawing: - Application of point, line, hatching, shading to create different tones - Textures, patterns, decorative effects - Structures (shapes, forms...) - Illustration - Perspective techniques - Use of various media (pastels, charcoal, ink, pencils...)
- Painting: - Theoretical and practical knowledge of colour theory - Use of basic tools - mix and apply colour (shade, tint, tone, hue) in a transparent and opaque manner, and create flat or textured surfaces with paint
- Printing: - Use of stencils, relief and engraving techniques to print and repeat shapes

Unit 4

- Collage: - Use of prefabricated and self-made materials
- Various media: - some experience of modern media techniques e.g. still and video camera, computer graphics, manipulation of images, animation, performance, installation, light shows
- 3D work: - Use of: - additive method: modelling (solid and hollow forms) - subtractive method: carving (soft materials: plaster, polystyrene...) - constructive method: montage: simple 3D forms (paper, wire, wooden profiles, puppets, props for theatre)

***Workshops:**

A workshop for half a day for one week of working with an artist or a group to learn basics of art or craft forms and understand its pedagogical aspects is required for student teacher in each year. The forms learnt during the course should help student teacher in his/her profession, as a means of exploring different media and creative expression in drawing, painting, rangoli, clay-work/pottery, collage-making, wood-work, toy-making, theatre, puppetry, dance,

music etc. including regional/ folk forms of arts and crafts, which will be helpful in imparting quality education among school children. The focus of the workshops should be on how art forms can be used as tool/ method of teaching-learning.

Modes of Learning Engagement:

- Classroom environment should be interactive and discussions should take place where student teachers can document each other's experiences as an artist and connoisseur both.
- Attending exhibitions and performances, interacting with artists and craft persons, watching and listening art related films, audio and video materials available on different performers, regional/ folk art forms etc. may also be shown from time to time.
- Workshops may be conducted at least once in each year where student teachers can get a first- hand experience of working with artists, handle different materials and media, learn about different aspects of an art form on how it relates to the society and community and can be used as pedagogical tool to transact.

Practicum/ Tutorials:

- Activities related to doing arts, including application of arts in the immediate environment.
- Small activities which enhances the skills including the communication and presentation skills, brings in imagination, creativity and aesthetic sensibility among the student teachers.
- Application of aesthetic and design sensibility in the day to day life, in their profession and environment are some of the practical aspects, which needs to be taken care of. During the celebrations of festivals, functions, special days etc. this should be reflected.

Modes of Internal Assessment:

The engagement of teacher- learners in the above set of experiences should be quantitatively and qualitatively evaluated, based on observations and submissions of projects and assignments that cover: a) submission of work b) participation c) creative potential displayed d) application of aesthetic and design sensibility in campus events or in other course work mentioned in unit 3 and unit 4.

Suggested Readings:

1. Arnold Berleant **(**2012).Aesthetics beyond the Arts. New and Recent Essays.Ashgate Publishing.
2. Goldblatt D. **(**2010).Aesthetics- A Reader in Philosophy of the Arts. New Delhi.Pearson Education (Singapore).
3. Dennis Atkinson D Atkinson **(**2003). Art in Education: Identity and Practice. Springer.
4. Parul Dave- Mukherji **(**2015).Arts and Aesthetics in a Globalizing World. UK. Bloomsbury Publishing.
5. Perry Ellen (2005). The Aesthetics of Emulation in the Visual Arts of Ancient Rome**.** Cambridge University Press.
6. Saxena, S. K. (2010). Aesthetics. Approaches Concepts and Problems. D.K. Printworld (P) Ltd.
7. S. S. Barlingay. (2007).Modern Introduction of Indian Aesthetic Theory. D. K. Printworld.

8. Weitz Morris **(**2005).Philosophy of the Arts: An Introduction to Aesthetics Routledge Chapman & Hall.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSPS 301: PEDAGOGY OF PHYSICAL SCIENCE

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Gain insight about the nature of science and its curriculum.
- Comprehend the approaches and strategies of learning science at secondary level.
- Apply pedagogic aspects in teaching-learning of science effectively by adopting appropriate teaching strategy.
- Discuss a topic in science; construct test items to measure objectives belonging to various cognitive levels.
- Use teaching aids effectively in teaching science.
- Gain the knowledge and comprehend the principles of curriculum and analyse the organization of science content at secondary level.
- Select and use the relevant methods, strategies and approaches in science class and laboratory.
- Develop skills in organizing, using and maintaining the available resources in teaching science.
- Transfer the fundamental experimental skills to the pupils and organize different activities related with science processes/skills to the pupils.

Course Contents

Unit I: Nature of Science and its Curriculum:

Nature of Science: History, Philosophy and nature of science, its role and importance in daily life, Science as interdisciplinary area of learning, development of science and technology, their interdependence and impact on society, development of scientific attitude and values through science education.

Curriculum Development: need and salient features of curriculum,strategy and principles of curriculum construction, trends in science curriculum, development of science curriculum in India, basic criteria of validity of a science curriculum in the light of NCF – 2005, curriculum for the secondary level. Objectives of teachingscience at Upper Primary level and Secondary level.Analysis of syllabus and textbooks of science at Upper Primary and Secondary level.

Unit II: Approaches and Strategies of Learning Science

Lesson Planning: Instructional objectives, identification of teaching points, organising the content, designing learning experiences, Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge.

Scientific Method: Observation, enquiry, hypothesis, experimentation, data collection, generalization.

Unit and Lesson Planning: Using constructivist approach, taking examples from specific contents of science such as electric circuit, magnetic effects of current, physical and chemical changes, animal and plant kingdom.

Strategies of Learning: Inquiry approach, experimentation, problem solving, concept mapping, collaborating learning and experiential learning in science, facilitating learners for self-study in science.

Learning Resources and strengthening Science

Learning Resources: Identification and use of learning resources in science from immediate environment such as natural pH indicators, common salts, fruits, lenses and mirrors, inter-conversion of one form of energy to other, exploring alternative sources of energy, audio-visual materials; multimedia–selection and designing; use of ICT in learning science.

Instructional resources: Multimedia, computer, charts, models, improvised apparatus and their role and functions.

Strengthening of Learning Science: Organisation of practicals in laboratory, use of science kits, investigatory project, field trips, science clubs, science fairs, use of worksheets.

Unit III: Planning and Pedagogic Aspects in Teaching - Learning of Science

Lesson Planning and learning concepts of science such as Newton's laws of motion, universal law of gravitation, heat as energy, temperature, transfer of heat, reflection, refraction and total internal reflection of light.

Mole concept and Avogadro‘s number, structure of atom, periodicity of elements, acid, base & salt and pH scale, carbon and its compounds.

Nutrition in amoeba and. hopper, digestive and respiratory system in animals, control and coordination in animals, reproduction in animals.

Photosynthesis, factors affecting the process of photosynthesis, respiration in plants, transportation in plants, asexual and sexual reproduction, pollination, fertilization and partheno-genesis in plants. Heredity and variations, structure of chromosome, RNA & DNA.

Unit IV: Exploring Learning of Science

Exploring learning of science concepts such as electric circuits, series and parallel combination of circuits, electric current, measurement of current and potential difference, ohm's law, resistance, factors effecting resistance, electrical energy, elementary ideas about A.C. and D.C. motors, characteristics of metals, metallurgical operations-dressing of the ore, calcinations, roasting, smelting and refining, concept of electrode potential and electrochemical series, reactivity of metals and non-metals, extraction of metals like iron, copper and aluminium.

Types and structure of cell, brief account of functions of various cell organelles, cell division, elementary idea of mitosis and meiosis. Structure and function of meristems (apical meristems), permanent tissue (complex, secretory) structure and functions of epithelial, connective, muscular and nervous tissues, feeding mechanism, nutrients, balance diet and nutrition deficiency diseases, communicable and non-communicable diseases.

Evaluation in Science

Modes of evaluation: oral, observation and written, objective and essay type questions, Types of objective test items: short answer type, multiple choice type, fill-in-blank type, true-false, matching type, construction of test items: achievement test, diagnostic test and their construction, Preparation of blue print: taking examples of concepts of science mentioned in unit III and IV, continuous and comprehensive evaluation for overall development of child.

Tools and Techniques of Assessment: learning indicators, performance-based assessment, learners' records of observations, field diary, oral presentation of learner's work, portfolio, assessment of project work, assessment of learning based on content mentioned in unit III and IV.

Modes of Learning Engagement:

Constructivist Approach: Activity based learning experimentation, Interactive learning, Group work, demonstration method, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum:

Activities based on Science syllabus of Classes IX and X:

- Preparation of teaching aids: charts, models, Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/ presentation before the whole group.

- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes).
- Preparation of blue print and construction of an achievement test, its administration on one section of a class and analysis of results.

Practicals:

- Study of laws of reflection and refraction.
- Verification of Ohm's law.
- Demonstration of Magnetic effect of current.
- Determination of given resistance and specific resistance of a material using wheat stone bridge and post office box.
- Preparation of crystals of copper sulphate.
- Study of exothermic and endothermic, combination and decomposition reactions.
- Preparations of gases (H_2, O_2& CO_2) and study of their properties.
- Study nature of soft and hard water from a given water sample and its removal.
- Preparation of blood film/blood group testing.
- Study of diffusion and osmosis.
- Study of evolution of CO_2 and heat in respiration.
- Study of evolution of O_2 in photosynthesis.
- Check adulteration in food items.
- Demonstration of interaction between a magnet and current.
- Examine bacteria from curds and milk under microscope.

Suggested Readings:

1. Lewis, J. 1972 Teaching of School Physics, Penguin Book, UNESCO.
2. Anderson, Hans O and Koutnik, Paul G, 1972.Towards More effective science Instruction in secondary education.The MacMillan Co., New York and Courier MacMillan, London,.
3. Das, RC. 1984 Curriculum and Evaluation.National Council of Educational Research and Training, New Delhi,.
4. Driver, R.The pupil as scientist, Open University Press, Buckingham, 1983.
5. Saxena A.B. 1988. Vigyan Shikshan Ka AyonjanHar Prasad Bhargava & Sons, Agra,
6. Science for Class IX and X, NCERT Publication.
7. National Curriculum Framework 2005, NCERT Publication.2006
8. NCERT (2005) National Curriculum Framework. New Delhi. NCERT
9. Science Teachers and Educators 1985. UNESCO Bangkok
10. NCERT: Teacher Education Curriculum Framework 1978NCERT, New Delhi.
11. Teaching Life Sciences, J.K. Sood, Kohli Publication.
12. Science Teaching In Schools by Du RC (1985) Sterling Publication.
13. Science for Class IX and X, NCERT Publication New Delhi
14. R.C.Sharma Modern Science Teaching, Dhanpat Rai& Sons, Delhi.
15. Teaching Technology for College Teachers, Sterling Publishers. New Delhi

16. Food and Nutrition by E.P.G Arya Book Depot. New Delhi.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester V
CPSPM 301: PEDAGOGY OF MATHEMATICS I

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teachers will be able to:

- Acquire a clear perspective of the nature of mathematics
- Gain insight on the meaning, nature, scope and objective of mathematics education
- Appreciate the changes in curriculum and evolve new approaches to teaching
- Understand the principles, processes relationships and to design appropriate strategies for teaching.
- Design appropriate activities for developing a concept.
- Design mathematics laboratory.
- Develop competencies in designing appropriate diagnostic and remedial tests.
- Construct appropriate assessment tools for evaluating mathematics learning.
- Appreciate the importance of mathematics lab in learning mathematics.
- Develop the competencies in preparation of appropriate teacher aids unit plan lesson plan and test items.
- Construct appropriate assessment tools for evaluating mathematics learning.
- Understand and develop Technology Integrated Mathematics Module (TIMM) using on different subject specific open source software on various concepts of Geometry at secondary stage and
- Understand and develop dynamical digital applets with emphasis on process involved in teaching and learning of mathematics at secondary stage.

- Explain the meaning of evaluation
- Infer the effect of evaluation on students

Course Contents

Unit I: Nature of Mathematics

- Human Needs as a Basis of Growth in Mathematics
- Mathematical Statements are Unambiguous, Truth Criteria, Use of Symbols
- The role of Intution and Logic in Mathematical Thinking
- Axiomatic Framework of Mathematics: Axioms, Postulates, Undefined Terms, Defined Terms, Reasoning, Type of Reasoning, Proofs - Types of Proofs.
- Language of Mathematics

Unit II: Exploring learners

- Cultivating learner's sensitivity like listening, encouraging learner for probing, raising queries, appreciating dialogue among peer group, promoting the student's confidence.
- Exploring ways of Learning Engagements
- Providing opportunities for group activities, Group/individual presentation, Providing opportunity for sharing ideas, Exposing to exemplar constructivist learning situations in mathematics, Visit to district, state and national level science exhibition/ field visit, Audio visual presentation followed by its analysis and discussion, Reflective written assignments, Case studies.

Unit III: Aims and objectives of Mathematics

- Need and Importance of Mathematics in School Curriculum
- Social Aspects
- Mathematical Aspects
- Applications of Mathematics
- Aims, objectives and scope of mathematics at the secondary stage.
- Writing of objectives for each stage (Primary, Secondary and Sr. Secondary).
- Writing objectives in behavioral terms for each stage. Piaget's operational thinking.
- Emphasis on the use of mathematics in daily life situations
- Role of mathematics in other subject areas – Interdisciplinary approaches.
- Developing Skills in learners - Problem solving, Logical thinking, Drawing inferences, Handling abstraction, Visualising etc. in learner's personality
- History of development of mathematics and contributions of Indian mathematicians.

Unit IV: Integration of mathematical content with activities through Mathematics Laboratory

- Designing and setting up models,
- Teaching aids and activities/ laboratory work -using open source software in Mathematics Lesson (Expressive way- to create their own from scratch, as they

express themselves with contentment by means of a more open application or resource)

- Identifying activity in several content areas at secondary level conducive to the comprehension level of learner, Inculcating skills in Designing, Demonstrating, Interpreting and drawing inference of digital applets/concrete models.

Modes of Learning Engagement:

- Providing opportunities for group activities.
- Hands on experimentation within digital environment.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.
- Visit to district, state and national level science exhibition.
- Digital presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.
- Audio visual presentation followed by its analysis and discussion.

Practicum:

- Preparation of lesson plans on different approaches on selected content matter.
- Preparation of teaching aid (software based applets and concerte materials based).
- Designing of mathematics kits (software based and concerte materials based) for secondary classes.
- Identification and analysis of common errors.
- Study of learning difficulties at Secondary level.
- Development of a working model on a topic of Mathematics.
- Critical analysis of CBSE/Any Board Secondary School Syllabus in Mathematics. Development of plan of mathematics resource (concrete and digital) room.
- Preparation and analysis of achievement test.
- Action Research on a Mathematical topic.
- Any innovative activity perform during internship in teaching program

Suggested Readings:

1. Teaching of Mathematics (ES-342), Indira Gandhi National Open University, School of Education, New Delhi
2. Roy Dubisch(1963). The Teaching of Mathematics, John Wiley and Sons INC, New York and London
3. Butler and Wren, (1960). Teaching of Mathematics, Mc-Graw Hill Book Company, INC, New York and London
4. Claude H. Brown, (1953). The Teaching of Secondary Mathematics, Harper & Brothers, Publishers, New York

5. George Polya, 1962 (I), 1965 (II). Mathematical Discovery (Volume I and II), John Wiley & Sons, INC, New York and London
6. C. G. Corle, (1964). Teaching Mathematics in Elementary School, The Ronalal Press Company, New York
7. NCTM, USA, (1999) Activity for Junior High School and Middle School Mathematics, Volume – II, NCTM, USA,
8. J.L. Heilborn, (2000). Geometry - History, Culture and Techniques, Oxford University Press,
9. NCERT (2010) A textbook of Content-cum-Methodology of teaching Mathematics, NCERT, New Delhi.
10. NCERT (2005) Position Paper of NFG on Teaching of Mathematics, NCERT, New Delhi.
11. Johnston-Wilder, S. &Pimm, D. (Eds.) (2004). Teaching Secondary Mathematics with ICT, London: Open Univer- sity Press / McGraw-Hill.
12. Capel, S., Leask, M. & Turner, T. (Eds.) (2009). Learning to Teach Mathematics in Secondary School., NY: Routledge. New York.
13. Law, N., Pelgrum, W.J. &Plomp, J. (Eds.) (2008). Pedagogy And ICT Use In Schools Around The World Findings From The IEA Sites 2006 Study: Springer. New York
14. Glazer, E. M. (2001). Using Internet Primary Sources to Teach Critical Thinking Skills in Mathematics. Santa Bar- bara, CA: Libraries Unlimited Press
15. Prichard, A. (2007). Effective Teaching with Internet Technologies Pedagogy and Practice. Thousand Oaks, CA: Sage Publications.
16. S. K. Mangal, Teaching of Mathematics, Prakash Brothers, Ludhiana.
17. A. B. Bhatnagar, New dimensions in the teaching of Mathematics, Modern Publishers, Meerut.
18. K. S. Sindhu, Teaching of Mathematics, Sterling Publications, New Delhi.
19. UNESCO: Trends in Mathematics Teaching.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSPBS 302: PEDAGOGY OF BIOLOGICAL SCIENCE

Time: 3 Hours Max. Marks: 100 Credit- 4
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teachers will be able to:

- Develop insight on the meaning, nature, and effective use of different activities/experiments/demonstrations/ laboratory experiences for determining aims and strategies of teaching-learning of biological science;
- Prepare and use of lesson plans and unit plans required for instructional purposes;
- Integration with other school subjects and to identify and relate everyday experiences with learning of biological science;
- Explore the curricular processes and skills in science at secondary level and laboratory in teaching–learning;
- Formulate meaningful inquiry episodes, problem-solving situations, investigatory and discovery learning projects based on upper primary, stages during teaching-learning of biological science

Course Contents

Unit I: Aims, Objectives, its Nature and Scope

- Developing scientific attitude and scientific temper : Nurture the natural curiosity, aesthetic senses and creativity in biology,
- Acquire the skills to understand morphology, taxonomy, genetics, cell biology, development biology etc.
- Understanding biology in relation to society and human welfare,
- Imbibe the values of honesty, integrity, cooperation, concern for life and preservation of environment;
- Solving problems of everyday life;
- Know the facts and principles of biology and its applications consistent with the stages of cognitive development of learners;
- Specific objective of different content areas in biology.
- Science as a domain of enquiry, dynamic body of knowledge and as a process of constructing knowledge;
- Biological Science for environment and health, History of biological science, its nature and knowledge of biological science independent of human application;
- Origin of life and evolution, biodiversity, observations and experiments in biological sciences;
- Biological sciences and society.

Unit II: Exploring Biology

- Motivating learner to bring his/her previous knowledge in science/biology gained through classroom/environment/parents and peer group;
- Cultivating in teacher-learner the habit of listening to child;

- Generating discussion, involving learners in teaching-learning process;
- Encouraging learners to raise questions,
- Appreciating dialogue amongst peer groups,
- Encouraging learners to collect materials from local resources and to develop/fabricate suitable activities in biological science (individual or group work);
- Understanding the role of learners in negotiating and mediating learning in biology.

Unit III: School Science Curriculum (Biological Science)

- Trends in Science curriculum; Consideration in developing learner- centred curriculum in biology
- Concept of curriculum, historical background of Biology curriculum and its studies. Biological sciences curriculum study project.
- Principles of curriculum construction, curriculum development process, techniques of structuring and restructuring of curriculum, trends in curriculum development in Biology, analysis of existing Biology syllabi and study of recent trends/innovations in biological sciences.
- Pedagogical analysis of – different types of natural resources; food resources and enriched food habits; diversity in plants and animals; hierarchical organization of life.

Unit IV: Approaches and Strategies of Learning Biological Science

- Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge, scientific method - observation, enquiry, hypothesis, experimentation, data collection, generalization (teacher- educator will illustrate taking examples from different stage-specific content areas keeping in mind the variation, e.g. structure and function, interaction between living and non-living, biodiversity etc.).
- Communication in biological sciences;
- Problem solving, investigatory approach, concept mapping, collaborative learning, and experiential learning in biological science (teacher-learner will design learning experiences using each of these approaches);
- Facilitating learners for self- study
- Lesson plan format for learning objectives, preparation and use of teaching aids, time management, recapitulation and evaluation strategies for learners and presentation of lesson plan in biological sciences in class-room transaction.

Modes of Learning Engagement:

Constructivist approach, Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Language across the Curriculum Activities: As an integral part of teaching-learning process, relevant activities should be carried out to enhance and promote language skills (LSRW) and proficiency based on the rationale of Language Across Curriculum. The activities in this regard are language centered and, therefore, the focus of learning and teaching activities should be on language skills not necessarily on the content. The activities in this regard may be designed/improvised according to the context. Some of the exemplar activities may include:

- Presentation (Oral and Written) based on themes from the content area
- Debate on themes from the content area
- Panel discussion/Seminar/ discussion etc.
- Group discussion/group work
- Question-answer sessions
- Role play/dramatization
- Extempore speech/Elocution
- Organization of reading/reflection activities beyond the textbooks

Practicum:

Activities based on Science syllabus at secondary level.

- Preparation of teaching aids: charts, models, Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/ presentation before the whole group.

- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes)
- Construction of an achievement test, its administration on one section of a class and analysis of results.
- Tools and Technique in Biological Science
- Perform experiments to detect presents of carbohydrates, lipids and proteins in food by qualitative test
- Different types of Microscopes and their principle
- Experiments on Diffusion and osmosis
- Evolution of CO_2 and heat in respiration
- Evolution of O_2 in photosynthesis
- Observation of stages of mitosis and meiosis/animal tissues.

Suggested Readings:

1. NCERT. (2005) National Curriculum Framework. New Delhi. NCERT.
2. NCERT. (2005) Position Paper of NFG on Teaching of Science. New Delhi. NCERT.
3. NCERT. (2005) Position Paper of NFG on Habitat and Learning. New Delhi. NCERT.
4. Vaidya, N. (2004) Science Teaching for 21st Century, Deep & Deep Publications.(1999). Dat Poly, Encyclopedia of Teaching Science.New Delhi. Sarup & Sons.
5. Sutton, CR and Hayson J.H. (1974). The Art of the Science Teacher. McGraw Hill Book Company Ltd.
6. Their, DH. (1973) Teaching Elementary School Science.A Laboratory Approach, Sterling Publication Pvt. Ltd.
7. Science Teacher. (Peer reviewed journal for science teachers).
8. Journal of Research in Science Teaching. (Wiley-Blackwell).
9. Ameeta, P. (2008) Methods of Teaching Biological Science.Neelkamal Publications Pvt. Ltd. Educational Publishers.
10. Sharma, R.C. (1987) Modern Science Teaching. New Delhi. Dhanpatarai& Sons.

Web Sites

1. http:/www.tc.columbia.edu/mst/science.ed/courses.asp.
2. http:/www.edu.uwo.ca

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester V
CPSLA 301: LEARNING ASSESSMENT

Time: 3 Hours Max. Marks: 100 Credit- 4
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Gain a critical understanding of issues in assessment and evaluation
- Become cognizant of key concepts such as test, measurement, examination, formative and summative assessment, and evaluation
- Understand different kinds and forms of assessment that aid student learning
- Use a wide range of assessment tools, learn to select and construct them appropriately
- Evolve realistic, comprehensive and dynamic assessment procedures that are able to keep the whole student in view
- Understand the use of action research in solving problems

Course Contents

Unit I: Overview of Assessment and Evaluation

- Perspective on assessment and evaluation of learning in a constructivist paradigm
- Distinction between 'assessment of learning' and 'assessment for learning'
- Purposes of assessment in a 'constructivist' paradigm:
  - engage with learners' minds in order to further learning in various dimensions
  - promote development in cognitive, social and emotional aspects
- Meaning and Objectives of :
  - test, measurement, examination, and evaluation
  - formative and summative evaluation
  - continuous and comprehensive evaluation
  - grading and its types

Unit II: School- Based Assessment and Evaluation: Policies, Practices and Possibilities

- Impact of examination-driven schooling
- On Pedagogy: content-confined, information focused testing; memory- and activity centric teaching and testing
- De-linking school-based assessment from examinations: some possibilities and alternative practices
  Contexts of assessment: subject- related and person- related

Unit III: Efforts towards Examination Reforms

- Efforts towards examination reforms in India based on**:** NPE,1986; POA, 1992; NCF, 2000 and 2005 and National Focus Group Position Paper on Examination Reforms (Discussion should cover analysis of recommendations, implementations and the emerging concerns)

- Management of Examination in Schools
- Role of ICT in examination
- Action Research in improving classroom practices, concept, need and steps of action research, action research as an approach to improve class and school practices. Development of an Action Research Plan.

Unit IV: Teacher competencies in evolving appropriate assessment tools, Data Analysis, Feedback and Reporting

- Teacher competencies
- Visualizing appropriate assessment tools for specific contexts, content, and student
- Achievement test: meaning, need, steps and blue print.
- Evolving suitable criteria for assessment
- Organizing and planning for student portfolios and developing rubrics for portfolio assessment
- Statistical tools- percentage, graphical representation, frequency distribution, central tendency, variation, normal distribution
- Feedback as an essential component of formative assessment
  - use of assessment for feedback; for taking pedagogic decisions
  - Types of teacher feedback (written comments, oral); peer feedback
  - Place of marks, grades and qualitative descriptions
- Developing and maintaining a comprehensive learner profile
- Purposes of reporting: to communicate
  - progress and profile of learner
  - basis for further pedagogic decisions
- Reporting a consolidated learner profile

Modes of Learning Engagement: Some suggested modes of learning engagement are:

- Lecture-cum-discussion
- Readings and presentations
- Group discussions
- Analysis of a range of assessment tools
- Developing worksheets and other tasks for learning and assessment in one's specific subject area
- Maintaining a portfolio related to the course-work and devising rubrics for assessment
- Constructing a test or an examination paper in one's subject area; critical review of these
- Observing, interviewing and writing comprehensive profile of a student
- Simulated exercises in 'marking' and giving feedback to fellow student-teachers (on a written task); critical review of feedback
- Simulated exercise in marking an examination paper in one's subject area; critical review of marking

Practicum:

- Compare different forms of assessment.
- Presentation of different kinds of grading with advantages and disadvantages.
- Focus group discussion on examination driven teaching and learning.
- Critical evaluation of examination reforms suggested and implemented based on NPE-1986; POA-1992; NCF-2000; and NCF-2005.
- Developing Action Research proposal following the established steps of Action Research.
- Organizing student Portfolio assessment and developing rubrics for portfolio assessment.
- Developing Achievement Test and practicing method of finalizing the test.

Suggested Readings:

1. Black, P. Harrison. C., Lee, C., Marshall, B, & William, D. (2004). Working inside the black box. Assessment for learning in the classroom. Phi Delta Kappan, 86 (1), 8- 21.
2. Bransford, J. Brown, A.L., & Cocking, R.R. (Eds.). (2000). How people learn: Brain, mind, experience, and school. Washington. DC. National Academy Press.

3. Carr, J.F. & Harris, D.E. (2001). Succeeding with standards. Linking curriculum, assessment, and action planning. Alexandria, VA: Association for Supervision and Curriculum Development.
4. Danielson, C. (2002). Enhancing student achievement: A framework for school improvement. Alexandria, VA: Association for Supervision and Curriculum Development.
5. Gentile, J.R. &Lalley, J.P. (2003). Standards and mastery learning: Aligning teaching and assessment so all children can learn. Thousand Oaks. CA. Corwin.
6. Guskey, T.R., & Bailey, J.M. (2001). Developing grading and reporting systems for student learning. Thousand Oaks. CA. Corwin.
7. NCERT (1985). Curriculum and Evaluation. New Delhi. NCERT.
8. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
9. NCERT (2005). National Focus Group Position Paper on Examination Reforms. New Delhi. NCERT.
10. Norris N. (1990). Understanding Educational Evaluation. Kogan Page Ltd.
11. Newman, F.M. (1996). Authentic achievement: Restructuring schools for intellectual quality. San Francisco. CA. Jossey-Bass.
12. Nitko, A.J. (2001). Educational assessment of students (3rd ed.). Upper Saddle River. NJ. Prentice Hall.
13. Singh H.S. (1974) Modern Educational Testing. New Delhi. Sterling Publication.
14. Thorndike R.L. and Hagen. (1977). Measurement and Evaluation in Psychology and Education.

Semester VI
B. Sc. B. Ed. (CBCS) Semester- VI
GROUP C: CORE COURSE (CC)
Semester VI
PHY 302: PHYSICS SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the basic concepts of solid state physics and electronics.
- Understand the thermal, electrical and magnetic properties of solids.
- Apply the concepts in understanding the working of some electronics devices.
- Solve the problems related to solid state physics and electronics.
- Establish the link between theory and experiments.

Course Contents

Unit I: SolidState Physics

Overview: Crystalline and glassy forms, liquid crystals, glass transition.
Structure: Crystal structure, periodicity, lattices and bases, fundamental translation vectors, unit cell, Wigner-seitz cell, allowed rotations, lattice types, lattice planes, common crystal structures, Laue's theory of X-ray diffraction, Bragg's law, Laue patterns.
Bonding: Potential between a pair of atoms, Lennard-Jones potential, concept of cohesive energy, covalent, Vander Walls', ionic, and metallic crystals.
Magnetism: Atomic magnetic moment, magnetic susceptibility, Dia-, Para- and Ferro-magnetism, Ferromagnetic domains, hysteresis.

Unit II:Thermal properties and band structure

Thermal properties: lattice vibrations, simple harmonic oscillator, second order expansion of Lennard-Jones potential about the minimum, vibrations of one dimensional monatomic chain under harmonic and nearest neighbor interaction approximation, concept of phonons, Debye model; lattice specific heat, low temperature limit.
Band structure: Electrons in periodic potential, nearly free electron model (qualitative), energy bands, energy gap, metals, insulators, semiconductors.

Motion of electrons: Free electrons, conduction electrons, electron collisions, mean free path, conductivity and Ohm's law, Density of states, Fermi energy, Fermi velocity, Fermi-Dirac distribution.

Unit III: Semiconductors

Intrinsic semiconductors, electrons and holes, Fermi level, Temperature dependence of electron and hole concentrations, Doping, impurity states, n and p type semiconductors, conductivity, mobility, Hall effect, Hall coefficient.

Semiconductor devices: metal-semiconductor junction, p-n junction, majority and minority carriers, diode, Zener and tunnel diodes, light emitting diode, transistor, solar cell.

Unit IV:Electronics

Power supply: Diode as a circuit element, load line concept, rectification, ripple factor, Zener diode, voltage stabilization, IC voltage regulation, characteristics of a transistor in CB, CE and CC mode, graphical analysis of the CE configuration, low frequency equivalent circuits, h-parameters, bias stability, thermal runaway.

Field effect transistors:I-V curves of JFET, biasing of JFET, operation of JFET, source follower, depletion and enhancement mode, MOSFET, biasing of MOSFET, FET as variable voltage resistor, digital MOSFET circuits, Tunnel diode, concept of negative resistance, characteristics and working of tunnel diode, UJT- its construction and working, UJT as relaxation oscillator.

Small signal amplifiers: General principles of operation, classification, distortion, RC coupled amplifier, gain, frequency response, input and output impedance, multistage amplifiers, transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common-source and common-drain amplifier, Noise in electronic circuits.

Suggested Readings:

1. C.Kittel, Introduction to Solid State Physics, V Edition (John Wiley and Sons, New York, 1976)
2. A.J. Dekker, Solid State Physics, (Macmillan & Co, 1967)
3. S Blackmore, Solid state Physics, II Edition (Cambridge University press, Cambridge)
4. N W Ascroft and N D Mermin, Solid State Physics (Holt, Rinehart and Winston, New York, 1976)
5. R. J. Singh, Solid State Physics (Pearson, 2012)
6. J. P. Srivastava, Elements of Solid State Physics (PHI, 2006)
7. B G Streetman,Solid State Electronic devices, II Edition (Prentice-Hall of India, New Delhi, 1986)
8. W D Stanley,Electronic Devices, Circuits and Applications, (Prentice-Hall, New Jersey, USA, 1988)
9. J D Ryder,Electronics Fundamentals and Applications, II Edition (Prentice-Hall of India, New Delhi, 1986)
10. J Millman and A Grabel; Microelectronics, International Edition (McGraw-Hill Book Company, New York, 1988).
11. B L Theraja, Basic Electronics (S. Chand Publishing, 2005)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To trace an output waveform of RC phase-shift oscillator and determine its frequency for different values of capacitance used.
2. To study the characteristics of field effect transistor (FET) and find out r_p, g_m, and μ.
3. To study diode rectifier and effect of load resistance on ripple factor for L and π filters in full wave rectifier and bridge rectifier.
4. To study the unijuction transistor (UJT) and plot V-I characteristic of a given transistor.
5. To measure the hybrid parameters h_{ie}, h_{re}, h_{fe}, and h_{oe} of a given transistor.
6. To study the performance of an electronically regulated power supply in terms of its regulation characteristics.
7. To study the zener diode in terms of voltage regulation.
8. To study the temperature dependence of resistance of semi-conducting material by four probe method.
9. To study the Hall Effect and calculate Hall coefficient and the carrier concentration.
10. Determine the magnetic susceptibility of a given material and study its field dependence.

GROUP C: CORE COURSE (CC)
Semester VI
CHM 302: CHEMISTRY: ORGANIC CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- Students will gain an understanding of the fundamental electronic structure and bonding in carbonyl compounds, substituent effects on pKa (in the case of carboxylic acids), the reactivity of carbonyl compounds with both hard and soft nucleophiles (carboxylic acids, aldehydes and ketones), the ability of synthetic organic chemistry to prepare specific molecular targets in a selective manner through a series of simple bond-forming processes.
- To know about important functional group transformations and bond-forming methods in organic synthesis
- To introduce students to the chemistry of carbonyl compounds including structure and reactivity, 1,2- and 1,4-addition and enols and enolates. Chemistry of Nitrogen Compounds, Synthetic transformation of aryl diazonium salts, azo coupling. Chemistry of Heterocyclic compounds.

Course Contents

Unit I: Chemistry of Hydroxy Compounds and ether

Chemistry of hydroxy compounds

- **Alcohols:**classification and nomenclature.Monohydric alcohols-nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.
  Dihydric alcohols-nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.
  Trihydric alcohols- nomenclature and methods of formation, chemical reactions of glycerol.
- **Phenols**: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanism of Fries rearrangement, Claisen

rearrangement, Gatterman synthesis, Hauben-Hooesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

- **Ethers and Epoxides:** Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions – cleavage and auto oxidation, Ziesel's method.Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and Organolithium reagents with epoxides.

UnitII: Chemistry of Carbonyl Compounds including Enolates

- **Aldehydes and Ketones**: Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acid. Physical properties,
  Mechanism of nucleophilic additions to carbonyl group with particular emphasis on Benzoin, Aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Witting reaction, Mannich reaction.
  Use of acetals as protecting group, Oxidation of aldehydes, Baeyer-villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen, Wolff-kishner, $LiAlH_4$ and $NaBH_4$ reductions, Halogenation of enolizable ketones.
- Introduction to α, β unsaturated aldehydes and ketones.
- **Organic Synthesis via Enolates**: Acidity of α-hydrogens. Synthesis of ethyl acetoacetate by Claisen condensation and Synthesis of diethylmalonate. Keto-enoltautomerism in ethyl acetoacetate. Synthetic applications of ethyl acetoacetate and diethylmalonate. Alkylation of 1,3-dithianes.

UnitIII: Chemistry of Nitrogen Compounds

- **Nitroalkanes and Nitroarenes**: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes.Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media.Picric acid.Halonitroarenes: Reactivity.
- **Amines**: Structure and nomenclature of amines, physical properties. Stereochemistry of amines, Separation of a mixture of primary, secondary and tertiary amines, Structural features effecting basicity of amines, Amines salts as phase-transfer catalysts, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction, Hofmann bromamide reaction. Reactions of amines: Electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformation of aryl diazonium salts, azo coupling.

Unit IV: Chemistry of Heterocyclic compounds

- **Heterocyclic Chemistry:** Introduction: Molecular orbital picture and aromatic characteristic of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution.Mechanism of nucleophilic substitution reactions in pyridine derivatives.Comparison of basicity of pyridine, piperidine and pyrrole.

Suggested Readings:

1. Bruckner, R. Advanced organic chemistry: Reaction Mechanisms Academic Press
2. Lowry, Thomas H. Mechanism and theory in organic chemistry Addison-Wesley
3. Kalsi P S Reaction Mechanism 6th Edition
4. Singh Mukherjee, Reaction Mechanism
5. Francis A Carey Organic Chemistry fourth edition.

6. Bahl, Arun A textbook of organic chemistry S. Chand and Co. Ltd.
7. Gupta R, Kumar M, Gupta V, Heterocyclic Chemistry, Springer
8. Francis A. Carey, Richard A. Sundberg, Advanced Organic Chemistry
9. David E. Lewis Advance Organic Chemistry Oxford University Press.
10. Bernard Miler Advanced Organic Chemistry: Reactions And Mechanism Prentice Hall College
11. David R. Klein, Organic Chemistry 4th Edition John Wiley & Sons.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. Synthesis of Organic Compounds

- **a.** Acetylating of salicylic acid, aniline, glucose and hydroquinone.
- **b.** Benzoylation of aniline and phenol.
- **c.** Aliphatic electrophilic substitution: Preparation of iodoform from ethanol/ acetone.
- **d.** Aromatic electrophilic substitution:
  - **i.** Nitration: Preparation of m-dinitrobenzene and p-nitroacetanilide
  - **ii.** Halogenation: Preparation of *p*-bromoacetanilide and 2,4,6-tribromophenol
- **e.** Diazotization/coupling: Preparation of methyl orange and methyl red
- **f.** Oxidation: Preparation of benzoic acid from toluene
- **g.** Reduction: Preparation of aniline from nitrobenzene and *m*-nitroaniline from *m*-dinitrobenzene.

GROUP C: CORE COURSE (CC)
Semester VI
ZOO 302: ZOOLOGY: ENVIRONMENTAL STUDIES, ETHOLOGY AND ECONOMIC ZOOLOGY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to understand the energy sources, flow of energy and conservation; to understand the recycling of minerals and nutrients in ecosystem; to understand the dynamics of population; to understand causes of pollution; to comprehend origin of life, animal behaviour and economic importance of animals with wild life protection.

Course Contents

Unit I: Ecosystem

- Environment: - Atmosphere, lithosphere and hydrosphere as habitats and ecological factors.
- Abiotic factors: Light and Temperature as ecological factors, limiting factors, Liebig's law of minimum and Shelford Law of tolerance
- Ecosystem: Dynamics of Ecosystem, Ecological Pyramids, Energy flow, Food chain and Food web,Productivity.
- Biochemical cycle: water, nitrogen and suphur cycles recycling of organic nutrients.
- Population: Definition and attributes–density, natality, vital index, age distribution, growth patterns, migration, dispersal, dispersions, carrying capacity.
- Biotic Community: Definition, Structure, Ecotone, edge effects, habitat and different types of niche, Ecological succession, Infra and Interspecific interaction. All types of animal association.
- Elementary statistics: Central tendency and Correlation Coefficient.

Unit II: pollution and its effect

- Pollution Types and Causes
- Air pollution: sources, acid rain, photochemical smog, prevention and control
- Water pollution, sources, prevention and control, eutrophication.
- Noise pollution: sources, prevention and control.
- Soil pollution: sources, prevention and control
- Thermal pollution.
- Green house effect and global warming

- Depletion of ozone layer.
- Natural Disaster: Earthquake, Tsunami
- Natural Resources and conservation – Non Renewable and Renewable
- Bioaccumulation and Biomagnifications.

Unit III: Ethology

- Introduction and history of Ethology.
- Behaviour: Innate (tropism, Texas, reference instincts) and Acquired (learning and reasoning)
- Motion: Classification of directional movements:- kinesis, tropism & taxes
- Communication: Definition ,types of signal (touch, sound, Chemical, and visual),
- Societies: characteristics and advantage with reference to honey bee, and monkey

Unit IV: Economic Importance and Wild life

- Economic Importance of Invertebrates (Apiculture, Aquaculture, Sericulture).
- Insects as pests and their management
- Economic Importance of vertebrates (Fish culture and Poultry culture.)
- Wild life of India, causes of depletion of wild life, modes of wild life conservation, Red data book. Environmental legislations (Wildlife Protection Act, Environment act. Biodiversity act). Wild life scenario in and around central foot hills of the Aravalli and the Thar desert.

Suggested Readings:

1. Environmental Biology, M Calver, Cambridge Pub 2009.
2. Fundamentals of Ecology of E.P. Odum – W.B. Saunders, Philadelphia)
3. Fundamentals of Ecology of Gene P Odum &Gray W Barrett 5th ed., Cengage Learning 2011
4. Environmental studies by S.V.S Rana – Rastogi Publication, 2008
5. Animal Ecology by S.P. Singh 6th Revised Edition – Rastogi Publications,2008
6. Basic Ecology by E.P. Odum (Holt, Rinehart & Winston , New York)
7. Ecology by S.K. Charles(Prentice Hall of India, New Delhi)
8. Ecology : Principle and Applications by Chapman E (1988) – Cambridge University Press
9. Modern concept of ecology by Kumar HD (1986) Vikas Publication House.
10. Ecology and Environment by Sharma PD (1991) Rastogi Publication
11. Environmental Biology by Trievedi PR &Gurudeep Raj (1992)
12. Animal Ecology and Biostatistics. KC Soni Hindi Edition college book centre, Chaura Rasta, Jaipur
13. Mammalian Endrocrinology and Animal Behavior, VS Pawar, Hindi Edition, College book centre, Chaura Rasta

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Simulation of an ecosystem in the laboratory.
2. Determination of oxygen content of water sample by Winkler's method.
3. Determination of chloride content of water sample.
4. Determination of dissolved CO_2 content of water.
5. Determination of Alkalinity in the pond water.
6. Determination of total solid content of water.
7. Determination of pH of soil sample.
8. Determination of water content in a given simple of soil.
9. Demonstration of Phototactic responses by *Tribolium* / House fly / *Drosophila*.
10. Demonstration of Geotactic responses by Earthworm.
11. Exercise on mean, median, mode and test of significance- Correlation Coefficient.

GROUP C: CORE COURSE (CC)
Semester VI
BOT 302: BOTANY: PLANT PHYSIOLOGY AND METABOLISM

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to;

- Understandthe sub-cellular physiological phenomena inplants;
- Understand the water relations inplants;
- Understand the functioning of plant from the physiological point ofview;
- Understand about enzymes and their mechanism of action
- Understand various facets of growth, differentiation and physiology of flowering in angiosperms.

Course Contents

Unit I: Movement of water molecules in plants

- Importance of water to plant life, properties ofwater.
- Review of diffusion, osmosis and imbibition – definitions, concept of water potential, osmotic potential, pressure potential, solute potential.
- Absorption of water: Root as an absorbing organ, mechanism and pathways of water movement from root hair to root xylem - symplast, apoplast and trans-membrane pathways.
- Ascent of sap: Vertical pathway of water in plants, structural properties of xylem, root pressure theory, cohesion – tension hypothesis.

Unit II: Respiration in plants

- Transpiration: Definition, types, mechanism of stomatal opening and closing (role of K^+ and Abscisic acid), anti-transpirants, factors and significance of transpiration, guttation.
- Cellular respiration: Introduction, respiratory quotient, aerobic and anaerobic respiration, structure of mitochondrion, glycolysis, synthesis of acetyl CoA, Krebs cycle, oxidative phosphorylation, electron carrier complexes, chemiosmotic hypothesis, proton pump theory, synthesis of ATP, pentose phosphate pathway.

Unit III: Manufacture &transport of organic substances

- Photosynthesis: Introduction, brief history, ultrastructure of chloroplast,

photosynthetic pigments, absorption and action spectra, photochemical (light) reaction, photophosphorylation, Z-scheme, Calvin cycle, C4 pathway, CAM pathway, photorespiration, factors and significance of photosynthesis.

- Transport of Organic Substances: Ultrastructure and functions of phloem, (sieve tube), mechanism of phloem transport, source – sink relationship, theories and factors affecting photosynthesis.
- Mineral Nutrition: Major and micro-nutrients, absorption of mineral salts, mechanism and theories of mineral uptake; passive absorption – mass flow, Donnan equilibrium: active absorption – carrier concept, cytochrome pumphypothesis.Role of N, P, K, Ca, Mg, Fe, N and Zn in plant metabolism, Mineral deficiency symptoms.

Unit IV: Plant Hormones

- Growth and Development: Definitions, phases of growth and development, photomorphogenesis, brief account of phytochromes – discovery, physiological role and mechanism of action.
- Plant growth Regulators: General account, discovery, chemical nature, physiological effects and applications of auxins, cytokinins, gibberellins, ethylene and abscisic acid. Brief account of plantmovements.
- Physiology of flowering: (i) Brief account of photoperiodism, short day, long day and day-neutral plants, night interruption phenomenon, florigen concept, role of phytochromes (ii) Brief account ofvernalization.

Suggested Readings:

1. Taiz, L. and E. Zeiger, 1998, Plant Physiology (2nd Ed.), Sinauer Associates Inc.USA.
2. Salisbury, F.B. and C.W.Ross, 1992, Plant Physiology (4th Ed.) Wadsworth Publishing Co.USA.
3. Leo, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons,England.
4. Hopkins, W.J.1995, Introduction to Plant Physiology, John Wiley and Sons, Inc., New York.
5. Lehninger A.B.,1982, Principles of Biochemistry, CBS Publishers and Distributors, NewDelhi.
6. John, J.L., 1994, Fundamentals of Biochemistry, Sultanchand& Co., New Delhi.
7. Srivastava, H.S., 2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications,Meerut.
8. Srivastava H.S. and N Shankar, 2006, Plant Physiology and Biochemistry, Rastogi Publications,Meerut.
9. Salisbury F.B. and Ross C.W. 2005. Plant Physiology (4th Ed.) CBS Publishers & Distributors N. Delhi.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- To demonstrate osmosis using egg membrane, onion / tomato peels, potato osmoscope.
- To study the effect of temperature and alcohol on the permeability of membranes.
- To demonstrate plasmolysis.
- To compare the water holding capacity of soils (clay, peat and sand).
- To demonstrate transpiration pull.
- To compare the rates of transpiration in different environmental conditions.
- To demonstrate the evolution of oxygen during photosynthesis.
- To compare the rates of photosynthesis under different environmental conditions.
- To demonstrate the necessity of light, CO_2 and chlorophyll for photosynthesis.
- Separation of photosynthetic pigments by paper chromatography.
- Demonstration of aerobic respiration.
- Demonstration of anaerobic respiration.
- To demonstrate the liberation of CO_2 during aerobic respiration.

GROUP C: CORE COURSE (CC)
Semester VI
MTH 302: MATHEMATICS: COMPLEX ANALYSIS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objective:
To develop the understanding and application of concepts of complex variables in problem solving situations.

Course Contents

Unit I: Complex Function
Complex numbers, function of a complex variable, limits, Cauchy-Riemann equations (Cartesian & polar forms), continuity, differentiability of a function, Analytic functions, Harmonic functions, Construction of an analytic function.

Unit II: Complex integration
Complex integration, Complex line integrals, Cauchy's integral theorem, Morera's theorem, Indefinite integral, Fundamental theorem of Integral calculus, Derivative of an analytic function, Liouville's theorem, Poisson's integral formula.

Unit III: Series And Analytic Functions
Taylor's &Laurents series, Maximum modulus principle, Schwarz's Lemma, Singularities, Zeros of an analytic function, branchpoint, Meromorphic functions and Entire functions, Reimann's theorem, Casorati-Wierstrass theorem.

Unit IV: Theorems
Residue theorem, residue at a pole, residue at infinity, computation of residue, Rouche's theorem, fundamental theorem of algebra, Mittag-leffer expansion theorem, evaluation of real definite integrals by contour integration, Conformal mapping, Bilinear transformation and its properties.

Suggested Readings:
1. Complex Analysis: L. Alhfors (1979) McGraw Hill
2. Functions of One Complex Variable I: J.B. Conway (1978) GTM Springer
3. Complex Analysis (Princeton Lectures in Analysis): E.M. Stein, R. Shakarchi (2003) Princeton University Press
4. Complex Analysis: G. N. Purohit and S. P. Goyal, JPH, 2005.

5. Complex Analysis: A. R. Vasishtha, Krishna Prakashan Media (P) Ltd., Meeruth, 11th ed, 2010.
6. Real and Complex Analysis: Walter Rudin, Mc-Graw Hill, New Delhi, 2006.
7. Functions of a Complex Variable:J.N. Sharma, Krishna Prakashan, Meerut, 1998.
8. Function Theory of One Complex Variable: R.E. Greene and S.G. Krantz (2006) AMS.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPS 302: PHYSICAL SCIENCE: PEDAGOGY OF PHYSICAL SCIENCE

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course, the student teacher will be able to:

- Gain insight about the nature of science and its curriculum.
- Comprehend the approaches and strategies of learning physical science at secondary level.
- Apply pedagogic aspects in teaching-learning of physical science effectively by adopting appropriate teaching strategy.
- Discuss a topic in Science, construct test items to measure objectives belonging to various cognitive levels.
- Use teaching aids effectively in teaching science.
- Gain insight the salient features of curriculum,strategy and principles of curriculum and science curriculum for the secondary level.
- Comprehend the objectives of teaching science at secondary level.
- Apply the principles of learning processes in the teaching of science.
- Teach a topic in science effectively by adopting appropriate teaching strategy.
- Construct test items to measure objectives belonging to various cognitive levels.
- Use effectively the teaching aids in teaching science.

Course Contents

Unit I: Nature of science and its Curriculum:

Nature of Science: History, Philosophy and nature of science, its role and importance in daily life, Science as interdisciplinary area of learning, development of science and technology, their interdependence and impact on society.

Curriculum Development: need and salient features of curriculum, strategy and principles of curriculum construction, trends in science curriculum, development of science curriculum in India, basic criteria of validity of a science curriculum in the light of NCF – 2005, curriculum for the secondary level. Objectives of teaching science at upper primary level and secondary level.Analysis of syllabus and textbooks of science at upper primary and secondary level.

Unit II: Approaches and Strategies of Learning Physical Science

Lesson Planning: Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge, scientific method: observation, enquiry, hypothesis, experimentation, data collection, generalization, unit and lesson planning: using constructivist approach taking examples from specific contents of science such as electric circuit, magnetic effects of current, physical and chemical changes.

Strategies of Learning: inquiry approach, experimentation, problem solving, concept mapping, collaborating learning and experiential learning in science, Facilitating learners for self-study in science.

Learning Resources: identification and use of learning resources in science from immediate environment such as natural pH indicators, common salts, fruits, lenses and mirrors, inter-conversion of one form of energy to other, exploring alternative sources of energy, improvisation of apparatus, audio-visual materials; multimedia–selection and designing; use of ICT in learning science.

Strengthening of Learning Science: organisation of practicals in laboratory, use of science kits, investigatory project, field trips, science clubs, science fairs, relationship between science and other subjects, scientific attitude, development of values through science education, concept mapping and its use, co-operative learning.

Unit III: Pedagogic Aspects in Teaching - Learning of Physical Science

Pedagogic aspects in teaching-learning of science concepts such asnature of matter: classification of matter based on chemical constitution elements, compounds and mixtures, types of mixtures- homogenous and heterogeneous solution, atoms and molecules, atomic theory of matter, atomic and molecular masses, concept of mole, chemical reactions, types of chemical reactions: combination, decomposition displacement reactions, electronic concept of oxidation reduction, oxidation number of redox reactions, elementary idea of electro chemical cell and dry cell.

Planning and Pedagogic Aspects for Teaching - Learning of Physical Science

Planning and pedagogic aspects– lesson planning and learning of scienceconcepts such as Charge, electrostatic force, quantization of charge, capacitance, potential and potential difference, Ohm's law, series and parallel connections of resistances and capacitances, electric power, magnetic effect, heating effect of current, Faraday's law of induction, Lenz Law, motor and generators, oscillations and waves, periodic and non-periodic motion, sound as wave motion, longitudinal and transverse waves.

Unit IV: Exploration of learning of Physical Science

Exploration of learning of scienceconcepts such asdisplacement, motion and its types, speed, velocity and acceleration, angular velocity and acceleration, force: magnitude and direction, addition and subtraction, resultant, balanced and unbalanced force, momentum, work: work done by force, dependence of work on relative orientation of force and displacement, energy (kinetic and potential) work - energy equivalence, power, conversion of K.E. into P.E. and vice-versa, law of conservation of energy and momentum, gravitation: Newton's laws of gravitation, acceleration due to gravity, factors affecting 'g'. Chemical reactions, type of chemical reactions-combination, decomposition, displacement reactions, endothermic and exothermic reactions, concept of oxidation, reduction, redox reactions, rate of reaction, factors affecting the rate like concentration, temperature, pressure and catalyst.

Evaluation in Science

Concept of CCE, modes of evaluation: oral, observation and written, objective and essay type questions, types of objective test items: short answer type, multiple choice type, fill-in-blank type, true-false, matching type, making of test items, achievement test, diagnostic test and their construction, preparation of blue print taking examples of concepts of science mentioned in unit III and IV, continuous and comprehensive evaluation for overall development of child.

Tools and Techniques of Assessment: development of learning indicators, Performance-based assessment, learners' records of observations, field diary, oral presentation of learners work, portfolio, assessment of project work, construction of test items and administration of tests, exploring content and assessments of learning based on content mentioned in unit III and IV.

Modes of Learning Engagement:

Constructivist approach: Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum:

Activities based on Science syllabus of classes IX and X

- Preparation of one working model.
- Preparation of a model lesson plan followed by seminar /presentation before the whole group.
- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes).
- Construction of an achievement test, its administration on one section of a class and analysis of results.

Practicals:

- Preparation of designs of ideal Laboratory/Herbarium/Aquarium/terrarium.
- Measuring the rates of water absorption and loss in plants and animals.
- To design and perform experiment to demonstrate that by product of Respiration in plants and animals is heat.
- To demonstrate oxygen consumption during respiration in plants and animals.
- Perform experiments to detect the presence of carbohydrates, lipids and proteins in food by qualitative chemical tests.
- Measurement of length, mass, time, temperature, current, voltage.
- Graphic manipulation like (a) distance-time graph (b) velocity – time graph (c) voltage – current graph (d) temperature – time graph.
- Study of motion under force (design and demonstration).
- Methods of preparation of common laboratory reagents.
- Separation of substances of a given mixture like (i) NaCl, NH_4Cl and sand and (ii) Sulphur, NaCl and Iron scrap.
- Demonstration of laws of electromagnetic induction.
- Study heating effect of current.
- Qualitative chemical test for some common food stuffs.
- Preparation of Chlorine (Cl_2) and Ammonia (NH_3) and Study of their properties.
- Study nature of soft and hard water.

Suggested Readings:

1. P.K.G.Nair, 1985 Principle of Environmental Biology, UNESCO training of science teachers and educators Bangkok UNESCO.
2. NCERT: 1978 Teacher Education curriculum framework, NCERT, New Delhi

3. Science Teaching in Schools by Das. R.C.(1985), Sterling publication.
4. Modern Science teaching by Heiss, E.d. Obourn, E.S. Hoffman, C.W (1961) MacMillian Publication, New York.
5. NCERT (2006) Science for Class IX & X. New Delhi. NCERT.
6. Lewis, 1. 1972 Teaching of school physic, Penguin Book, UNESCO,.
7. Anderson, Hans 0 and Koutnik Paul G. 1912 Towards More effective science instruction in secondary education. The Macmillan Co., New York and Courier Macmillan, London,:
8. Das; 'RC. 1984 Et a. Curriculum and Evaluation National Council of Educational research And Training New Delhi,.
9. Driver, R 1983 The pupil as scientist? Open University Press, Buckingham.
10. Saxena, A.B. 1988 Vigyan Shikshan KaAyonjan Har Prasad Bhargava& Sons, Agra.
11. NCERT (2006) Science for class IX and X, New Delhi. NCERT
12. NCERT (2005) National Curriculum Framework. New Delhi. NCERT.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPM 302: PEDAGOGY OF MATHEMATICS II

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course, the student teachers will be able to:

- Formulate instructional objectives for different topics of mathematics.
- Appreciate mathematics to strengthen the student's resource.
- Design the process of developing a concept.
- Appreciate the role of mathematics in day-to-day life.
- Channelize, explain, reconstruct and evaluate their thinking.
- Pose and solve meaningful problems.
- Appreciate the historical perspective and contribution of Indian mathematicians in development of the subject.
- Appreciate and explore Technology Integrated Mathematics Module (TIMM) based on different subject specific open source software on various concepts of Geometry at secondary stage; and
- Appreciate and develop dynamical digital applets with emphasis on process involved in teaching and learning of mathematics at secondary stage.
- Be conversant with the nature, values, structure and scope of Mathematics.
- Interpret the principles of child development for planning lessons;
- Understand the principles of learning

Course Contents

Unit I: Approaches of Teaching Mathematics

- Basic Principles of Methods of Teaching Mathematics
- Principles of Child Development and Learning
- Problem posing / solving in Mathematics
- Problem posing: Problem posing skill contextualised to recognition of pattern, Extension of pattern, Formulisation of conjecture and generalisation through several illustrations drawn from learners immediate environment, Skill development of Process Questioning can stimulate discussion of an idea, leading to further exploration and use of oral language to explain and justify a thought.

- Problem solving: Understanding of Problem, Splitting the Problem in known and unknown parts, Symbolisation and mathematical formulation, Solving problem with multiplicity of approaches- exploration of alternative methods through Probing questions and concrete analogies, Attitude build up of internal questioning – learn to ask themselves key questions before, during and after the solution process.
- Methods of Teaching Mathematics
- Induction and Deduction
- Analytic and Synthetic Methods
- Heuristic or Discovery Method

Unit II: Assessment and Evaluation

- Exploring ways of Assessment
- Presentation and communication skills in mathematics, Posing conceptual questions from simple situations, interpretation and analysis, Designing innovative learning situations, Performance in group activity, Laboratory/ Technological experiences, Reflective written assignment, Written test on conceptual understanding of specific topics and its pedagogy, A year and summative assessment by the university.
- Informal creative Evaluation
- Encouraging learner to examine a variety of methods of assessment in mathematics so as to assess creativity, problem solving and practical performance. Appreciating evaluation through overall performance of the child. Self and peer evaluation.
- Formal ways of Evaluation
- Variety of assessment techniques and practices. Assessing Product vs. Process, Knowing vs. Doing. In practice midterm / terminal examination, practicing continuous and comprehensive evaluation to test regular programs / achievement of learner.

Unit III: Construction of concepts and Techniques of Teaching Mathematics

- Trends in Organising Content
- Recall and consolidation of various concepts with varied examples and illustrations in teaching of Arithmetic, Algebra, Co-ordinate Geometry, Geometry, Trigonometry, Mensuration, Statistics and Probability using Inductive and Deductive, Analytic and Synthetic, Heuristic,Project and problem solving methods.
- Analysis of concepts coherently in graded way.
- Misconception and common errors
- Developing Blue print for designing question paper
- Identifying and organizing components for developing frame work of question paper at different stages of learning different types of questions and framing questions based on concepts and sub concepts so as to encourage critical thinking, promote logical reasoning and to discourage mechanical manipulation and rote learning. Framing of open ended questions providing the scope to learners to give responses in their own words. Framing of conceptual questions from simple questions.

Unit IV: Planning for Classroom Transaction

- Planning Classroom Strategies:
- Analysis of textual and supplementary print materials, connecting lab/field experiences and suitable planning for classroom interaction.
- Desirable Characteristics of a Good Instructional Programme in Mathematics
- Identifying desired outcome, designing essential questions guiding teaching/ learning.
- Determining acceptable evidences that show students understanding.

- Integrating learning experiences and instructions – sequence of teaching /learning experiences that enable students to develop / demonstrate desired understanding.
- Developing unit plan and lesson plan for teaching of mathematics:
- Learning Objectives
- Introduction of the topic
- Some thought-provoking questions
- Flow of chapter
- Examples
- Hands on activities
- Self exploratory experiments (if any)
- Daily life application
- Application (Problem Solving)
- Interdisciplinary Applications / Problems
- HOTS questions
- Extension activities
- External Web resources for the content
- Suggested Readings
- Thought-provoking questions that lead students to do more exploration
- Planning ICT Based Mathematics Lesson, Disticnt ways of using open source software in Mathematics Lesson (Exploratory way only- by giving already created ready-made document or file and invite them to explore it.), Thinking Geometrically (Dynamics in Mathematics using software) Technological Pedagogical Content Knowledge (TPCK)- Developing competencies required to make appropriate use of technology, learner teachers will be required to make pedagogical choices critically about when and where technology should be used.
- The role of cooperative learning in mathematics.
- Learning Styles, Learning Difficulties and Diagnostic Tests
- What are the learning styles in Mathematics? - Visual Learners, Auditory Learners and Kinesthetic Learners, Identification of learning difficulties, Error Patterns, Diagnostic and Remedial Teaching, Preparation of Diagnostic tests

Modes of Learning Engagement:

- Providing opportunities for group activities.
- Hands on experimentation within digital environment.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.
- Visit to district, state and national level science exhibition.
- Digital presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.
- Providing opportunities for group activities.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.

- Visit to district, state and national level science exhibition.
- Audio visual presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.

Practicum:

- Preparation of lesson plans on different approaches on selected content matter.
- Preparation of teaching aid (software based applets and concerte materials based).
- Designing of mathematics kits (software based and concerte materials based) for secondary classes.
- Identification and analysis of common errors.
- Study of learning difficulties at Secondary level.
- Development of a working model on a topic of Mathematics.
- Critical analysis of CBSE/Any Board Secondary School Syllabus in Mathematics.
- Development of plan of mathematics resource (concrete and digital) room.
- Preparation and analysis of achievement test.
- Action Research on a Mathematical topic.
- Any innovative activity perform during internship in teaching program

Suggested Readings:

1. Teaching of Mathematics (ES-342), Indira Gandhi National Open University, School of Education, New Delhi
2. Roy Dubisch (1963). The Teaching of Mathematics, John Wiley and Sons INC, New York and London
3. Butler and Wren, (1960). Teaching of Mathematics, Mc-Graw Hill Book Company, INC, New York and London
4. Claude H. Brown, (1953). The Teaching of Secondary Mathematics, Harper & Brothers, Publishers, New York
5. George Polya, 1962 (I), 1965 (II). Mathematical Discovery (Volume I and II), John Wiley & Sons, INC, New York and London
6. C. G. Corle, (1964). Teaching Mathematics in Elementary School, The Ronalal Press Company, New York
7. NCTM, USA, (1999) Activity for Junior High School and Middle School Mathematics, Volume – II, NCTM, USA,
8. J.L. Heilborn, (2000). Geometry - History, Culture and Techniques, Oxford University Press,
9. NCERT (2010) - A textbook of Content-cum-Methodology of teaching Mathematics, NCERT, New Delhi.
10. NCERT (2005)- Position Paper of NFG on Teaching of Mathematics , NCERT, New Delhi.
11. Johnston-Wilder, S. &Pimm, D. (Eds.) (2004). Teaching Secondary Mathematics with ICT, London: Open Univer- sity Press / McGraw-Hill.
12. Capel, S., Leask, M. & Turner, T. (Eds.) (2009). Learning to Teach Mathematics in Secondary School., NY: Routledge. New York.
13. Law, N., Pelgrum, W.J., &Plomp, J. (Eds.) (2008). Peda- gogy And ICT Use In Schools Around The World Findings From The IEA Sites 2006 Study: Springer. New York
14. Joubert, M. (2012). ICT in mathematics. Mathematical knowledge in teaching: seminar series. Cambridge, UK: University of Cambridge. Available online at www. maths-ed.org.uk/mkit/Joubert_MKiT6.pdf

15. Glazer, E. M. (2001). Using Internet Primary Sources to Teach Critical Thinking Skills in Mathematics. Santa Bar- bara, CA: Libraries Unlimited Press
16. Prichard, A. (2007). Effective Teaching with Internet Technologies Pedagogy and Practice. Thousand Oaks, CA: Sage Publications.
17. S. K. Mangal, Teaching of Mathematics, Prakash Brothers, Ludhiana.
18. A. B. Bhatnagar, New dimensions in the teaching of Mathematics, Modern Publishers, Meerut.
19. K. S. Sindhu, Teaching of Mathematics, Sterling Publications, New Delhi.
20. UNESCO: Trends in Mathematics Teaching.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPBS 302: PEDAGOGY OF BIOLOGICAL SCIENCE

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the students will be able to:

- Identify and relate approaches of teaching-learning of biological science with social relevance;
- Explore the process skill in science and develop competency to organise laboratory facilities and equipment in teaching– learning of biological sciences;
- Use effectively different activities – ICT, excursion, visits, research methodology etc for teaching–learning of biological science;
- Examine different pedagogical issues in learning biological science;
- Construct appropriate assessment tools for evaluating learning of biological science;
- Develop ability to use biological science concepts for life skills; and
- Develop professional competencies for teaching, learning of biological science.
- Appreciate that science is a dynamic and expanding body of knowledge

Course Contents

Unit I: Planning for Teaching-Learning of Biological Science

- Identification and organization of concepts for teaching-learning of biology;
- Determining acceptable evidences that show learners' understanding.
- Understanding Constructivist Approach
- Instructional materials required for planning teaching-learning of biological science and learners' participation in developing them; Identifying and designing teaching-learning experiences;
- Planning field visits, Zoo, Sea shore life, Botanical garden, etc.;
- Organizing activities, laboratory experiences, making groups, planning ICT applications in learning biology.
- Behavioural, physical and mental changes during Adolescence.

Unit II: Learning Resources in Biological Science

- Identification and use of learning resources in biological science from immediate environmental, exploring alternative sources;
- Developing and designing science kit and biological science laboratory; Planning and organizing field observation; Collection of materials, etc.;
- Textbooks, audio-visual materials, multimedia-selection and designing;
- ICT introduction, Use of ICT in teaching and learning, ICT resources to support Biology teaching and learning;
- E- learners introduction, e-learning and changing nature of classroom, challenges and drawbacks of e-learning.
- Using community resources for biology learning; Pooling of learning resources in school complex/block/ district level; Handling hurdles in utilization of resources.

Unit III: Tools and Techniques of Assessment for Learning in Biological Science

- Performance-based assessment; Developing indicators for performance assessment in biological sciences; Learners record of observations;
- Field diary, herbarium;
- Oral presentation of learners work in biological science, Portfolio; Assessment of project work in biology (both in the laboratory and in the field), Assessment of participation in collaborative learning;
- Construction of test items (open-ended and structured) in biological science and administration of tests;
- Developing assessment framework in biological science;
- Assessment of experimental work in biological science- Evidences of evolution, fitness and heredity, role of environment in day to day life.
- Exploring content areas in biological science not assessed in formal examination system and their evaluation through various curricular channels;
- Encouraging teacher-learners to examine a variety of methods of assessments in biological science;
- Continuous and comprehensive evaluation.

Unit IV: Biological Science – Lifelong Learning and Professional Development of Biology Teacher

- Nurturing natural curiosity of observation and drawing conclusion; Facilitating learning progress of learners with various needs in biology;
- Ensuring equal partnership of learners with special needs;
- Stimulating creativity and inventiveness in biology; Organising various curricular activities, such as debate, discussion, drama, poster making on issues related to science/biology;
- Organizing events on specific day, such as Earth Day, Environment Day, AIDS Day, Science Day etc.
- Planning and organizing field experiences, Science club, Science exhibition; Nurturing creative talent at local level and exploring linkage with district/state/central agencies.

Professional development programmes for science/biology teachers:

- Participation in seminar, conferences, online sharing membership of professional organization; Teachers as a community of learners;
- Collaboration of school with colleges, universities and other institutions;
- Journals and other resource materials in biology education;
- Role of reflective practices in professional development of biology teachers;

- Teacher as a researcher: Learning to understand how children learn science – action research in biological science.

Modes of Learning Engagement:

Constructivist approach, Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum: Activities based on Science syllabus at secondary level.

- Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/presentation before the whole group.
- Preparation of a kit for teaching learning of a topic along with write-up (name of unit, theme/topic, material used, procedure, learning outcomes).
- Construction of an achievement test, its administration on one section of a class and analysis of results.
- Study of heredity and evolution.
- Preparation of Herbarium and Herbarium techniques
- Establishment of Science Laboratory
- Respiration in plants and animals
- Nutrition in plants and animals
- Excretion in plants and animals
- Movements in Plants and animals
- Techniques of formulating science project in laboratories as per curriculum
- Evidences of evolution
- Principle of working of Human eye.

Suggested Readings:

1. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
2. NCERT (2005). Position Paper of NFG on Teaching of Science. New Delhi. NCERT.
3. NCERT (2005). Position Paper of NFG on Habitat and Learning. New Delhi. NCERT.
4. N. Vaidya, Science Teaching for 21st Century (1999). New Delhi.Deep & Deep Publications.Dat Poly, (2004).Encyclopaedia of Teaching Science. New Delhi. Sarup& Sons.
5. Their, DH, (1973). Teaching Elementary School Science.A Laboratory Approach, Sterling Publication Pvt. Ltd.
6. Science Teacher. (Peer reviewed journal for science teachers).
7. Journal of Research in Science Teaching. (Wiley-Blackwell).
8. Turner Tony and Wendey Di Macro. Learning to Teach School Experience in secondary school teaching.London and New York.Routledge.
9. P. Ameeta, (2008). Methods of Teaching Biological Science. Educational Publishers edition or later ed.
10. Sharma R.C., (1987). Modern Science Teaching or later edition. New Delhi. Dhanpatarai& Sons.
11. Teaching of Science Today and Tomorrow. New Delhi Docba House.

Web Sites

- http:/www.tc.columbia.edu/mst/science.ed/courses.asp.
- http:/www.edu.uwo.ca

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester VI
EFSE 302: SCHOOL EXPOSURE AND RELATED ACTIVITIES

Credits: 4 **Marks: 100**

Contact hours: 04 weeks

Distribution of Marks for the School Exposure and Related activities		
Activity	**Max. Marks**	**Min. Pass Marks**
Content Analysis in each teaching subject	20	10
Preperation and use of learning resources during peer teaching in each teaching subject (two)	10+10 =20	10
Observation record • Five classes of regular classroom teacher • Five classes of peer	10+10=20	10
Actual classroom teaching (Two lesson in each teaching subject)	40	20
Total	**100**	**50**

Objectives of the Course: On completion of the Course, the students will be able to:

- Understand about the activities to be carried out during school internship programme.
- Observe classroom teaching, various school activities and gain a feel of the multiple roles of a teacher.
- Develop skill in content analysis, preparing TLM and observing classroom processes.
- Plan and implement teaching learning activity for peers and actual classroom.

Pre-Internship Tasks:

(The Internship Committee formulated by the Institute will prepare a Schedule for execution of Pre- Internship Tasks)

During the four week duration, the student teachers are oriented to the school internship programme.

For the first two weeks, they will be provided training in core teaching skills, content analysis, preparing Teaching Learning Material (TLM), writing observation records, Reflective Journals, conducting Action Research and Case Study, organizing school activities and their reporting, developing Achievement Tests, administering and analyzing. Student teachers will also write lesson plans and take up peer teaching.

For the next two weeks, student teachers will be placed in the schools. They will observe the classes being handled by the regular teachers as well as their peers. Every student teacher will teach at least one lesson in each teaching subject and reflect on the teaching.

Modes of Learning Engagement:

Pre internship will be carried out both in the Institute and the School.

First two weeks they will be exposed to theoretical knowledge about internship and receive information on various activities that are required to be carried out by the student teachers.

Student teachers will get hands on experience on performing certain tasks which they are expected to perform in the school.

In the beginning they learn to teach in a simulated condition by teaching their peers.

Next two weeks, student teachers are attached to the school on full time basis, observe the teaching by the regular classroom teacher, teach at least one lesson in each teaching subject, involve in all the activities of the school and learn to understand the school.

Student teachers keep a record of all the work carried out by them in the school (Details to be worked out).

Semester VII
B. Sc. B. Ed. (CBCS) Semester- VII
GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
PHY 401: PHYSICS: QUANTUM MECHANICS AND STATISTICAL PHYSICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe the limitation of classical mechanics and requirement of Quantum mechanics.
- Understand the fundamental aspects of Quantum mechanics followed by its application.
- Apply the Statistical principles to various physical phenomena.
- Solve the problems related to Quantum mechanics and Statistical mechanics.
- Establish the link between theory and experiments.

Course Contents

Unit I:

Origin of the quantum theory- Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Ritz combination principle in spectra, stability of an atom, Planck's radiation law, Einstein's explanation of photoelectric effect, Bohr's quantization of angular momentum and its application to hydrogen atom, limitations of Bohr's theory.

Unit II:

Wave-particle duality and uncertainty principle, de Broglie's hypothesis for matter waves, the concept of wave and group velocities, evidence for diffraction and interference of 'particles', experimental demonstration of matter waves, Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a box, wave packets, Heisenberg's uncertainty relation for p and x, its extension to energy and time.

Consequence of the uncertainty relation: gamma ray microscope, diffraction at a slit, particle in a box, position of electron in a Bohr orbit.

Quantum Mechanics: Schrodinger's equation, Postulates of quantum mechanics, operators, expectation values, transition probabilities.

Unit III:

Applications of quantum mechanics to particle in one dimensional and three dimensional box, harmonic oscillator, reflection at a step potential, transmission across a potential barrier.

Hydrogen atom: natural occurrence of n, l and m quantum numbers, the related physical quantities, comparison with Bohr's theory, Wave functions, Probabilistic interpretation.

Unit IV:

Statistical Physics

The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a-priori probabilities, probability distribution and its narrowing with increase in number of particles, The expressions for average properties, Constraints, accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states.

Some universal laws: The mu space representation, division of mu space into energy sheets and into phase cells of arbitrary size, application to one-dimensional harmonic oscillator and free particles, Equilibrium between two systems in thermal contact, bridge with macroscopic physics, Probability and entropy, Boltzmann entropy relation, Statistical interpretation of second law of thermodynamics, Boltzmann canonical distribution law and its applications, rigorous form of equipartition of energy, Partition function and its applications, Saha's ionization formula. Maxwell distribution of speeds in an ideal gas, Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values, Doppler broadening of spectral lines. Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator, Indistinguishability of particles and its consequences, Bose-Einstein and Fermi-Dirac conditions, applications to liquid helium, free electrons in a metal and photons in blackbody chamber, Fermi level and Fermi energy.

Suggested Readings:

1. D.J. Griffith, Introduction to Quantum Mechanics (Pearson Education, 2015)
2. A.K. Ghatak and S. Loknathan, Quantum Mechanics- Theory and Application (Macmillan India Ltd. Delhi)
3. H.C. Verma, Quantum Physics (TBS, 2012)
4. H.S. Mani and G.K. Mehta, Introduction to Modern Physics, (Affiliated East West Press Pvt. Ltd. New Delhi, 1998)
5. B. Laud, Introduction of Statistical Mechanics (Macmillan 1981).
6. F. Reif, Statistical Physics (Mcgraw-Hill, 1988).

7. K. Huang, Statistical Physics (Wiley Eastern, 1988).

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To find out the reverse recovery time of given diodes.
2. To study RC transmission line at 50 Hz and to draw curve showing the variation of magnitude and phase of the voltage along the RC ladder network.
3. To study the Gaussian distribution law.
4. To study the Poisson's distribution law.
5. To determine the value of Planck's constant by photo cell. (Photo electric effect).
6. To determine the value of Planck's constant by solar cell.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
CHM 401: CHEMISTRY: ADVANCE CHEMISTRY-I

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: Students Teachers will be able to

- Understand the Spectroscopic methods that are used to study the molecules.
- Predict the appearance of a molecule's vibrational spectra as a function of symmetry and uses in detailed organic structure analysis
- Evaluate the utility of UV/VIS spectroscopy as a qualitative and quantitative method.
- Determine the vibrations for a triatomic molecule and identify whether they are infrared-active.
- Determine whether the molecular vibrations of a tri-atomic molecule are Raman active.
- Explain the difference between Stokes and anti-Stokes lines in a Raman spectrum.

Course Contents

Unit I: Spectroscopy-I (Theoretical Principle)

Introduction: electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

- **Rotational Spectrum:** Diatomic molecules, Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.
- **Vibrational Spectrum:** Infrared spectrum: energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect

of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

- **Raman Spectrum**: Concept of polarisability, pure rotational and pure vibrationl Raman spectra of diatomic molecules, selection rules,σ,π- and n M.O., their energy levels and the respective transitions.

Unit II: Separation Techniques

Solvent Extraction: distribution Coefficient, distribution ratio, solvent extraction of metals, multiple batch extraction, counters current distribution – Chromatographic Techniques: classification, theory of chromatographic separation, distribution coefficient, retention, sorption, efficiency and resolution - Column, ion exchange, paper, TLC & HPTLC: techniques and application.

Unit III: Electronic Spectrum

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank-Condon principles.Qualitative description of σ, π- and n M.O., their energy levels and the respective transitions.

Unit IV: Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions – energy transfer processes (simple examples).

Suggested Readings:

1. Mahendra R. Awode, Quantum Chemistry S. Chand Publishing.
2. A. K. Chandra, Introductory Quantum Chemistry, Tata McGraw-Hill Education
3. Peter Atkins Julio de Paula, Atkins' Physical Chemistry Oxford University Press.
4. Robert J. Silbey, Robert A. Alberty , Moungi G. Bawendi, Physical Chemistry 4th Edition, Wiley
5. Colin N. Banwell, Fundamentals of Molecular & Spectroscopy, Tata McGraw-Hill Education
6. Walter S. Struve, Fundamentals of Molecular Spectroscopy, Wiley

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Inorganic Chemistry: Estimations

a. Quantitative estimation of one metal volumetrically from a given mixture.

b. To estimate magnesium volumetrically from a mixture containing Ba^{2+} and Mg^{2+} Ions/ Zn^{2+} and Mg^{2+} ions.

c. To estimate copper iodometrically from a given mixture containing Pb^{2+} and Cu^{2+} ions.

d. Estimation of Glucose with the help of Fehling's solution.

e. Determination of Total hardness of water.

Colorimetry

- To verify Beer-Lambert law for $KMnO_4$/$K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.

Conductometry

- To determine normality and gms/lit of xNHCl and also determine specific conductance by conductometry.
- To determine normality and gms/lit of the mixture of $HCl+CH_3COOH$ by Conductometry.
- To determine the normality of weak acid by Conductometry.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
ZOO 401: ZOOLOGY: EVOLUTION AND PALAEONTOLOGY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to understand and comprehend origin of life and theories of evolution; to understand the evolution from the evidences.

Course Contents

Unit I: Origin of Life &its Theories

- Origin of life (Abiogenesis and biogenesis)
  a. Evidence in favour of evolution: from morphology, comparative anatomy, embryology and Paleontology.
- Molecular basis of evolution
- Theories of evolution:
  1. Lamarckism, inheritance of acquired characters and Neo-Lamarckism.
  2. Darwinism, theory of natural selection and Neo Darwinism.
  3. Mutation theory of Hugo de Vries.
  4. Weismann theory of germplasm
  5. Recapitulation theory

Unit II: Evolution

- Variation: Kinds, sources of variation, origin of new mutations.
- Isolation: Definition, mechanism and role of isolation in evolution.
- Adaptation: Introduction, kinds (structural, physiological and protective) of animal associations, divergent evolution, convergent evolution, evolutionary significances of adaption.

Unit III: Evolution Changes

- Origin of species: Concept of species/subspecies/sibling. Specie, Factors causing genetic divergence in the population of species, genetic drifts, Bottle Neck effect founder's effect.
- Mimicry and protective coloration: Definition, kinds, condition necessary for mimicry, significance.
- Zoogeographical distribution of animals, geological time scale, origin and evolution of amphibian, reptiles, birds and mammals.

Unit IV:

- Introduction, formation, kinds, determination of age of fossil and its significance.
- Dinosaurs, fossil evidence & reasons for extinction of dinosaurs.
- Evolution of man: Time of origin, compelling causes, ancestor of man, evolution from apes and evolutionary trends.

Suggested Readings:

1. Evolutionary Biology by B.S. Tomar& S.P. Singh – (Rastogi Publications, 2008)
2. The origin of life by K. John – (Reinhold Publishing Corpn)
3. The evolution of Man by G.W. Lasker – (Holt,Rinehart&Winston)
4. Organic Evolution by R.S. Lull – (MacMillan)
5. Organic evolution – V.B. Rastogi
6. Animal Taxonomy and Evolution, VS Pawar Hindi Edition, College book centre, Chaura Rasta, Jaipur
7. Mammalian Endrocrinology and Animal Behavior, VS Pawar, Hindi Edition, College book centre, Chaura Rasta Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Content:

1. Study of vestigial organs, models of dinosaurs, living fossils.
2. Study of teeth and skulls of horse, elephant and man.
3. Study of five animals for mimicry.
4. Study of various types of beaks of local birds.
5. Study of various types of feet of local birds.
6. Evolution of Man (Chart / Model).
7. Evolution of Horse (Chart / Model).
8. Zoogeographical distribution of animals in India and World.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
BOT 401: BOTANY: PLANT ANATOMY AND ECOLOGY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understand the development, organization and functions of tissues inplants;
- Understand the histological complexity inplants;
- Understand the dynamics of environment and its delicatebalance;
- Understand the influence of human beings on quality ofenvironment.

Course Content:

Unit I: Tissue & Tissue System : Root & Shoot Organisation

- Types of Tissue and Tissue System, basic body plan of a flowering plant.
- The root system: The root apical meristem and its organisation; differentiation of primary and secondary tissues and their roles; structural modifications for storage, respiration, reproduction and for interaction with microbes.
- The shoot system: The shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; formation of internodes, branching pattern; monopodial and sympodial growth; canopy architecture.

Unit II: Organization of Xylem & Phloem tissues

- Cambium and its functions; formation of secondary xylem; a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings, sapwood and heart wood; secondary phloem: structure, function relationships; periderm
- Leaf: Origin, development, arrangement and diversity in size and shape; internal structure in relation to photosynthesis and water loss; adaptations to water stress; stomatal types and trichomes; senescence and abscission.

Unit III: Ecology & Environment

- Ecological Factors: Brief account of edaphic, climatic, physiographic and biotic factors and their ecologicalimportance.
- Ecosystem : Structure, abiotic and biotic components, bio-energetic approach, food chain, food web, ecological pyramids, bio-geo-chemical cycles of carbon, nitrogen and phosphorus.
- Community ecology:Community characteristics, frequency, density, cover, life forms.
- Plant succession: General features, events in succession, brief account of xerarch succession.

Unit IV: Environmental Adaptations

- Morphological, anatomical and physiological adaptations of plants to environment – hydrophytes, xerophytes,halophytes.
- Biodiversity: General account, types and characteristics, biodiversity conservation efforts, WCU, Red databook, brief account of Intellectual Property Rights (IPR) and patentlaws.
- Environmental pollution – a brief account of causes, effects and remedies of air, water, soil, radioactive and noisepollution.

Suggested Readings:

1. Esau, K., 1977, Anatomy of Seed Plants, 2nd Ed., John Wiley & Sons, NewYork.
2. Fahn, A. 1974, Plant Anatomy 2nd Ed., Pergamon Press, Oxford.
3. Mouseth J.D.,1988, Plant Anatomy. The Benjamin/cummings Publishing Co. Inc., California,USA.
4. Singh V., P.C.Pande& D K Jain 2006, Angiosperms, RastogiPublications,Meerut.
5. Vashishta, P.C. A Text book of Plant Anatomy, PredeepPublications,Jullandar.
6. Gangulee S.C. &Kar.1980, College Botany Vol.I, Central Book Agency,Calcutta.
7. Sharma, P.D., 2006, Environmental biology, RastogiPublications,Meerut.
8. Mitra, J.N., An Introduction to Systematic Botany and Ecology, World Press,Calcutta.
9. Odum, E.P. 1983, Basic Ecology, Saunders,Philadelphia.
10. Kormondy, E.J. 1996, Concepts of Ecology, Viva Books Pvt. Ltd., NewDelhi.
11. Misra, R. 1968, Ecology Work Book, Oxford &IBH, NewDelhi.
12. Moore P.W. and S.B.Chapman, 1986, Methods in Plant Ecology, Blackwell Scientific Publications.
13. Krebs, C.J.1989, Ecological Methodology, Harper and Row, NewYork.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Anatomy of primary and secondary growth in monocots and dicots using hand sections (or prepared slides).
- Anomalous secondary growth in *Boerhaavia, Nyctanthes* and *Dracaena*
- Anatomy of leaf and peel mount for stomatal types/trichomes.
- Anatomy of the root-primary and secondary structure
- To determine the minimum size of quadrate by species area curve method.
- To determine the minimum number of quadrate to be laid down in field under study.
- To study the vegetation structure through profile diagram.
- To determine moisture content and water holding capacity of different types of soil.
- To determine the dust holding capacity of different types to leaves.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
MTH 401: MATHEMATICS: NUMBER THEORY AND THEORY OF EQUATIONS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

At the end of the semester learners will be able to understand basic principles, formulae and procedures of number theory and theory of equations and apply them in problem solving situations.

Unit I:

Division Algorithm, Prime and Composite numbers, proving the existence and uniqueness of GCD and the Euclidean Algorithm, Fundamental theorem of Arithmetic, the least common multiple, congruences, linear congruences,

Unit II:

Sigma function, Tau function, Phi function, Wilson's theorem, simultaneous congruences, theorem of Euler- Fermat and Lagrange.

Unit III:

Continued fractions, Relation between roots and coefficients**,** symmetric functions, Transformations, Reciprocal equations, Descarte's rule of signs, Multiple roots

Unit IV:

Solving cubic equation by Cardon's method, Solving quartic Equations by Descarte's method and Ferrari's method.

Suggested Readings:

1. Elementary Number Theory by David M. Burton.
2. Theory of Equations by Uspensky, Mc. Graw Hill Book Co. Ltd.
3. Elementary Number Theorywith Applications by Thomas Koshy.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester VII

EFSI 401: SCHOOL INTERNSHIP

Credits: 14P **Marks: 300**

Contact hours : 14 weeks

Distribution of Marks for the School Internship		
Activity	**Max. Marks**	**Min. Marks**
Classroom Teaching (two Pedagogy courses)	200	100
Critisism Lessons (four lessons in total)	40	20
Reflective Journal (two Pedagogy courses)	10	5
Observation Records • Ten lessons of school teacher • Ten lessons of peer	5+5 =10	5
Achivement test-development, Administration and Analysis	10	5
Case Study / Action Research	10	5
Detailed Record of any two activities organized by the student teacher	10	5
Learning Resource in two teaching subjects	10	5
Total	**300**	**150**

Objectives of the course: On the completion of the course the student teachers will be able to:

- Observe the classes of regular teachers and peers and learn about teaching learning process and classroom management.
- Develop skill in planning and teaching in actual classroom environment.
- Reflect, learn to adapt and modify their teaching for attaining learning outcomes of students.
- Maintain a Reflective Journal.
- Acquire skill in conducting Action Research/ Case Study.
- Inculcate organizational and managerial skills in various school activities.
- Create and maintain resources for teaching and learning in internship schools.
- Work with the community in the interest of the learner and their learning outcomes.

Internship Tasks:

The student teachers will perform the following in the school attached to her/him.

(a) Delivery of lessons

- The student teachers will deliver a minimum of 40 lessons including two criticism lessons (one at the end of 9th week and the other during the last week of the teaching assignment) in each Pedagogy course. In total they will teach 80

lessons in two Pedagogy courses (Preferably 20 lessons for Upper Primary classes and 20 for Secondary classes in each Pedagogy course).

- The student teachers will visualize details of teaching learning sequences, keeping all considerations in view. They will also involve themselves in discussion, reflection, reconsideration and consolidation after each lesson as well as at the end of the unit.

(b) Practicum

- Preparation, administration and analysis of achievement tests in two Pedagogy courses.
- Conducting Action Research / Case Study.
- Observing ten lessons of a regular teacher and ten lessons of peers in each Pedagogy course and preparing an Observation Record.
- Preparing and using teaching aids in each Pedagogy course.
- Writing a Reflective Journal.
- Organising any two co curricular activities and reporting.
- Preparing a suggestive comprehensive plan of action for improvement of some aspects of the school, where they have been teaching during Internship.
- Reporting on activities conducted with the community.

Any other activity given under Suggested School Activities can be studied after consultation with the Faculty, in charge of learning to function as a teacher (School Internship).

Suggested School Activities:

- Organising cultural, literary, sports and games activities
- Framing of time table
- Organising Morning Assembly
- Maintenance of school discipline
- Maintenance of school records, library and laboratories
- Providing Guidance and Counseling services
- Studying the role of community in school improvement
- School Mapping
- Water Resource Management in schools
- Mass awareness of social evils and taboos
- Organising educational fair, exhibition, club activities, nature study and field trip. (Any other activity/ activities decided by the Institute)

Post Internship Tasks:

- Post Internship is organized for a day mainly for reflection and review of internship programme as a whole, to facilitate the understanding of the effectiveness of various activities undertaken during the internship. The tasks include the following.
- Seeking reactions from students, teachers, Heads and teachers of cooperating schools and supervisors of the Institute.

- Exhibition of the Teaching Learning Material used by the student teachers during the internship.
- Any other activity decided by the Institute.
- Inviting suggestions for improving the programme.

Modes of Learning Engagement:

- Internship tasks will be carried out as a part of the 'in-school' practice. A mentor/cooperating teacher and supervisor of the Institute will guide the student teacher periodically.
- Student teachers will observe at least 10 lessons of regular classroom teacher and 10 lessons of their peers.
- Adequate classroom contact hours - a minimum of 40 lessons including two criticism lessons in each Pedagogy course preferably 20 lessons for Upper Primary classes (VI-VIII and 20 lessons for Secondary classes (IX and X) for subject based teaching – learning will be under taken in consultation with the school authorities.
- A Reflective Journal will be maintained by the student teacher in which she/he records her/his experiences, observations and reflections on classroom experiences.
- A portfolio will be maintained by the student teachers which includes lesson plans, resources used, assessment tools, student observations and other records.
- Student teachers will always work in liaison with the regular teachers in the schools involving themselves in all the school activities and conducting at least two activities.
- The Institute in consultation with the schools will prepare the details of the internship programme for each of the schools.

Semester VIII

B. Sc. B. Ed. (CBCS) Semester- VIII

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)

Semester VIII

PHY 402: PHYSICS: ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand thefundamental concepts of Atomic, Molecular and Nuclear Physics.
- Develop the concepts of transitions between various energy levels.
- Understand the source of energy in nuclear reactors and stars.
- Solve the problems related toAtomic, Molecular and Nuclear Physics.
- Establish the link between theory and experiments.

Course Contents

Unit I: Atomic Physics

Spectra of hydrogen, Frank-Hertz experiment and discrete energy states, Stern Gerlach experiment, deuteron and alkali atoms, spectral terms, doublet fine structure, screening constants for alkali spectra for s,p,d and f states, selection rules, L-S and J-J couplings, Atoms in a magnetic field, Zeeman effect, Zeeman splitting.

Weak spectra: continuous X-ray spectrum and its dependence on voltage, Duane-Hunt law, Characteristics of X-rays, Moseley's law, doublet structure of X-ray spectra, X-ray absorption spectra.

Unit II: Molecular Physics

Discrete set of electronic energies of molecules, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotational-vibrational spectra, Dissociation limit for the ground and other electronic states, transition rules for pure vibrational and electronic vibrational spectra.

Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

Spectroscopic techniques: Sources of excitation, prism and grating spectrographs for visible, UV and IR, absorption spectroscopy, double beam instruments, different recording systems.

Unit III: Accelerators

Ion sources, Cockcroft-Walton high voltage generators, Van deGraaff generators, Drift tube, Linear accelerators, Wave guide accelerators, Magnetic focusing in Cyclotron, Synchrocyclotron, Betatron, The electromagnetic induction Accelerator, Electron synchrotron, Proton Synchrotron.

Detectors: Interaction of charged particles and neutrons with matter, working of nuclear detectors, Geiger-Muller counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions.

Unit IV: Nuclear Fission and Nuclear Fusion

Nuclear Fission: Theory of Nuclear Fission, Liquid Drop Model, Shell Model, Barrier Penetration-Theory of Spontaneous Fission, Nuclear Fission as a source of Energy, The Nuclear Chain reaction, Condition of controlled Chain Reaction, The Principle of Nuclear Reactors, Classification of Reactors, Power of Nuclear Reactors, Critical size of Thermal Reactors, The Breeder Reactors, Reprocessing of spent fuel, Radiation hazards and Fission products poisoning.

Nuclear Fusion: The sources of stellar energy, The Plasma: The fourth state of the matter, Fusion reaction, Energy balance and Lawson Criterion, Magnetic confinement of Plasma, Classical Plasma losses from the Magnetic Container, Anomalous losses, Turbulence and Plasma instabilities, The Laser Fusion Problem, Fusion reactor

Structure of Nuclei: Structure of nuclei, basic properties (angular momentum, magnetic moment, Quadrupole moment and binding energy), deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces. Beta decay, range of alpha particles, Geiger-Nuttalllaw, Gamow's explanation of alpha decay, gamma decay, continuous and discrete spectra.

Elementary Particles: Classification of Elementary Particles, Fundamental interactions, Unified Approach (basic ideas), The Conservation laws, Quarks (basic ideas), Charmed and Colour Quarks, Higgs Boson, Large Hadron Collider.

Suggested Readings:

1. H.S. Mani and G.K. Mehta, Introduction to Modern Physics, Affiliated East West Press Pvt. Ltd. New Delhi, 1998.
2. A Beiser, Prospective of Modern Physics
3. H E White, Introduction to Atomic Physics
4. Barrow, Introduction to Molecular Physics
5. T A Littlefield and N Thorley, Atomic and Nuclear Physics (Engineering Language Book Society)
6. H A Enge, Introduction to Nuclear Physics (Addision- Wesly)

7. Eisenberg and Resnik, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles (John Wiley)
8. D P Khandelwal, Optics and Atomic Physics, (Himalaya Publishing, Bombay, 1988)
9. Rajkumar, Atomic and Molecular Physics (Campus Books International, 2003)
10. C Banwell, Fundamentals of Molecular Spectroscopy (McGraw Hill Education, 2017)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To study the voltage distribution along LC transmission line when its output terminals are open, short and terminated by characteristics impedance. Find attenuation constant, phase constant and propagation constant also for a given line.
2. To study the effect of feedback on transistor amplifier in terms of its frequency response and voltage amplification
3. To determine the value of Rydberg's constant with the help of plane transmission grating.
4. To study the following applications of an operational amplifier (i) Differentiator (ii) Integrator.
5. To study the following applications of an operational amplifier (i) adder (ii) Subtractor.
6. Determine the absorption coefficient of a given solution. Also study the concentration dependence of absorption coefficient.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
CHM 402: CHEMISTRY: ADVANCE CHEMISTRY-II

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- Evaluate the utility of UV/VIS spectroscopy as a qualitative and quantitative method.
- Understand Chemistry of Biomolecules.
- The knowledge about Spectral & Magnetic properties of Transition Metal complexes.
- Understand the Bioinorganic Chemistry, Geochemical effect on the distribution of metals.
- Learn chemistry of Amino Acids, Peptides, Proteins and Nucleic Acids

Course Contents

Unit I: Spectroscopy-II

Electromagnetic Spectrum: Absorption Spectra

(A) **Ultraviolet (UV) absorption spectroscopy** – absorption laws (Beer-Lambert law), molar absorptivity, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones. Woodward Fieser rules for calculation of absorption maxima in dienesand α, β unsaturated carbonyl compounds.

(B) **Infrared (IR) absorption spectroscopy** – molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, fingerprint region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

(C) **Nuclear magnetic resonance (NMR) spectroscopy**: Proton magnetic resonance (^{1}H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, area of signals and proton counting, splitting of signals, spin-spin coupling and coupling constant, interpretation of NMR spectra of

simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1, 1, 2-tribromoethane, ethyl acetate, toluene and acetophenone.

(D) Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and NMR spectroscopic techniques.

Unit II: Chemistry of Biomolecules

(A)Classification and nomenclature. Monosaccharide, Configuration of monosaccharides.Mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.Erythro and threodiastereomers.Structure of glucose including ring size determination and cyclic structure.Conversion of glucose into mannose.Formation of glycosides, ethers and esters.Mechanism of mutarotation.

(B) Structure of ribose and deoxyribose.Introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

Unit III: Spectral & Magnetic properties of Transition Metal complexes

(A) **Electronic spectra of Transition Metal Complexes:** Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d^1 to d^9states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

(B) **Magnetic Properties of Transition Metal Complexes:** Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit IV: Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Sodium / Potassium pump,

carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine,Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin; Storage and transfer of iron.

Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis.Preparation and reactions of α-amino acids.

Structure and nomenclature of peptides and proteins.Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides and proteins. Primary and secondary structures of proteins.Protein denaturation/renaturation.

Nucleic acids: introduction, Constitution of nucleic acids, Ribonucleosides and ribonucleotides. The double helical structure of DNA.

Suggested Readings:

1. Sharma Y. R. elementary organic spectroscopy: principles and chemical applications paperback.
2. Mehta and Mehta, Organic chemistry, PHI

3. Donald L. Pavia Gary M. Lampman George S. Kriz James A. Vyvyan, Introduction to Spectroscopy, 5th Edition.
4. Bahl B. S.&BahlArun 5000 Solved Problems In Organic Chemistry, S. Chand Publishing.
5. Madan R. L., Chemistry for Degree Students B.Sc. 3rd Year S. Chand Publishing.
6. NafisHaider S, Fundamental of Organic Chemistry, S. Chand Publishing.
7. Pradeep. T. Nano: The Essentials; Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Education Pvt. Ltd., New Delhi.
8. Kenneth J. Klabunde and Gleb B. Sergeev Nanochemistry (Second Edition)
9. Bandyopadhyay, A. K. Nano Materials. New Age International Publishers, New Delhi
10. P.T. Anastas and J.C. Warner, Green Chemistry: Theory and Practice. Oxford University Press.
11. Lancaster M. Green Chemistry: Introductory Text. Royal Society of Chemistry (London).
12. Ryan M.A. and Tinnesand M. Introduction to Green Chemistry. American Chemical Society (Washington).
13. Cann M. C. and Connelly M. E. Real world cases in Green Chemistry, American Chemical Society (Washington).
14. Cann M. C. and Umile T. P. Real world cases in Green Chemistry (Vol 2) American Chemical Society (Washington)
15. Ahluwalia, V.K., Kidwai, M. New Trends in Green Chemistry, 2004
16. Inorganic Polymers by Stone and Graham.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Note: The students should be given exposure of any research labs and instrumentation center/ reputed university lab/industry/ government labs of northern region.

1. Organic Chemistry

a. Two stage preparation: *p*-nitroacetanilide from Aniline and *p*-Bromoacetanilide from Aniline.

b. Determination of Iodine value of an oil/fat.

c. Separation of two component mixture using water or $NaHCO_3$ solution & identification of the two components. Preparation of one derivative.

d. Green synthesis:

2. Physical Chemistry

a. Colorimetry

i. Determination of formula of complex by Job's method**.**

ii. Verification of Beer – Lambert law for $KMnO_4$/$K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.

b. Polarimetry

i. Determination of the specific rotation of a given optically active compound and determination of the concentration of given solution of an optically active substance

c. Solvent Extraction

i. Separation and estimation of Mg (II) and Zn (II)

d. Ion Exchange Method

i. Separation and estimation of Mg (II) and Zn (II)

e. Chromatography

i. To determine R_f value of individual and mixture of amino acid by thin layer chromatography (TLC).

ii. Separation, Isolation and Analysis of the Different Components in a Mixture.

iii. Method of separation of green leaf pigment, mixture of inorganic, vitamins, colors of flowers etc. separation of α, β, γ carotene from carrot.

f. Refractometry and Polarimetry

i. To verify law of refraction of mixture (e.g of glycerol and water) using Abbe's refractrometer.

ii. To determine the specific rotation of a given optically active compound.

g. UV spectrophotometer

i. Record the UV spectrum of p-nitrophenol (in 1:4 ethanol:water mixture). Repeat after adding a small crystal of NaOH. Comment on the difference, if any.
ii. Record the U.V. spectrum of a given compound (acetone) in cyclohexane (a) Plot transmittance versus wavelength. (b) Plot absorbance versus wavelength.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
ZOO 402: ZOOLOGY: MOLECULAR GENETICS, BIOTECHNOLOGY AND INSTRUMENTATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to comprehend the modern concepts and applied aspects of Molecular Genetics, Biotechnology and instrumentation.

Course Contents

Unit I: Nucleic Acids: RNA & DNA

- Nucleic acids: DNA- Structure, forms, chemical composition functions and units of DNA, Genetic Code
- RNA: Genetic RNA, non–genetic RNAs (mRNA, tRNA, and rRNA) – Structure and functions.
- Replication of DNA
- Gene mutation : nature of mutation, types of mutation and causes of mutation
- DNA repair: mismatch repair, direct repair, base-excision, nucleotide-excision repair and other types of DNA repair. Genetic diseases and faulty DNA repair.

Unit II: Genetic Engineering

- Gene expression: Transcription and translation of prokaryotes and eukaryotes.
- Regulation of gene expression in prokaryotes (Lac and tryptophan operon)
- Genetic engineering : Gene cloning
  i. Cloning vectors
  ii. Restriction endonucleases, staggered and blunt ended cuts, ligation and example.
  iii. Recombinant DNA technology
- Gene amplification

i. cDNA library
ii. Genomic library and
iii. Polymerase chain reaction

- Applications of recombinant DNA technology – DNA finger printing, human gene therapy, ethical concerns and cloning. Human Genome Project.

Unit III: Tissue Culture

- Animal Cell, Tissue and organ culture. History of animal Cell & organ culture requirements. Characteristics of animal cell culture. Culture media (Natural & Synthetic).
- Sterilization of glassware, equipment isolation of animal tissue; sometic cell fusion, hybridoma technology.
- Elementary idea of bio informatics, genomics, proteomics

Unit IV: Microscopy

- Microscopy : Principle structure and function of simple and compound microscope
- Spectrophotometry: Principle of spectrophotometer, structure of simple & UV visible spectrophotometer. Principles of Chromatography.
- Principles of electrophoresis, separation technique of proteins and DNA.
- Principles of Centrifugation, simple, Gradient &Ultracentrifuge.
- General Principle & functions of instrument related to ECG, EEG, CT scanning and Sonography.

Suggested Readings:

1. Molecular Biology of the Cell, Alberts al, 5thed, Garland Science 2008
2. Molecular Biology of the Gene Watson Baker et al, 7thed, Pearson 2014.
3. Biochemistry , Molecular Biology and Genetics 5thed, Lippincott Williams and Wilkinson, 2013
4. Biochemistry D Voet & JG Voet, Wiley 2011.
5. Immunology , Kuby 7thed, Owen Punt Stenford McMillan, 2013
6. Fundamentals of Biochemistry , JL Jain , S Chand Pub 2014
7. Essentials of Molecular Biology 2ed, David Freifileder, Panima Publishing N Delhi 1996.
8. Genetics and Biotechnology, Dr KC Soni Hindi Edition, College book centre Chaura Rasta Jaipur.
9. Microbiology and biotechnology, Dr KC Soni Hindi Edition, College book centre Chaura Rasta Jaipur.
10. Biochemistry and Molecular Biology, K Wilson & J Walker, 7th Cambridge 2010.
11. Animal Cell Culture – A practical approach, Ed, John, R.W. Masters IRL Press
12. Gunther S. Stent, Molecular Genetics, MacMillian Publishing Co Inc.
13. R.W. Old and S.B. Primorse: Principle of gene manipulation: An introduction to genetic engineering.
14. R.A. Meyers (Ed) : Molecular Biology and Biotechnology .(VCH Publishers)

15. Genetics – Analysis and Principles- Robert J. Brooker , McGraw Hill
16. Principles of Cell and Molecular Biology –L.J Kleinsmith& V.M Kish, Harper Collins College Publisher.
17. Molecular Cell Biology 7th Ed, 2013- Lodish,Berk, Matsludaira, Kaiser Kriegar, Scott, Zipursky, Darnell,W.H Freeman And Co.
18. Bioinformatics, Sharma Munjal and Shankar, 2012 Rastogi Publications , Gangotri , Shivaji Road, Meerut-25002
19. Biotechnology – BD Singh (Hindi Ed) , Kalyani Publisher B1/292, Ludhiana, -141008 Punjab

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents:

1. Study of DNA in the *Drosophila*'ssalivary gland chromosomes.
2. Isolation of genomic DNA
3. Molecular separations by chromatography, electrophoresis, precipitation etc.
4. Isolation of milk protein from the milk sample.
5. Separation of serum from blood by using centrifuge
6. Separation of plasma from blood by centrifugation.
7. Separation of biomolecules by paper and gel chromatography.
8. Preparation and use of culture media for microbes.
9. Preparation and use of culture media for animal tissues.
10. Media preparation media sterilization and inoculation.
11. Cell culture techniques- Design and functioning of tissue culture laboratory, cell proliferation measurements, culture media preparation and cell harvesting methods.
12. Isolation and staining of bacteria.
13. Determination of pH value of different water samples, blood urine and saliva.
14. Qualitative tests for carbohydrates.
15. Qualitative test for proteins.
16. Qualitative test for lipids.
17. Effects of temperature on the activity of enzyme.
18. Chart, model, Power point/multimedia presentation preparation related to evidence of evolution Human /Horse evolution, Geographical time scale etc.
19. Students are expected to visit different laboratories (RRL, CSIR, ICMR, Science centers etc).

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)

Semester VIII

BOT 402: BOTANY: MOLECULAR BIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to::

- Understand the structure and functions of biological macromolecules;
- Understand and appreciate the importance of nucleic acid and gene research in modern times;
- Understand the tools and techniques of biotechnology, the processes involving gene manipulation and their applications.
- Understand the tools, techniques and applications of plant tissue culture.

Course Contents

Unit I: Genetics

- Discovery, brief history of DNA and RNA. (i) DNA: types, molecular structure, characteristics, structural properties and functions. Satellite and repetitive DNA, mitochondrial and plastid DNA, plasmid, DNA damage and repair, replication of DNA in prokaryotes and eukaryotes. (ii) RNA: Types, structure, characteristics, structural properties and functions, Role of RNAs in proteinsynthesis.
- Gene expression: Structure of gene, transfer of genetic information, genetic code,
- Gene structure and regulation in prokaryotes, operon concept – lac and tryptophan operon.

Unit II: Nitrogen & Protein Metabolism

- Nitrogen Metabolism: Forms of nitrogen, cellular conversion of nitrates to ammonium ions, assimilation of NH^{+}_{4} ions physiology and biochemistry of biological nitrogen fixation, amino acids – nature, classification, structures, synthesis of amino acids – reduction amination and transamination.
- Proteins – classification, structure – primary, secondary, tertiary and

quaternary.

- Protein synthesis, transcription, translation, regulation of gene expression in prokaryotes and eukaryotes
- Enzymes: Nomenclature, types and mechanism of action

Unit III: Complex Molecules: Carbohydrates & Lipids

- Carbohydrates: Introduction, classification, chemical structures of mono, oligo and polysaccharides, synthesis and breakdown of sucrose and starch.
- Lipids: Introduction, classification, chemical structures, saturated and unsaturated fatty acids, synthesis and breakdown of fatty acids, β-oxidation.

Unit IV: Biotechnology and Bioinformatics

- Tools and techniques for DNA recombinant technology, cloning vectors, brief account of genomics and c-DNA library, interferons, transposable elements, PCR.
- Applications of Biotechnology – function, definition and applications, brief account of DNA finger printing, *Agrobacterium* – mediated gene transfer, achievements in crop improvement, transgenicplants.
- Brief account of recent advances in Plant bio-technology; products of biotechnology
- Brief account of Bioinformatics – genomics,proteomics.

Suggested Readings:

1. Lea, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons,England.
2. Lehninger, A.B., Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
3. Srivastava, H.S.2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications,Meerut.
4. Jain.J.L. 1994, Fundamentals of Biochemistry, Sultanchand & Co., NewDelhi.
5. Old, R.W. and S.B.Primrose, 1989, Principles of Gene Manipulation, Blackwell Scientific Publication, Oxford,UK.
6. Lodish, H., A.Berk, S.L.Zipursky, P.Matsudaiva, D. Baltimore, and J.Darnell, 2000. Molecular Cell biology, W.H. Freeman & Co., NewYork.
7. Alberts, B., D.Bray, J.Lewis, M.Raff, K.Roberts and I.O.Watson, 1999, Molecular Biology of Cell, Garland Publishing Co., Inc., NewYork.
8. Malacinski, G.M., 2005, Essentials of Microbiology (4th Ed.). Narosa Publishing House, NewDelhi.
9. Cell and Molecular Biology (8th Ed.) E.D.P. De Robertis and EMF De Robertis Lippencott Williams & Wilkins

Practicals

Distribution of Marks for End Semester Practical Examination

Activity	**Marks**
Experiments	20
Viva Voce	5
Record	5
Total Marks	**30**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Basic requirements of a tissue culture laboratory: (a) Common Glassware, (b) test tubes, culture tubes and screw-capped tubes, (c) Petridish (d) Pipette (e) Pasteur pipette (f) Erlenmeyer flask (g) Volumetric flask (h) Cleaning glassware (i) Inoculation needle and inoculation loop (j) Bunsen burner (Spirit-lamp)(k) Water baths (l). Autoclaves (m) Laminar air flow (n) Incubator (o) Hot air oven (p) Colony counter (q) pH meter (r) Electric balance (s) Spectrophotometer (t) Centrifuge (u) Binocular Microscope.
- Method of using balance
- Preparation of temporary cotton plugs.
- Preparation of permanent cotton plugs.
- Preparation of culture media
- Preparation of liquid medium (broth)
- Preparation of solid media (PDA medium and plates)
- Preparation of agar slants.
- Methods of sterilization
- To test for the presence of carbohydrates, proteins andlipids.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII

MTH 402: MATHEMATICS: NUMERICAL ANALYSIS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
At the end of course, learner will be able to apply concepts of Numerical methods in solving problems related to real life situation.

Unit I:
Error - its sources, propagation and analysis, Root finding for nonlinear equations (Transcendental and Algebraic equations): Bisection method, Regula-Falsi method, Newton Raphson's method order of convergence, Iterative method.

Unit II:
Numerical solution of system of linear equations, direct methods- Gauss elimination method, Gauss-Jordan method, the matrix inversion method, Iterative methods: Gauss-Jacobi Method, Gauss Siedel method.

Unit III:
Differences: forward, backward, central, Relation betweendifference and derivatives, Differences of polynomials, Newton's formula for forward and backward interpolation.Divided differences and simple differences, Newton's general interpolation formula, Lagrange's interpolation formula, Error in interpolation.

Unit IV:
Numerical differentiation and numerical integration- Newton's Cotes Quadrature formula, Gauss Quadrature formula,Trapezoidal, Simpson's& Weddle's rules, Numerical solution of first and second order differential equations, Taylor's series approximation, Euler's Method, Picard's Method, Runge-Kutta Method.

Suggested Readings:

1. An Introductory Methods in Numerical Analysis: S.S. Sastri, P.H.I, New Delhi, 4th edition2005.
2. Numerical Analysis: J.L. Bansal, J.P.N. Ojha, JPH, Jaipur, 1991.
3. An Introduction to Numerical Analysis: Kendall E. Atkinson, John Wiley, New York, 2ndedition 2001.

4. Computer Based Numerical Methods and Statistical Techniques: P.K. De, CBS Publication, New Delhi, 1stedition 2006.

Group D: Discipline Specific Elective (DSE)
Semester VIII

DSE 402: ONE PROJECT IN PHYSICS / CHEMISTRY / MATHEMATICS / BOTANY / ZOOLOGY

Credits: 6 **Marks: 100**

Students will select the topics of Project in consultation with concerned subject teacher in Semester VI and they will work for the Project from Semester VI to VIII. Final Project Report will be submitted by the student-teacher in the Semester VIII for its evaluation. Evaluation of the Project will be done out of the 100 marks as per the distribution given below:

Distribution of Marks for the Project Evaluation		
Activity	**Max. Marks**	**Min. Marks**
Project Report	70	28
Viva Voce	15	6
Presentation	15	6
Total Marks	**100**	**40**

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)

Semester VIII

PEVE 402: VISION OF EDUCATION IN INDIA-ISSUES AND CONCERNS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Understand determinants of the purposes and processes of education.
- Understand the role of education as an agency of social transformation.
- Reflect critically on concerns and issues of contemporary Indian schooling.
- Develop their insight as future concerns of education.
- Analyze development of education in light of socio, economic, political and cultural development.

Course Contents

Unit I: Vision of Indian Education and Indian Thinkers

- Aims and purposes of education drawn from the ancient intellectual tradition of India
- Communities, Religion, State and Market as the determinants of purpose and process of Education
- An overview of salient features of the philosophy and practice of education by
    - Swami Vivekanand: Humanistic Approach
    - Rabindranath Tagore: Liberationist pedagogy
    - M. K. Gandhi: Basic education or Education for self sufficiency
    - Aurobindo Ghosh: Integral Education
    - J. Krishnamurthi: Education for individual and social transformation

Unit II: Contemporary Indian Schooling: Concerns and Issues

- Constitutional interventions for universalization of education and RTE Act 2009
- Constitutional provisions on education that reflect National ideals (Democracy, Equality, Liberty, Secularism and Social justice)

- Equality of Educational Opportunity:
  - Meaning of equality of educational opportunity and constitutional provisions
  - Prevailing nature and forms of inequality, including dominant and minor groups and related issues
  - Inequality in schooling: Public and private schools, rural-urban Schools, single teachers' schools and many other forms of inequalities in school systems and the processes leading to disparities
- Issues of Quality and Equity in schooling (with specific reference to girl child, weaker section and differently abled children), Variations in school quality
- Idea of 'common school' system

Unit III: Future Concerns and changing scenario in Education

- Impact of globalization, liberalization and privatization on Indian society and education
- Rights and Scheme for education of Girl Child
- Education for National Integration and International Understanding
- Citizenship education, Education for Sustainable Development of society
- ICT In School Education- National Repository of Open Educational Resources (NROER)

Unit IV: Education and Development- An Interface

- Emerging trends in the interface between:
  - political process and education
  - economic developments and education
  - Socio- cultural changes and education
  - Skill development with reference to vocational education
  - Educational development through community participation (Govt. and Non- Govt. Agencies)

Modes of Learning Engagement:

- Sourcing and studying relevant portions of documents relevant to the themes.
- Presentations based on readings (including original writing of at least one educational thinker).
- Conduct surveys of various educational contexts (e.g. Schools of different kinds) and make interpretative presentations based on these.
- Study writings on analysis of education-development interface and make presentations.
- Group discussions, debates and dialogue on the themes.

Practicum:

- Preparing an assignment on Constitutional Provisions on Education.
- Preparing a brief summary of Educational writers/books contributed by any of the Indian Thinkers.
- Reporting on Practice of Rights of the Child with special reference to Girl Child.
- Comparative analysis of different types of schools.
- Conducting surveys and presentations based on aforesaid units.

- Interpretation of field studies and experiences in terms of the course themes
- Comprehension of ideas of thinkers and presenting them in groups.
- Extent of innovative ideas and sensitivity in visualizing project on 'peace' or 'environmental concerns'

Suggested Readings:

1. Agrawal, J.C. & Agrawal S.P. (1992). Role of UNESCO in Educational. New Delhi. Vikas Publishing House.
2. Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society. New Delhi. NCERT.
3. Govt. of India (1986). National Policy on Education. New Delhi. MHRD.
4. Govt. of India (1992). Programme of Action (NPE). New Delhi. MHRD.
5. Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore. New Delhi. New Book Society.
6. Manoj Das (1999). Sri Aurobindo on Education. New Delhi. National Council for Teacher Education.
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GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)

Semester VIII

EPCPE 402: PEACE ORIENTED VALUE EDUCATION

Time: 1.5 Hours Max. Marks: 50

Credits- 2 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:-

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhhaand logic.
- Understand the co-ordination withIndian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute evalues in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that makes them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

Unit I: Importance of Peace

- Aims, objectives and importance of Peace Education.
- Barriers- Psychological, Cultural, Political
- Factors responsible for disturbing Peace: Unemployment, terrorism, Exploitation, Suppression of individuality, complexes.
- Characteristics of good textbook, evaluation of textbook, analysis of text book from peace education perspective.

Unit II: Nature and sources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

UNIT III: Values in religious scriptures

- Bhagwad gita-Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastyaand Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran–Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

UNIT IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacheras teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty to wards self and society

Practicum/Field Work (Any two of the following):

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a schoolfrom the point of view of value education.
- Analysis of a text book of a school subject from the point of view of values hidden.
- Preactice of role- play in two situations and preparation of report.
- Report on value conflict resolution in a situation.

Suggested Readings:

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2. moZ'kh] ljrah &uSfrd f'k{kk ,oa ckyfodkl] izHkkr izdk'ku] pkoMhcktkj] fnYyh] 1979
3. dk.ksih-ch- & /keZ'kkL=h dkbfrgkl] m-iz- fgUnhlaLFkku] fgUnh Hkou]egkRek xk/akhekxZ] y[kuÅA
4. xqIrkuRFkwyky&ewY;ijdf'k{kk i)fr] t;d`".k vxzoky] egkRekxk/akhekxZ] vtesj 1989
5. xks;udkt;n;ky&egRoiw.kZf'k{kk] xhrkizsl xskj[kiqjA

6. ik.Ms; xksfoUnpUn&ewY; ehekalk&jktLFkkufgUnhxzUFkvdkneh] fryduxj] t;iqj] 1973A
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20. SharmaR.S.: The Monk who sold his Ferrari, Mumbai, JaicoPublishingHouse, 2003
21. Swami RagunathAnand: Eternal ValuesforaChangingSociety, BVB Bombay1971.
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23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
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26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
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GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester VIII
EPCGI 402: GENDER ISSUES IN EDUCATION

Time: 1.5 Hours Max. Marks: 50
Credits- 2 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- develop basic understanding and familiarity with key concepts - gender, gender perspective, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism
- understand the gradual paradigm shift from women studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period
- learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, culture, religion and region
- understand how Gender, Power and Sexuality relate to education (in terms of access, curriculum and pedagogy)

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Unit I: Gender Issues: Key Concepts

- Gender, Social construction of Gender.
- Gender Socialization, Gender Roles.
- Gender discrimination.

Unit II: Structures of Gender Inequality

- Patterns of Gender inequality in terms of caste, class and Culture.
- Patterns of violence against women: Female foeticide, Female Infanticide.
- Child marriage. Dowry, Widowhood, Female commercial sex workers, Domestic violence.

- Gender Identities and Socialization Practices in: Family, Schools, Other formal and Informal Organization.

Unit III: Gender and Education, issues related to marginalized women

- Gender bias in curriculum, drop out, Sex Ratio, Literacy and Recent trends in Women's education.
- Issues related to marginalized Women: ST/SC/Minorities.

Unit IV: Gender Jurisprudences

- The Pre-natal diagnostic Techniques Act, 1994.
- The Draft sexual Assault Law Reforms, India, 2000.
- Domestic violence Act 2005.
- Reservation for Women.
- Child marriage Act.

Modes of Learning Engagement:

Classroom will be interactive by sharing experiences, discussing day today happenings in the society, visiting centres and offices, showing films followed by discussions and priority will be given to student teachers throughout the transaction of the course.

Practicum/ Tutorials:

- Write a paper on efforts of the Central and State governments for Gender Jurisprudences.
- Prepare on any one topic from any one unit with the support of Teacher Educator and present in the classroom.
- Review one recent article on Gender Issues in Education.
- Prepare a report on recent trends in Educational development of girl child in India.
- Conduct an opinion survey for Gender Issues in Education.

Suggested Readings:

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15. Bhasin, Kamla (2004). Exploring Masculinity. New Delhi. Women Unlimited.
16. MHRD(2000). Bringing Girls Centre stage: Strategies and Interventions for Girls' Education in DPEP. New Delhi. MHRD.
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Scheme of Examination for B.Com. (General) and B.Com. (Honours) w.e.f. Session 2017-2018 in Phased Manner

B.Com. (General):
A student pursuing B.Com. (General) has to study all the subjects in first and second semester. In 3rd, 4th, 5th& 6th semesters, besides five compulsory subjects a student will have to choose one optional subject in each of these semesters.

B.Com. (Hons.):
A student pursuing B.Com. (Hons.) has to study all the subjects in first and second semester. In 3rd, 4th, 5th& 6th semesters, besides five compulsory subjects a student will have to choose two optional subjects in each of these semesters.

SCHEME OF EXAMINATION

B.Com. Ist Semester

Course Code	Course Title	External	Internal	Total Marks
BC 101	Financial Accounting-I	80	20	100
BC 102	Micro Economics	80	20	100
BC 103	Principles of Business Management	80	20	100
BC 104	Computer Applications in Business	80	20*	100
BC 105	Business Mathematics-I	80	20	100
BC 106	Business Communication	80	20*	100

***Internal Assessment based on Practical.**

B.Com. IInd Semester

Course Code	Course Title	External	Internal	Total Marks
BC 201	Financial Accounting-II	80	20	100
BC 202	Macro Economics	80	20	100
BC 203	Fundamentals of Marketing	80	20	100
BC 204	E-Commerce	80	20*	100
BC 205	Business Mathematics-II	80	20	100
BC 206	Business Environment of Haryana	80	20	100
BC 207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical**

B.Com. IIIrd Semester

Course Code	Course Title	External	Internal	Total Marks
BC 301	Corporate Accounting-I	80	20	100
BC 302	Business Statistics-I	80	20	100
BC 303	Business Laws-I	80	20	100
BC 304	Company Law-I	80	20	100
BC 305	Indian Financial System	80	20	100
Optional Subjects				
BC 306	(i) Rural Marketing	80	20	100
	(ii) Foreign Trade of India	80	20	100
	(iii)Networking and Web Designing	80	20*	100

***Internal Assessment based on Practical.**

Syllabus for Bachelor of Commerce (Vocational) Scheme
w.e.f. 2017-2018 in Phased Manner
Tourism and Travel Management
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-104	Computer Applications in Business	80	20*	100
BC(Voc)-105	Tourism Business – I	80	20	100
BC(Voc)-106	Tourism Products – I	80	20	100

***Internal Assessment based on Practical.**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Tourism Business – II	80	20	100
BC(Voc)-206	Tourism Products – II	80	20	100
BC-207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical.**

Semester –III

Paper Code	Subject	External	Internal	Max. Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC(Voc)-305	Tourism Marketing – I	60	20	80
BC(Voc)-306	Travel Agency: Tour Operations Business – I	60	20	80
BC(Voc)-307	On-the-Job Training Report	40	-	40

Semester –IV

Paper Code	Subject	External	Internal	Max. Marks
BC-401	Corporate Accounting-II	80	20	100
BC-402	Business Statistics-II	80	20	100
BC-403	Business Laws-II	80	20	100
BC-404	Company Law-II	80	20	100
BC(Voc)-405	Tourism Marketing – II	80	20	100
BC(Voc)-406	Travel Agency: Tour Operations Business – II	80	20	100

Syllabus for Bachelor of Commerce (Vocational) Scheme
w.e.f. 2018-2019 in Phased Manner
Office Management & Secretarial Practice
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-106	Business Communication	80	20*	100
BC(Voc)-105	Computer Fundamentals and Business Data Processing	80	20*	100
BC(Voc)-106	Introduction to Computer Applications	80	20*	100

***Internal Assessment based on Practical.**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Shorthand (English) Theory	80	20	100
BC(Voc)-206	Shorthand (English) Practical	100**	-	100
BC-207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical.**

Semester-III

Paper Code	Subject	External	Internal	Max Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC (Voc)-305	Office Practice & Communication	60	20	80
BC (Voc)-306	Typewriting Theory (English)	60	20*	80
BC (Voc)-307	On-the-Job Training Report	40	-	40

***Internal Assessment will be based on practical exam conducted by Internal Examiner w.e.f. 2018-2019**

Syllabus for Bachelor of Commerce (Vocational) Scheme
w.e.f. 2017-2018 in Phased Manner
Foreign Trade – Practices and Procedures
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-104	Computer Applications in Business	80	20*	100
BC(Voc)-105	Basics of Foreign Trade-I	80	20	100
BC(Voc)-106	India's Foreign Trade-I	80	20	100

***Internal Assessment based on Practical.**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Basics of Foreign Trade-II	80	20	100
BC(Voc)-206	India's Foreign Trade -II	80	20	100
BC-207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical.**

Semester –III

Paper Code	Subject	External	Internal	Max. Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC(Voc)-305	Elements of Export Marketing-I	60	20	80
BC(Voc)-306	Foreign Trade Financing and Procedures-I	60	20	80
BC(Voc)-307	On-the-job Training Report	40	-	40

Syllabus for Bachelor of Commerce (Vocational) Scheme
w.e.f. 2017-2018 in Phased Manner

Tax Procedure and Practice
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-104	Computer Applications in Business	80	20*	100
BC(Voc)-105	Indian Taxation System	80	20	100
BC(Voc)-106	Income Tax Law-I	80	20	100

***Internal Assessment based on Practical.**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Income Tax Law-II	80	20	100
BC(Voc)-206	Goods and Services Tax-I	80	20	100
BC-207	Environmental Studies (Qualifying Paper)*	-	-	100

***Internal Assessment based on Practical.**

Semester –III

Paper Code	Subject	External	Internal	Max. Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC(Voc)-305	Income Tax Law-III	60	20	80
BC(Voc)-306	Goods and Services Tax-II	60	20	80
BC(Voc)-307	On-the-Job Training Report	40	-	40

Syllabus for Bachelor of Commerce (Vocational) Scheme
w.e.f. 2017-2018 in Phased Manner

Principles and Practice of Insurance
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-104	Computer Applications in Business	80	20*	100
BC(Voc)-105	Life Insurance-I	80	20	100
BC(Voc)-106	General Insurance -I	80	20	100

***Internal Assessment based on Practical**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Life Insurance -II	80	20	100
BC(Voc)-206	General Insurance -II	80	20	100
BC-207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical**

Semester –III

Paper Code	Subject	External	Internal	Max. Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC(Voc)-305	Fire Insurance	60	20	80
BC(Voc)-306	Insurance Business Regulations	60	20	80
BC(Voc)-307	On-the-Job Training Report	40	-	40

Semester –IV

Paper Code	Subject	External	Internal	Max. Marks
BC-401	Corporate Accounting-II	80	20	100
BC-402	Business Statistics-II	80	20	100
BC-403	Business Laws-II	80	20	100
BC-404	Company Law-II	80	20	100
BC(Voc)-405	Marine Insurance	80	20	100
BC(Voc)-406	Insurance and Finance	80	20	100

Advertising, Sales Promotion and Sales Management
(Vocational Course)

Each student who has opted for the above said course shall opt two theory papers in each Semester in addition to four papers common with B.Com. General Scheme.

Semester –I

Paper Code	Subject	External	Internal	Max. Marks
BC-101	Financial Accounting-I	80	20	100
BC-102	Micro Economics	80	20	100
BC-103	Principles of Business Management	80	20	100
BC-104	Computer Applications in Business	80	20*	100
BC(Voc)-105	Marketing Communication-I	80	20	100
BC(Voc)-106	Fundamentals of Advertising	80	20	100

***Internal Assessment based on Practical**

Semester –II

Paper Code	Subject	External	Internal	Max. Marks
BC-201	Financial Accounting-II	80	20	100
BC-202	Macro Economics	80	20	100
BC-203	Fundamentals of Marketing	80	20	100
BC-204	E-Commerce	80	20*	100
BC(Voc)-205	Marketing Communication-II	80	20	100
BC(Voc)-206	Creativity in Advertising	80	20	100
BC-207	Environmental Studies (Qualifying Paper)	-	-	100

***Internal Assessment based on Practical**

Semester –III

Paper Code	Subject	External	Internal	Max. Marks
BC-301	Corporate Accounting-I	80	20	100
BC-302	Business Statistics-I	80	20	100
BC-303	Business Laws-I	80	20	100
BC-304	Company Law-I	80	20	100
BC(Voc)-305	Advertising Media	60	20	80
BC(Voc)-306	Personal Selling and Salesmanship-I	60	20	80
BC(Voc)-307	On-the-Job Training Report	40	-	40

BC (Voc) -306
TYPEWRITING THEORY (ENGLISH)

External Marks: 60
Internal Marks: 20*
Time: 3 hours

Note: Paper setter will set nine questions in all. Question No. 1 comprising of five short types questions carrying four (4) marks each is compulsory. It covers the entire syllabus. Answer to each question should not be more than one page. Candidate is required to attempt four questions from the remaining eight questions carrying 10 marks each.

Typewriting: Concept, need and usefulness; Evolution of typewriter: Early innovations, Standardization, Electric Designs/Models, Typewriter/printer hybrids; QWERTY and other keyboard layouts; Typewriter conventions; Electronic Typewriters: features and usefulness; Computer: Introduction, features and components.

Carbon Manifolding: carbon papers and their kinds, carrying out correction on carbon copies i.e. use of eraser, erasing shield, while correcting fluid etc., squeezing and spreading carbon economy.

Stencil: cutting and duplicating, techniques of stencil cutting.

Correspondence: Paragraph, Letters, Tables.

***Internal Assessment will be based on practical exam conducted by Internal Examiner.**

REFERENCES

- Pitman Shorthand Instructor and Key, Pearson Edu. (India).
- NEW ERA: Pitman New Era Shorthand, Pearson Edu. (India).
- Pitman NEW ERA – New Course Key, Pearson Edu. (India).

Source: https://en.wikipedia.org/wiki/Typewriter#Early_innovations

BC-207
ENVIRONMENTAL STUDIES (QUALIFYING PAPER)
w.e.f. 2018-2019

Total Marks: 100
Time : 3 Hours

The Subject of Environmental Studies is included as a qualifying paper in all UG Courses (including professional courses also) from the session 2004-2005 and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

Annual System: The duration of the course will be 50 lectures. The examination will be conducted by the college at its own level earlier than the examination along with the Annual Examination.

Semester System: The Environment Course of 50 lectures will be conducted in the second semester and the examinations shall be conducted at the end of second semester:

Credit System: The core course will be awarded 4 credits.

Exam. Pattern: In case of awarding the marks, the question paper should carry 100 marks. The structure of the question paper being:

PART-A: Short Answer Pattern	25 Marks
PART-B: Essay type with inbuilt choice	50 Marks
PART-C: Field work	25 Marks

INSTRUCTIONS FOR THE EXAMINERS

Part-A: Questions 1 is compulsory and will contain ten short answer type question of 2.5 marks each covering the entire syllabus.
Part-B : Eight essay type questions (With inbuilt choice) will be set from the entire syllabus and the candidates will be required to answer any four of them. Each essay type question will be of 12.5 marks.

The examination will be conducted by the college concerned at its own level earlier than he annual examination and each student will be required to score minimum of 35% marks each in Theory and Practical. The marks obtained in this qualifying paper will not be including in determining the percentage of marks for the award of degree.

However, these will be shown in the detailed marks certificate of the student.

Syllabus and Course of reading

The multidisciplinary nature of environmental studies: Definition, Scope and importance need for public awareness. (2 Lectures)
Natural Resources: Renewable and non-renewable resources:
Natural resources and associated problems.
a) Forest resources: Use ad over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. .
c) Mineral resources: Use and exploitation, environmental effects of extracting abd using mineral

resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources; Growing energy needs, renewable and non-renewable energy sources, case studies.
f) Land resources: Land as a resources, land degradation man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 Lectures)

Ecosystems
- Concept of an ecosystem
-Structure and function of an ecosystem.
- Producers, Consumers and decomposers.
-Energical flow in the ecosystem
-Ecological succession
--Food chains, food webs and ecological pyramids.
-Introduction, types, Characteristic features, structure and function *of* the following *of* the ecosystem.

a. Forest ecosystem
b. Grassm land ecosystem
c. desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

(6 lectures).

Biodiversity and its conservation

--Introduction-Definition: genetic, species and ecosystem diversity.
--Bio-geographical classification of India. "
--Value of bioversity: consumptive use, productive use, social, ethical; aesthetic and option values.
--Biodiversity at global, National and local levels.
--India as a mega-diversity nation.
Hot-sports of biodiversity.
--Threats to biodiversity: habitat loos, poaching *of* wildlife, man-wildlife conflicts. 1
--Endangered and endemics.
--Conservation *of* biodiversity: In-situ and Ex-situ, Conservation of biodiversity.

(8 Lectures)

Environmental Pollution
Definition

--Causes, effects and control measures *of* :-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid Waste Management: Causes, effects and control measures *of* urban and industrial wastes.
--Role of an individual in prevention of pollution.
--Pollution case studies. .
--Disaster Management: floods, earthquake, cyclone and landslides.

(8 lectures)

Social Issues and the environment

--From Unsustainable to Sustainable development.
--Ur ban problems related to energy.
-- Water conservation, rain water harvesting, watershed management.
--Resettlement and rehabilitation of people; its problems and concerns. Case studies.

--Environmental ethics: Issues and possible solutions.

--Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

-- Wasteland reclamation.

--Consumerism and waste products.

--Air (prevention and Control of Pollution) Act.

-- Water (prevention and control of pollution) Act.

--Wildlife Protection Act.

--Forest Conservation Act.

--Issues involved in enforcement *of* environmental legislation.

--Public awareness.

(7 lectures)

Human Population and the Environment

-- Population growth, variation among nations.

-. Population explosion- family Welfare Programme.

--Environment and human hea1th.

--Human Rights.

--Value Education.

--HIV/AIDS.

--women and child welfare

--role of information technology in environment and human health

-- Drug Abuse: Concept, Reasons, Impact and Remedies

-- Ability Enhancement: Concept, Need, Objectives, Methods and Constraints

--Case Studies. (6 lectures)

Field work

--Visit to a local area to document environmental assets: river/forest grass land/ hill/mountain.

-Visit to a local polluted site-Urban/Rural/Industrial/ Agricultural.

--Study of common plants, insects, birds.

--Study of simple ecosystems pond, river, hill slopes, etc.

(Field work Equal to 5 lecture. hours).

SIX MONTHS COMPULSORY CORE MODULE COURSE IN ENVIRONMENTAL STUDIES: FOR UNDERGRADUATES

Teaching Methodologies

The Core Module Syllabus for Environmental Studies includes class room teaching and Field Work. The syllabus divided into eight units covering 50 lectures. The first seven units will cover 45 lectures which are class room based to enhance knowledge skills mid attitude to environment. Unit eight is based on field activities which will be covered in five lecture hours and would provide students' firsthand knowledge on various local would environmental aspects.

Field experience is one of the most effective learning to for environmental concerns. This moves out of the scope of text book mode of teaching into realm of real learning in the field where the teacher merely acts as a catalyst to interpret what student observes or discovers in his/her environment.

Fields are as essential as class work and form an irreplaceable synergistic tool in the entire learning process.

Course material provided by UGC for class room teaching and field activities be utilized.

The universities/Colleges can also draw upon expertise of outside resource persons for teaching purposes. Environmental Core module shall be integrated into the teaching programmes of all undergraduate courses.

REFERENCES

- Agarwal, K.C. Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad
- Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc.
- Clerk RS., Marine Pollution; Clanderson Press Oxford(1B).
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M. T.
- Environmental Encyclopedia, Jaico Publishing House, Mumbai.
- De A.K., Environmental Chemistry, Wiley Esteem Ltd.
- Gleick, H.P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute.
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- Heywood, V.H. & Watson, R.T. Global Biodiversity Assessment. Cambridge Univ. Press.
- Jadhav, H & Dosale, V.M., Environmental Protection and Laws. Himalaya Pub. House, Delhi.
- Mhaskar A.K, Matter Hazardous, Techno-Science Publications(TB).
- Rao MN. & Datta, A.K., Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
- Townsend C., Harper J, and Michael Begon, Essentials Ecology, Blackwell Science(1B).
- Trivedi R.K and P.K Goel, Introduction to air pollution, Techno-Science Publications (TB).
- Trivedi R.K, Handbook of Environmental Laws, Ru1es, Guidelines Compliances and Standards, Vol I and II, Envirol Media(R).
- Wagner KD., Environmental Management. W.B. Saunders Co. Philadelphia, USA. (M) Magazine (R) Reference (TB) Textbook.

हिन्दी - विभाग

कुरुक्षेत्र विश्वविद्यालय कुरुक्षेत्र

(प्रदेश विधायिका एक्ट 12ए 1956 के तहत स्थापित)

('प्रथम़ + श्रेणी' रा.शै.मू.स.द्वारा प्रदत्त)

एम फिल हिंदी पाठयक्रम (वार्षिक प्रणाली - क्रेडिट बेस्ड सिस्टम) सत्र 2018-2019 से प्रभावी

परीक्षा की स्कीम

प्रश्न-पत्र	विषय	क्रेडिट	शिक्षण प्रति घंटा/ सप्ताह	परीक्षा की स्कीम (अंक)		
				लिखित परीक्षा	आंतरिक मूल्यांकन	कुल अंक
प्रश्न-पत्र -01 एम फिल हिंदी के सभी छात्रों के लिए अनिवार्य है।						
हिन्दी-01	शोध-प्रविधि एवं आलोचना	4	4	80	20	100
प्रश्न-पत्र -02 में निम्नलिखित पांच विकल्प होंगे। एम फिल हिंदी के छात्र किसी एक विकल्प का अध्ययन करेगा।						
हिन्दी-02-(क)	आदिकाल एवं मध्यकालीन हिंदी काव्य का विशेष अध्ययन	4	4	80	20	100
हिन्दी-02-(ख)	आधुनिक हिंदी काव्य का विशेष अध्ययन	4	4	80	20	100
हिन्दी-02-(ग)	आधुनिक हिंदी गद्य का विशेष अध्ययन	4	4	80	20	100
हिन्दी-02-(घ)	हिंदी भाषा का विशेष अध्ययन	4	4	80	20	100
हिन्दी-02-(च)	भारतीय साहित्य का विशेष अध्ययन	4	4	80	20	100
सेमीनार और लघु शोध् प्रबन्ध् सभी एम फिल हिंदी के छात्रों के लिए अनिवार्य है।						
हिन्दी-03	सेमीनार-1-शोध-प्रविधि एवं आलोचना	2×2 = 4	40×2 = 80			100
	सेमीनार-2 **(वैकल्पिक विषय)**					
	दो प्रदत्त कार्य (Assignments)		10×2 = 20			
कुल योग क्रेडिट/अंक		**12**	**-**			**300**
-	**लघु शोध् प्रबन्ध्** (Dissertation)	-	-	-	-	ग्रेड प्रणाली

पाठयक्रम एवं पाठय सामग्री

प्रश्न-पत्र :- हिन्दी-01-शोध-प्रविधि एवं आलोचना

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषय

खंड (क) शोधः स्वरूप और प्रकृति

शोध का अर्थ, स्वरुप और परिभाषा
शोध के उद्देश्य
शोध की विशेषताएँ
शोध की प्रेरणा, शोध दृष्टिकोण
शोधार्थी की विशेषताएँ,
शोध-निर्देशक की विशेषताएँ,
शोध-निर्देशक और शोधार्थी के बदलते संबंध

खंड (ख) शोध की पद्धतियां

(क). काव्यशास्त्रीय पद्धति
(ख). समाजशास्त्रीय पद्धति
(ग). भाषावैज्ञानिक पद्धति
(घ).शैली वैज्ञानिक पद्धति
(ङ). मनोवैज्ञानिक पद्धति
(च) तुलनात्मक पद्धति
(छ) ऐतिहासिक पद्धति
(ज)अंतर-अनुशासनात्मक शोध
(झ)आगमन -निगमन पद्धति

खंड (ग) शोधः प्रक्रिया और प्रस्तुतिकरण

शोध समस्या और शोध परिकल्पना में अंतर
शोध प्रारुपः उद्देश्य, भाग, विशेषताएँ और निर्धारक तत्व:
सामग्री संकलन, विश्लेषण और व्याख्या
शोध प्रबंध लेखनः पाद-टिप्पणी , संदर्भ ग्रंथ-सूची

खंड (घ) साहित्यिक विमर्श और आलोचना पद्धतियां

साहित्यिक शोध और साहित्यिक आलोचना के अंतःसंबध

आलोचना पद्धतियाः मनोवैज्ञानिक, समाजशास्त्रीय, मार्क्सवादी, सौंदर्यशास्त्रीय, शैलीवैज्ञानिक

अस्मितामूलक साहित्यिक विमर्शः दलित, स्त्री, आदिवासी

सहायक पाठ्य सामग्रीः

1 **विजयपाल सिंह, हिन्दी अनुसंधान**
2 **तिलक सिंह, नवीन शोध विज्ञान**
3 **विनयमोहन शर्मा, शोध प्रविधि**
4 **नगेन्द्र, अनुसंधान एवं आलोचना**
5 **बैजनाथ सिंहल, शोध - स्वरूप एवं मानक व्यावहारिक कार्यविधि**
6 **संभावना (शोधतन्त्र), हिन्दी विभाग, कु.वि. कुरुक्षेत्र।**
7 **मैथिली प्रसाद भारद्वाज, शोध प्रविधि, आधार प्रकाशन, पंचकूला।**
8 **निर्मला जैन, हिन्दी आलोचना का दूसरा पाठ, राजकमल प्रकाशन, दिल्ली।**
9 **देवीशंकर अवस्थी, आलोचना और आलोचना, वाणी, नई दिल्ली**
10 **टेरी ईगलटन, मार्क्सवाद और साहित्यालोचना, आधार प्रकाशन, पंचकूला**
11 **शरणकुमार लिंबाले, दलित साहित्य का सौन्दर्यशास्त्र, वाणी, नई दिल्ली**
12 **बजरंग बिहारी तिवारी, दलित साहित्यः एक अंतर्यात्रा**
13 **अनीता सिंह, दलित चेतना और हिन्दी साहित्य, यूनिवर्सिटी पब्लिकेशन, दिल्ली।**
14 **महादेवी वर्मा, श्रृंखला की कड़ियां**
15 **सं. साधना आर्य, नारीवादी राजनीति संघर्ष एवं मुद्दे, हिन्दी माध्यम कार्यान्वय निदेशालय, दिल्ली विश्वविद्यालय, दिल्ली**
16 **रमणिका गुप्ता, आदिवासी साहित्य यात्रा**
17 **रमणिका गुप्ता, आदिवासीः शौर्य एवं विद्रोह**

प्रश्न-पत्र :- हिन्दी-02-(क) - आदिकाल एवं मध्यकालीन हिंदी काव्य का विशेष अध्ययन

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषयः

खंड (क) प्राचीन काव्य

आदिकालीन हिंदी काव्य की वैचारिक पृष्ठभूमि

आदिकालीन हिंदी काव्य की विभिन्न काव्य धाराओं की विशिष्टता

आदिकाल के प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (विद्यापति, अमीर खुसरो, सरहपा, गोरखनाथ)

खंड (ख) मध्यकालीन काव्य- निर्गुण धारा

संत काव्य की वैचारिक पृष्ठभूमि व संत काव्य धारा की विशिष्टता

सूफी काव्य की वैचारिक पृष्ठभूमि व सूफी काव्य धारा की विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (कबीर, रैदास, दादू दयाल, मलिक मुहम्मद जायसी, कुतुबन)

खंड (ग) मध्यकालीन काव्य- सगुण धारा

कृष्ण काव्य की वैचारिक पृष्ठभूमि व संत काव्य धारा की विशिष्टता

राम काव्य की वैचारिक पृष्ठभूमि व सूफी काव्य धारा की विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (सूरदास, तुलसीदास, मीरा, रसखान, नंददास)

खंड (घ) रीतिकालीन काव्य

रीतिकाल की वैचारिक पृष्ठभूमि

विभिन्न काव्य धाराओं की विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (केशव, मतिराम, बिहारी, घनानंद, भूषण)

सहायक पाठ्य सामग्रीः

(नोटः पाठ्यक्रम में सम्मिलित कवियों की प्रमुख रचनाओं का अध्ययन)

1 हिन्दी साहित्य का इतिहास, आचार्य रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, दिल्ली

2 हिन्दी साहित्य का आदिकाल, हजारी प्रसाद द्विवेदी, बिहार राष्ट्र भाषा परिषद, पटना, 1961

4 हिन्दी साहित्य का इतिहास, सम्पादक, डॉ. नगेन्द्र, नेशनल पब्लिशिंग हाउस, दिल्ली, 1973

5 रीतिकाव्य की भूमिका, डॉ. नगेन्द्र साहित्य भवन इलाहाबाद

6 रामविलास शर्मा, लोक जागरण और हिन्दी जागरण साहित्य, वाणी, नई दिल्ली

7 सावित्री शोभा, हिन्दी भक्ति साहित्य में सामाजिक मूल्य एवं सहिष्णुतावाद

8 रामवृक्ष बेनीपुरी, विद्यापति पदावली

9 कबीर, हजारी प्रसाद द्विवेदी, नागरी प्रचारिणी सभा, काशी

10 दादूदयाल, परशुराम चतुर्वेदी, नागरी प्रचारिणी सभा

11 जायसी ग्रन्थावली, रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, वाराणसी

12 तुलसीदास, आचार्य रामचन्द्र शुक्ल, राधाकृष्ण, नई दिल्ली

13 रसखान, देवेन्द्र प्रताप उपाध्याय, आनन्द पुस्तक भवन, वाराणसी

14 आचार्य रामचन्द्र शुक्ल, भ्रमरगीत सार, राजकमल प्रकाशन, नई दिल्ली।

15 भोलानाथ तिवारी, अमीर खुसरो और उनका हिन्दी साहित्य, प्रभात प्रकाशन, नई दिल्ली

16 केशव ग्रन्थावली, विश्वनाथ प्रसाद मित्र, हिन्दुस्तान एकेडमी, इलाहाबाद

17 मतिराम ग्रन्थावली, कृष्ण बिहारी

18 बिहारी, विश्वनाथ मिश्र, संजय बुक सेन्टर, वाराणसी

19 घनानन्द कवित, सं. विश्वविद्यालय प्रसाद मिश्र, सरस्वती मन्दिर, वाराणसी

20 भूषण ग्रन्थावली, सं. श्यामबिहारी मिश्र, पं. शुकदेव बिहारी मिश्र, नागरी प्रचारिणी सभा, वाराणसी

प्रश्न-पत्र :- हिन्दी-02-(ख) - आधुनिक हिंदी काव्य का विशेष अध्ययन

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषयः

खंड (क) भारतेंदु व द्विवेदीयुगीन हिंदी काव्य

आधुनिक हिंदी काव्य की वैचारिक पृष्ठभूमि

भारतेंदु व द्विवेदीयुगीन हिंदी काव्य की विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (भारतेंदु, मैथिलीशरण गुप्त, अयोध्यासिंह उपाध्याय हरिऔध)

खंड (ख) छायावाद

छायावाद की वैचारिक पृष्ठभूमि

छायावादी काव्य की विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (जयशंकर प्रसाद, सूर्यकांत त्रिपाठी निराला, सुमित्रानंदन पंत)

खंड (ग) प्रगतिवाद, प्रयोगवाद, नई कविता

प्रगतिवादी काव्य की वैचारिक पृष्ठभूमि व विशिष्टता

प्रयोगवादी काव्य की वैचारिक पृष्ठभूमि व विशिष्टता

नई कविता की वैचारिक पृष्ठभूमि व विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (नागार्जुन, हीरानंद सच्चिदानंद वात्स्यायन अज्ञेय, गजानन माधव मुक्तिबोध)

खंड (घ) समकालीन कविता

समकालीन कविता की वैचारिक पृष्ठभूमि

विभिन्न काव्य आंदोलन व उनकी विशिष्टता

प्रमुख कवियों के काव्य का समीक्षात्मक अध्ययन (श्यामाप्रसाद पाण्डेय धूमिल, रघुवीर सहाय, कुंवर नारायण)

सहायक पाठ्य सामग्रीः

नोटः (पाठ्यक्रम में सम्मिलित कवियों की प्रतिनिधि काव्य रचनाओं का अध्ययन)

1 भारतेन्दु हरिश्चन्द्र, बाबू ब्रजरत्न दास

2. रामविलास शर्मा,भारतेन्दु हरिश्चन्द्र और हिन्दी नवजागरण की समस्याएं

3. छायावाद, नामवर सिंह
4. निराला की साहित्य साधना, डॉ. रामविलास शर्मा
5. सुमित्रानन्दन पंत, डॉ. नगेन्द्र प्रयाग
6. मुक्तिबोध, नयी कविता का आत्मसंघर्ष
7. विश्वनाथ प्रसाद तिवारी, समकालीन हिंदी कविता
8. कुमारेंद्र पारसनाथ सिंह, कविता का संघर्ष
9. रामस्वरूप चतुर्वेदी नयी कविता का एक साक्ष्य
10. मैनेजर पांडेय, हिंदी कविता का अतीत और वर्तमान
11. नन्दकिशोर नवल, हिंदी कविता अभी बिल्कुल अभी
12. डा. नगेंद्र, आधुनिक हिंदी कविता की मुख्य प्रवृतियां
13. भगवत रावत, कविता का दूसरा पाठ और प्रसंग
14. शिवकुमार मिश्र, आधुनिक कविता और युग संदर्भ
15. परमानंद श्रीवास्तव, कविता का अर्थात

प्रश्न-पत्र :- हिन्दी-02-(ग) - आधुनिक हिंदी गद्य का विशेष अध्ययन

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषयः

खंड (क) हिंदी गद्य - कथा साहित्य

हिंदी उपन्यास की वैचारिक पृष्ठभूमि और विकास

हिंदी कहानी की वैचारिक पृष्ठभूमि और विकास परमानन्द श्रीवास्तव, कहानी की रचना प्रक्रिया

प्रमुख कथाकारों के कथा-साहित्य का समीक्षात्मक अध्ययन (प्रेमचंद, फणीश्वरनाथ रेणु, भीष्म साहनी)

खंड (ख) हिंदी गद्य - नाटक और रंगमंच

हिंदी नाटक की वैचारिक पृष्ठभूमि और विकास

हिंदी रंगमंच की वैचारिक पृष्ठभूमि और विकास

प्रमुख नाटककारों के नाटक व रंगमंच का समीक्षात्मक अध्ययन (भारतेंदु हरिश्चंद्र, मोहन राकेश, सुरेंद्र वर्मा)

खंड (ग) हिंदी गद्य - निंबंध और पत्रकारिता

हिंदी निंबंध की वैचारिक पृष्ठभूमि और विकास

हिंदी पत्रकारिता की वैचारिक पृष्ठभूमि और विकास

प्रमुख निबंधकारों के साहित्य का समीक्षात्मक अध्ययन (बालमुकुंद गुप्त, रामचंद्र शुक्ल, हरिशंकर परसाई)

खंड (घ) हिंदी गद्य - आत्मकथा, जीवनी और संस्मरण

हिंदी आत्मकथा की वैचारिक पृष्ठभूमि और विकास

हिंदी जीवनी की वैचारिक पृष्ठभूमि और विकास

प्रमुख आत्मकथा, जीवनी व संस्मरण लेखकों के साहित्य का समीक्षात्मक अध्ययन (महादेवी वर्मा, विष्णु प्रभाकर, ओमप्रकाश बाल्मीकि)

सहायक पाठ्य सामग्रीः

(नोट- पाठ्यक्रम में निर्धारित रचनाकारों की प्रमुख कृति का अध्ययन)

1 रामविलास शर्मा, प्रेमचन्द और उनका युग

2 प्रेमचन्द और भारतीय किसान, प्रो. रामबक्ष

3 .बच्चन सिंह, उपन्यास का काव्यशास्त्र

4. गोपाल राय, उपन्यास की संरचना

5 डॉ. मधुरेश, हिन्दी कहानी का विकास, राजकमल प्रकाशन, दिल्ली।
6 राजेन्द्र यादव, कहानी: अनुभव और अभिव्यक्ति, वाणी प्रकाशन, नई दिल्ली
7 वैभव सिंह, भारतीय उपन्यास और आधुनिकता, आधार प्रकाशन, पंचकूला
8 डॉ. मधुरेश, हिन्दी उपन्यास का विकास, राजकमल प्रकाशन, दिल्ली
9 जयदेव तनेजा, हिन्दी रंगमंच, दशा और दिशा, तक्षशिला प्रकाशन, नई दिल्ली
10 बच्चन सिंह, साहित्यिक निबन्ध आधुनिक दृष्टिकोण, वाणी प्रकाशन, नई दिल्ली
11 जगदीशवर चतुर्वेदी, हिंदी पत्रकारिता का इतिहास
12 प्रो. शंभुनाथ, हिंदी पत्रकारिता : हमारी विरासत
13 भारतेन्दु हरिश्चन्द्र और हिन्दी नवजागरण की समस्याएं, रामविलास शर्मा
14 बालमुकुंद गुप्त एवं श्रेष्ठ निबन्ध, सं. सत्यप्रकाश मिश्र, लोकभारती, इलाहाबाद।
15. पंकज चतुर्वेदी, आत्मकथा की संस्कृति

प्रश्न-पत्र :- हिन्दी-02-(घ) - हिंदी भाषा का विशेष अध्ययन

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषयः

खंड (क) हिंदी भाषाः स्वरूप और विकास

हिंदी भाषा का स्वरूप और प्रकृति
हिंदी भाषा का विकास में लौकिक संस्कृत, प्राकृत और अपभ्रंश का योगदान
हिंदी की बोलियां (ब्रज, अवधी, मैथिली)

खंड (ख) मानक हिंदी

ध्वनि, शब्द और वाक्य संरचना
देवनागरी लिपि
खड़ी बोली का परिचय व विकास

खंड (ग) हिंदी और हिंदी आंदोलन

स्वतंत्रता पूर्व के हिंदी आंदोलन
स्वातंत्र्योत्तर हिंदी आंदोलन
हिंदी की वैश्विक स्थिति

खंड (घ) राजभाषा हिंदी

हिंदी की सांविधानिक स्थिति
राजभाषा हिंदीः उपलब्धियां और चुनौतियां
हिंदी भाषा और प्रौद्योगिकी

सहायक पाठ्य सामग्रीः

1 **किशोरदास वाजपेयी, हिन्दी शब्दानुशासन, काशी**
2 **श्याम सुन्दर दास, हिन्दी भाषा और साहित्य, प्रयाग।**
3 **रामविलास शर्मा, भाषा और समाज**
4 **रामविलास शर्मा, हिन्दी आर्य भाषाएं और हिन्दी**
5. **भोलानाथ तिवारी हिंदी भाषा का विकास**
6. **परमानंद पांचाल, हिंदी भाषा, राजभाषा और लिपि**
7 **पं. चन्द्रधर शर्मा गुलेरी, पुरानी हिन्दी**
8 **डॉ. राजमणि शर्मा, हिन्दी भाषा: इतिहास और स्वरूप**
9. **भोलानाथ तिवारी, राजभाषा हिंदी**
10 **पाण्डुरंग दामोदर गुणे, तुलनात्मक भाषा विज्ञान**
11 **विनोद कुमार प्रसाद, भाषा और प्रौद्योगिकी, वाणी प्रकाशन, नई दिल्ली।**

12 शंकर दयाल सिंह, हिन्दी राष्ट्रभाषा, राजभाषा, जनभाषा, किताबघर, नई दिल्ली
13 डॉ. कृष्ण कुमार रत्तू, मीडिया और हिन्दी, वैश्वीकृत प्रयोजनमूलक प्रयोग, वाई किंग बुकस, जयपुर
14. सूर्य प्रसाद दीक्षित, संचार भाषा हिंदी
15. भोलानाथ तिवारी, सामान्य हिंदी

प्रश्न-पत्र :- हिन्दी-02-(च) - भारतीय साहित्य का विशेष अध्ययन

क्रेडिटः 4 कुल अंक: 100

समय : 3 घंटे लिखित परीक्षा: 80

आंतरिक मूल्यांकन: 20

निर्देशः प्रश्न पत्र चार खंडों में में विभक्त होगा। प्रत्येक में से दो-दो प्रश्न परीक्षा में दिए जायेंगे, परीक्षार्थी को एक का उत्तर देना होगा। प्रत्येक के लिए 20 अंक निर्धारित हैं।

पाठ्य विषयः

खंड (क) भारतीय काव्य

भारतीय कविता के विकास व परिदृश्य का सामान्य परिचय

रवींद्रनाथ टैगोर (बंगला) व हाली पानीपती (उर्दू) के काव्य का अध्ययन

खंड (ख) भारतीय कथा

भारतीय कथा के विकास व व परिदृश्य का सामान्य परिचय

गुरदयाल सिंह (पंजाबी) व यू. आर. अनन्तमूर्ति (कन्नड़) के गद्य का अध्ययन

खंड (ग) भारतीय नाटक

भारतीय नाटक के विकास व व परिदृश्य का सामान्य परिचय

कालिदास (संस्कृत) व गिरीश कार्नाड (मराठी) के नाटक का अध्ययन

खंड (घ) भारतीय साहित्य आलोचना

भारतीय आलोचना के विकास व व परिदृश्य का सामान्य परिचय

भरतमुनि (संस्कृत) व रामचंद्र शुक्ल (हिंदी) के आलोचना का अध्ययन

सहायक पाठ्य सामग्रीः

नोटः (रवींद्रनाथ टैगोर, हाली पानीपती, गुरदयाल सिंह, यू. आर. अनन्तमूर्ति, कालिदास, गिरीश कार्नाड, भरतमुनि व रामचंद्र शुक्ल किसी एक रचना का अध्ययन)

1 **डॉ. नगेन्द्र, भारतीय साहित्य, प्रभात प्रकाशन, दिल्ली**

2 **डॉ. रामछबीला त्रिपाठी, भारतीय साहित्य वाणी प्रकाशन, नई दिल्ली**

3. **डा. मूलचंद गौतम, भारतीय साहित्य**

4. **डा. सियाराम तिवारी, भारतीय साहित्य की पहचान**

5. **डा. नगेंद्र, भारतीय साहित्य कोश**

6. **के. सच्चिदानंद, भारतीय साहित्यः स्थापनाएं और प्रस्तावनाएं**

7. **लक्ष्मीकांत पाण्डेय, भारतीय साहित्य**

8. **श्याम परमार, भारतीय लोक साहित्य**

9. **डा. रामविलास शर्मा, भारतीय साहित्य की भूमिका**

10. **प्रदीप श्रीधर, भारतीय साहित्य अध्ययन की दिशाएं**

BOTANY DEPARTMENT
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of examination for M.Phil-Botany Programme w.e.f. session 2018-19 under CBS

	Name	Credit	Hrs	Marks	Internal Assessment	Total
Paper- I (**Recent Advance in Plant Sciences**)	**Bot-501**	4	3	80	20	=100
Paper - II (**Research Techniques)**	**Bot- 502**	4	3	80	20	=100
Paper - III	**Seminar -503**	2	2	50	--	=50
Paper – IV	**Review - 504 writing**	2	2	50	--	=50
	Dissertation				Grades : A, B, C, D	

Course Work for M.Phil. Programme

Botany Department, Kurukshetra University, Kurukshetra

Paper- I **Recent Advance in Plant Sciences**
Bot-501

Max. Marks: 80(Theory), Internal Assesment-20
Duration : 3 hours Credit-4

Note: 1. Ten questions will be set from the entire syllabus and two from each unit.
2. The candidates are required to attempt five questions in all, selecting one from each unit. All questions carry equal marks.

Unit I

Mycology and Plant Pathology

1. Morphology and classification of fungi, bacteria and viruses.
2. Fungal Ecology, Fungal Biotechnology.
3. Fungi as symbionts of photobiont, plants and insects.
4. Chemical control, fungicides, systemic fungicides and soil fumigants.
5. Biological control.
6. Botanicals in disease control and mycoherbicidal strategies for biocontgrol.
7. Disease inciting microorganisms and symptoms of plant diseases.

Unit II

Seed Germination and Dormancy
1. Physiology and biochemistry of seed germination and CAM Plants.
2. Environmental and hormonal control of seed dormancy.

Photosynthesis
1. The path of carbon in photosynthesis, C3 and C4.
2. Structure and functions of Rubisco.

Phytohormones
Recent Advances in the mechanisms of action of gibberellin, abscisic acid and ethylene.

Senescence
Leaf senescence: Physiological and biochemical changes: and regulation of senescence.

Unit III

Ecology and Resource Conservation

1. Productivity: Patterns and process.
2. Biodiversity: Patterns, processes, conservation of biodiversity.

Ecological restoration
1. Basic concepts, process and strategies ecological restoration, restoration of aquatic ecosystem-river corridors, wetlands and lakes. Rehabilitation of salt affected soils. Bioremediation and phytoremediation.

2. Principles and approaches of Forest Management. Global changes and sustainability.

Unit IV

Algal Biotechnology

1. Algal fertilizers.
2. Algal immobilization: methods and applications, single cell proteins.
3. Cyanobacteria and N2-fixation.

Plant Cell and Tissue Culture

1. Introduction, concept of cellular differentiation, totipotency.
2. Organogenesis and embryogenesis, techniques and utility.
3. Somatic hybridization: Protoplast fusion, hybrid selection and regeneration.
4. Applications of plant tissue culture: Clonal propagation, artificial seeds, production of secondary metabolites, cryopreservation.

Unit V

Eukaryotic Genome

1. Chromosomes and their chemical organization: split genes, repeated DNA, different types and multigene families.

2. Regulation of gene expression in eukaryote a different levels: Transcriptional, post-transcriptional, translational and post-translational.

3. **Transgenic Plants**
   Transgenics for improvement of nutritional quality, fruit ripening, resistance against insects, fungi, bacteria and viruses, molecular farming and vaccines.

Course Work for M.Phil. Programme

Botany Department, Kurukshetra University, Kurukshetra

Paper-II- Bot-502

Research Techniques

Max. Marks: 80(Theory), Internal Assesment-20
Duration : 3 hours, **Credit-4**

Note: 1. Ten questions will be set from the entire syllabus and two from each unit.
2. The candidates are required to attempt five questions in all selecting one from each unit. All questions carry equal marks.

Unit – I

Techniques of isolation and raising pure cultures of microorganisms

1. Isolation of microorganisms from soil by the serial agar plating method.
2. Isolation of Fungi by Warcup and wakesman methof.
3. Isolatin o VAM fungi, inoculums production and mass culturing of
4. Microorganisms
5. Preparation of basic solid media, selective media etc., sub culturing techniques, Streak Plate, Pour Plate, Spread Plate methods.
6. Demonstration of Koch's postulates for fungal pathogens.
7. Isolation of plant pathogens.

Unit- II

Methods of extraction of Plant Metabolites

1. Chlorophyll and carotenoids.
2. Amino acids and organic acids
3. Starch and sugars
4. Tracer Techniques and Autoradiography, Methods of estimation of total proteins Spectrophotometry
5. Principles, applications: UV, Visible spectrophotometry and Atomic Absorption Spectrophotometry.

Unit – III

General Techniques of Plant Tissue Culture

1. Medium preparation and types of media
2. Sterilization techniques for medium, glassware and explants
3. Inoculation techniques
4. Techniques for isolation and culture of protoplasts.

General Botanical Micro techniques

1. Fixation, types of Fixatives
2. Sectioning, types of microtomes
3. Biological stains, staining techniques

Microscopy

Principles, types of microscopy (Phase-Contrast, Fluorescence, TEM and SEM).

Unit – IV

Electrophoresis **:** Types (Paper, TLC, GLC and HPLC) & their applications

Principle and types : Partition, adsorption, affinity, ion exchange, Gas chromatography, gel filtration, HPLC.

Unit – V

Ecology and Environmental Analysis

1. Methods of vegetation analysis, Plants function traits (PFTs), estimating plant biomass, and productivity.
2. Methods of analysis of carbon sequestration, nitrogen mineralization and immobilization
3. Application for data analysis & practical, use of basic computer software: M.S.Office, SPSS

Department of English

Kurukshetra University Kurukshetra
Established by the state Legislature Act XII of 1956)
(A+ NAAC Accredited)

Scheme of Examination for M. Phil (English)
(Effective from the Academic Session 2018-19)

Scheme of Examination for M. Phil English with CBS System. There are four credits for each paper one credit is equal to 20 Marks.

Scheme of Examination for M. Phil (English)

Course Code	Nomenclature of the papers	Theory Marks	Internal Assessment	MM	Credit Marks	Time	Month and year of the Exam
Course-I	Research Methodology of Critical Approaches	80	20	100	4	3hrs	May, 2019
Course-II	Modern English Fiction (Option –I)	80	20	100	4	3hrs	May, 2019
	Modern English Poetry (Option –II)	80	20	100	4	3hrs	May, 2019
	Modern English Drama (Option –III)	80	20	100	4	3hrs	May, 2019
	Indian Writing in English (Option –IV)	80	20	100	4	3hrs	May, 2019
	Two Seminar+ Two Assignment	40+40	10+10	100	4		May, 2019
	Total			**300**	**12**		

Total Credits 4x3=12

Dissertation= Grade (as per University Rules)

DEPARTMENT OF ENGLISH

KURUKSHETRA UNIVERSITY KURUKSHETRA
(Established by the State Legislature Act XII of 1956)
("A" Grade, NAAC Accredited)

Outline of Test, Syllabi and Courses of Reading for M. Phil. (English) Examination (effective from the academic session 2018-19)

OUTLINES OF TEST

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours.

COURSE-I		**:**	**Research Methodology and Critical Approaches**
COURSE-II	**(Opt. i)**	**:**	**Modern English Fiction**
	(Opt. ii)	**:**	**Modern English Poetry**
	(Opt.iii)	**:**	**Modern English Drama**
	(Opt.iv)	**:**	**Indian Writing in English**

Seminars	**:**	**Two Seminars**	**:**	**80 Marks (40+40)**
& Assignments		**Two Assignments**	**:**	**20 Marks (10+10)**

Dissertation **:** **Grading System**

DEPARTMENT OF ENGLISH
KURUKSHETRA UNIVERSITY KURUKSHETRA
(Established by the State Legislature Act XII of 1956)
(A Grade, NAAC Accredited)

M.Phil. (English) Syllabus for the Session 2018-19

Note: There will be five questions in all, one from Section A, two from Section B and two from Section C. All the questions will be compulsory.

Course-I: Research Methodology and Critical Approaches

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours

Section-A: Non-detailed Study

(**A candidate shall be required to show his/her acquaintance with any four of the given six items)**

Consulting library catalogue, Reader-Response Criticism, Eco-feminism, Paul de Man, Harold Bloom, Elaine Showalter, George Lukacs on Modernism, Michel Foucault, Phenomenological criticism, Ethnic Studies, Hermeneutics (Hirsch), Reception Theory, Queer Theory.

(4 x 4 = 16 Marks)

Section-B: Research Methodology

Part I: Mechanics of writing Dissertation

(A candidate shall attempt two out of four items from part I(a)

(a)

(i) Choice of the topic
(ii) Overview of extant criticism.
(iii) Use of quotations: Prose, Poetry, Drama
(iv) Common scholarly abbreviations

(2 x 4= 8 Marks)

(A candidate shall attempt four given items from part I (b)

(b) Documentation : Citing sources in the text.
(Following sections from MLA Handbook are prescribed: 6.1, 6.2, 6.3, 6.4 and 6.6)

(4 X 2 = 8 Marks)

Part II:

(A candidate shall attempt Eight items from part II)

(a) Documentation: Preparing the list of works cited.
(Following sections from MLA Handbook are prescribed: 5.1., 5.2, 5.3, 5.4, 5.5. and 5.6)

(8 X 2 = 16 Marks)

Section-C: Methodological Approaches/Theories.

Part-I: Post-structuralism and Feminism

(**There will be four questions based on the essays and the candidates shall be required to attempt two)**

(i) Post-structuralism

(a) Roland Barthes: "Death of the Author"

(b) Jacques Derrida: "Differance"

(ii) Feminism

(a) Gayatri Spivak: "Feminism and Critical Theory".

(b) Gilbert and Gubar: "The Madwoman in the Attic"

(2x8 = 16 Marks)

Part-II:

(There will be four questions based on the essays and the candidates shall be required to attempt two)

(i) Postcolonialism

(a) Edward Said: Crisis (in *Orientalism*)

(b) Homi K. Bhabha: "The Location of Culture"

(ii) New Historicism and Cultural Materialism

(a) Stephen Greenblatt: "The Circulation of Social Energy"

(b) Alan Sinfield: "Cultural Materialism, Othello, and the Politics of Plausibility"

(2x8 =16 Marks)

(The above essays are taken from Julic Rivkin and Michael Ryan., *Literary Theory : An Anthology.* London: Blackwell, 2002)

Books Recommended:

1. Berry, Peter. *Beginning Theory.*
2. Daiches, David. *Critical Approaches to Literature*.
3. Gibaldi, Joseph. *MLA Handbook 8th Edition.*
4. Soch, Wilbar. *Five Approaches to Literary Criticism.*

Course-II (Opt.i) : Modern English Fiction

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours

Note: A candidate shall attempt five questions in all. Besides question No. 1 in section-A which is compulsory, the candidates shall attempt two questions from section-B and two from section-C. There will be internal choice in all the questions. All questions carry equal marks.

SECTION-A (NON-DETAILED STUDY)

This section aims at providing a historical perspective on books/ authors/trends/movements/sub-genres of the Modern English/American Fiction. The section will carry one compulsory question of 16 marks requiring the candidates to show acquaintance with any four of the six given items. The candidates are expected to write a paragraph of about 150 words on each of the four items they attempt.

SUGGESTED ITEMS

The Great Depression, Harlem Renaissance, Faulkner, Vonnegut, *The Grapes of Wrath, The Assistant,* Post-Modernism, Metafiction, The Campus Novel, Margaret Drabble, *Decline and Fall, Lucky Jim.*

Section-B

1.	F. Scott Fitzgerald	:	*The Great Gatsby*
2.	Saul Bellow	:	*Seize the Day*
3.	Ralph Ellison	:	*Invisible Man*

Section-C

1.	Iris Murdoch	:	*The Nice and the Good*
2.	John Braine	:	*Room at the Top (Penguin)*
3.	Anthony Burgess	:	*A Clockwork Orange* (Penguin)

Books Recommended:

1. Hoffman, Frederick. *The Twenties*
2. Aldridge, John W. *After the Lost Generation*
3. Hasan, Ihab. *Radical Innocence*
4. Hasan, Ihab. *The Dismemberment of Orpheus: Toward a Post-Modern Literature*
5. Scholes, Robert. *The Fabulators.*
6. Klein, Marcus. *After Alienation.*
7. Tanner, Tony. *City of Words.*
8. Scholes, Robert. *Fabulation and Metafication.*
9. Bergonzi, Bernard. *The Situation of the Novel* .
10. Karl, Federick R. *A Reader's Guide to the Contemporary English Novel*
11. Bradbury, Malcolm and David Palmer: Ed. *The Contemporary English Novel*
12. Bradbury, Malcolm, ed. *The Novel Today*.
13. Aggeler, Geoffery. *Anthony Burgess* .
14. Lee, James W. *John Braine*.

Course-II (Opt. ii) : Modern English Poetry

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours

Note: A candidate shall attempt five questions in all. Besides question No. I in section-A which is compulsory, the candidates shall attempt two questions from section-B and two from section-C. There will be internal choice in all the questions. All questions carry equal marks.

SECTION-A (NON-DETAILED) STUDY

This section aims at providing a historical perspective on books/authors/trends/movements/sub-genres of the Modern English/American Poetry. The Section will carry one compulsory question of 16 marks requiring the candidates to show acquaintance with any four of the six given items. The candidates are expected to write a paragraph of about 150 words on each of the four items they attempt.

SUGGESTED ITESMS

San Fransisco Renaissance, Ethnopoetics, Amy Lowell, Allen Tate, Randall Jarrell, Le Roi Jones, Modern British Poetry After Word War II, Symbolism, Movement Poets, Freudianism, D.H. Lawrence, W.H. Auden's The Age of Anxiety.

Section-B

1. Allen Ginsberg: "Howl," "America," "In the Baggage Room at Greyhound" (From *Howl and other Poems)*
2. Langston Hughes: "I, too, Sing America", "Dream Variation," "The Weary Blues", "Mother to Son", "The Negro Speaks of Rivers" , "Personal", "Merry-Go-Round" , "Song for a Suicide", "Harlem," "Birmingham" (From *The Poetry of the Negro 1941-1970).*

3. Syliva Plath : "Daddy" , "Death & Co" , " Two Views of Cadaver Room", "Fever 103" , "Lady Lazarus" , "The Disquieting Muses", "Suicide off Egg Rock" (From *The Colossus and Other Poems* N.Y., Knoff, 1969)

Section-C

1. Thom Gunn : The Poems included in Cambridge Book of English Verse, 1939-1975, ed. Alan Bold.

2. Seamus Heaney: Poems included in *Modern Poets Four* ed. By Jim Hunter (Faber and Faber):

"Digging", " Charming Day", "At a Potato Digging",
"Follower", "Mid Term Break", "The Barn", "Dawn Shoot",
"May Day"

3. Ted Hughes: The following Poems included in *Modern Poets Four*, ed. by Jim Hunter (Faber and Faber), "The Thought Fox", "View of a Pig", "Pike", "The Jaguar", "Hawk Roosting", "Wind", "Second Glance at a Jaguar", "The Bull Moses"

Books Recommended:

1. Untermeyer, Louise. *Modern American Poetry*.
2. Unger, Leonard, ed. *Seven Modern American Poets: An Introduction*.
3. Pearce, Roy Harvey. *The Continuity of American Poetry.*
4. Perkins, David. *A History of Modern Poetry From The 1890s to the Modernist Mode.*
5. Rosenblatt, Jon. *Sylvia Plath: The Poetry of Initiation.*
6. Wagner, Linda W., ed. *Critical Essays on Sylvia Plath.*
7. Litz, A. Walton. *Introspective Voyager: The Poetic Development of Wallace* Stevens.
8. Burney, William. *Wallace Stevens*.
9. Jemie, Onwuchekwa. *Langston Hughes: An Introduction*.
10. Wimsatt, W.K. *The Verbal Icon*.
11. Ford, Borris, ed. *The New Pelican Guide to English Literature*. (Vol. 7 & 8).
12. Davie, Donald. *Purity of Fiction in English Verse*.
13. Bedient, B. Calvin. *Eight Contemporary Poets*.

Course-II (Opt. iii): Modern English Drama

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours

Note: A Candidate shall attempt five questions in all. Besides Question No. 1 in section-A which is compulsory the candidates shall attempt two questions from section-B and two form section-C. There will be internal choice in all the questions. All questions carry equal marks.

SECTION-A (NON-DETAILED) STUDY

This section aims at providing a historical perspective on books/authors/movements/sub-genres Modern English Drama. The section will carry one compulsory question of 16 marks requiring the candidates to show acquaintance with any four of the six given items, The candidates are expected to write a paragraph of about 150 words on each of the four items they attempt.

SUGGESTED ITEMS

Expressionism, Lorraine Hansberry, Elmer Rice, Sam Shepard, The American Dream, *Death of a Salesman, Mourning Becomes Electra*, Epic Theatre, The Theatre of the Absurd, Poetic Drama, *Six Characters in Search of an Author*, *The House of Bernarda Alba*, David Mamet.

Section-B

1.	Arthur Miller:	*The Crucible*
2.	Tennessee Williams:	*Cat on a Hot Tin Roof*
3.	Edward Albee:	*Who's Afraid of Virginia Woolf ?*

Section-C

1.	Edward Bond	*Lear* (Translated by John Willett (Matheun Student Edition).
2.	Harold Pinter:	*The Birthday Party*
3.	Caryl Churchill	*Top Girls*

Books Recommended:

1. Bentley, Eric. *The Modern Theatre*
2. Gassner, John. *The Theatre in Our Times.*
3. Gllmani, Richard. *The Making of Modern Drama* Farras, Straus
4. Kernan, Alvin, ed. *Modern American Theatre*
5. Esslin, Martin. *The Theatre of the Absurd.*
6. Krutch, Joseph Wood. *Modernism in Modern Drama.*
7. Lumbley, Frederick. *New Trends in 20th Century Drama* .

8. Bigsby, C.W.E. *Modern American Drama*.
9. Lewis, Allen. *American Plays and Playwrights of Contemporary Theatre*.
10. Willaims, Raymond. *Drama form Ibsen to Brecht*.
11. Brunstien, Robert. *The Theatre of Revolt.*
12. Willett, John. *Breacht in Contest*.
13. Gassner, John. *Directions in Modern Theatre And Drama*.
14. Bentley, Eric. *Life of the Drama*.

Course-II Option (iv): Indian Writing in English

Max. Marks: 80
Internal Assessment: 20
Credit: 4
Time: 3 Hours

Note: A candidate shall attempt five questions in all. Besides Question No. I in section-A which is Compulsory the candidates shall attempt two questions form section-B and to form section-C. There will be internal choice in all the questions. All questions carry equal marks.

SECTION-A (NON-DETAILED) STUDY

This section aims at providing a historical perspective on books/authors/trends/movements/sub-genres of Indian Writing in English. The section will carry one compulsory question of 16 marks requiring the candidates to show acquaintance with any four of the six given items. The candidates are expected to write a paragraph of about 150 words on each of the four items they attempt.

Suggested Items

Shiv K. Kumar, Kamla Das, Keki N. Daruwalla, Kamala Markanday, Nissim Ezekiel, Arun Joshi, *Midnight's, Children, Untouchable, The Man-Eater of Malgudi, Baumgartner's Bombay, A Bend in the Ganges,* Mahesh Dattani.

Section-B

Nayantara Sahgal	:	*Storm in Chandigarh*
Amitav Ghosh	:	*The Shadow Lines*
Girish Karnad	:	*Tughlaq*

Section-C

Ruth P. Jhabvala	;	*Heat and Dust*
A.K. Ramanujan	:	The Following poems form R. Parthasarthy, (ed.) *Ten Twentieth Century Indian Poets:* "Looking for a Cousin on a Swing" , " A River" , "Of Mothers among Other Things", "Love Poem for a Wife" , " Small Scale Reflections on a Great House" , "Obituary" .
Vijay Tendulkar	:	*Ghasiram Kotwal*

Suggested Reading

1. Naik, M.K. *Studies in Indian English Literature*
2. Naik, M.K. *Perspectives on Indian Fiction in English*
3. Jain, Jasbir. *Nayantara Sahgal*
4. Kohli, Devender. *Kamla Das*
5. Ezekiel, Nissim. *Contemporary Poets*
6. Peeradina, Saleem . *Contemporary Indian Poetry in English: An Assessment and Selection*
7. Sharma, Vinod Bala. *Vijay Tendulkar's Ghashiram Kotwal: Critical Perspectives*
8. Madge, V.M. Madge, ed.*Vijay Tendulkar's Plays: An Anthology of Recent Criticism*
9. Shahane, Vasnat A. *Ruth Prawar Jhabvala*
10. Pandey, S.N. *A.K. Ramanujan*
11. Bose, Brinda. *Amitav Ghosh: Critical Perspecitves*

Scheme of Examination and Course Structure

B. Voc. in Banking Financial Services and Insurance (BFSI)

(W.E.F. SESSION 2018-19)

B. Voc. in Banking Finance Services and Insurance is a Three Year Full Time Programme. The course structure of the programme is given hereunder:

SEMESTER-I					
Subject Code	Papers	***Total Marks***	***Ext. Marks***	***Int. Marks***	***Hrs***
BFSI-101	Principles of Banking and Financial Services	100	80	20	3
BFSI-102	Indian Securities Market and Institutions	100	80	20	3
BFSI-103	Business Communication and Soft Skills	100	80	20	3
BFSI-104	Mutual Fund Operations-I	100	80	20	3
BFSI-105	Micro Finance Operations	100	80	20	3
BFSI-106	Hindi/English (Foreign students)	100	80	20	3
BFSI-107	Vocational Practical	50	-	50	-
	Total Marks	**650**			
SEMESTER-II					
BFSI-201	Banking and Financial Institutions	100	80	20	3
BFSI-202	Managerial Economics	100	80	20	3
BFSI-203	Basics of Statistics	100	80	20	3
BFSI-204	Organisational Behaviour	100	80	20	3
BFSI-205	Principles of Accounting	100	80	20	3
BFSI-206	Fundamentals of Management	100	80	20	3
BFSI-207	Vocational Practical	50	-	50	-
BFSI-208	Environmental Studies	100	80	20	3
	Total Marks	**750**			

Note: Students after completion of second semester are required to undergo summer internship of 4-6 weeks in a reputed business organization, which shall be credited as BFSI-307 in the third Semester.

SEMESTER-III					
BFSI-301	Fundamentals of Computer and E-Commerce	100	80	20	3
BFSI-302	Accounting for Banking and Insurance Companies	100	80	20	3
BFSI-303	Fundamentals of Insurance	100	80	20	3
BFSI-304	Retail Banking and Operations-I	100	80	20	3
BFSI-305	Business Environment	100	80	20	3
BFSI-306	Mutual Fund Operations-II	100	80	20	3
BFSI-307	On the Job Training	100	100	-	
	Total Marks	**700**			
SEMESTER-IV					
BFSI-401	Entrepreneurship	100	80	20	3
BFSI-402	Investment Management	100	80	20	3
BFSI-403	Life Insurance Operations	100	80	20	3
BFSI-404	Currency Flows and FPI Investments	100	80	20	3
BFSI-405	Retail Banking and operations-II	100	80	20	3
BFSI-406	Operations of NBFCs in India	100	80	20	3
BFSI-407	Vocational Practical	50	-	50	-
	Total Marks	**650**			
SEMESTER-V					
BFSI-501	Merchant Banking Services	100	80	20	3
BFSI-502	Risk Management	100	80	20	3
BFSI-503	Business Banking and operations	100	80	20	3
BFSI-504	Security Market Operations	100	80	20	3
BFSI-505	General Insurance and Operations	100	80	20	3
BFSI-506	Analysis of Financial Statements	100	80	20	3
BFSI-507	On the Job Training	100	100	-	

	Total Marks	**700**			
SEMESTER-VI					
BFSI-601	Business Analytics	100	80	20	3
BFSI-602	Financial Planning and Wealth Management	100	80	20	3
BFSI-603	Depository Institutions	100	80	20	3
BFSI-604	Financial Technology in Banking Sector	100	80	20	3
BFSI-605	Venture Capital Financing	100	80	20	3
BFSI-606	Comprehensive Viva-Voce	100	100	-	-
	Total Marks	**600**		-	
	Grand Total	**4050**			

BFSI-101: Principles of Banking and Financial Services

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Overview of the BFSI Domain in India, Role & Importance of Banks in an Economy, Structure of Indian Banking Industry, Banking system in India.

Definition of Bank – Basic functions of Banker, Types of Banks in India, Commercial Banks, Private Sector Banks, Public Sector Banks, Foreign Banks, Regional Rural Banks, Co-Operative Banks. Reserve Bank of India and its role, Banker's Bank, functions of RBI, Regulatory framework of RBI.

Relationship Between Banker and Customer, Special types of Customers, Retail & Wholesale Banking, Deposit Accounts – Savings accounts, Current accounts, Fixed Deposit Accounts, Opening and Operation of Accounts: Nomination, Pass Book, Minors Accounts, Partnerships & Companies Accounts.

KYC – Concept, guidelines, Frauds in KYC, Role of KYC, Verification of KYC, RBI norms for KYC Hands on experience: Account Opening, form filling, Mobile Banking.

Banking & Economy: Cash Reserve Ratio, Statutory Liquidity Ratio, Repo & Reverse Repo rate, Open Market Operations.

Negotiable Instruments – Definition & Characteristics of Cheques, Bills of Exchange & Promissory Notes, Crossings, Endorsements, Collection and Payment of Cheques, Liabilities of Parties.

Overview of Basic Banking Products & Services, Financial Inclusion & Exclusion.

Suggested Readings:

1. Rose, Peter S. And Fraser, Donald R. Financial Institutions. Ontario, Irwin Dorsey, 1985.
2. Vij, Madhu. Management of Financial Institutions in India. New Delhi, Anmol, 1991.
3. Yeager, Fred C. and Seitz, Nail E. Financial Institution Management: Text and Cases. 3rd Ed. Englewood Cliffs, New Jersey, Prentice Hall Inc. 1989.
4. Bhole L.M., Management of Financial Institutions, Tata McGraw-Hill 2001.
5. Sapovadia, Vrajlal K., Micro Finance: The Pillars of a Tool to Socio-Economic Development. Development Gateway, 2006.
6. United Nations Department of Economic Affairs and United Nations Capital Development

BFSI-102: Indian Securities Markets and Institutions

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Indian Securities Markets: Definition & characteristics of securities, Structure of Indian securities markets, Operations of Indian Stock Market, New Issue Market; Listing of Securities, Cost of investing in securities;.

Mechanism of investing; investment process; market indices, Objectives of security analysis; investment alternatives, recent developments in the Indian stock market.

Different Types of Financial Securities -Financial securities – characteristics and types, valuation theories of fixed and variable income securities; government securities; non-security forms of investment; real estate investment; investment instruments of the money market

Suggested Readings :

1. Pandian, *Security Analysis and Portfolio Management,* Vikas Publishing House.
2. Raman, *Investment: Principles and Techniques,* Vikas Publishing House.
3. Fischer, Donald E. and Jordan, Ronald J., *Security Analysis and Portfolio Management,* Prentice Hall of India.
4. Fuller, Russell J. and Farrell, James L., *Modern Investment and Security Analysis*, New York, McGraw Hill.

BFSI-103: Business Communication and Soft Skills

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Business Communication: Definition, Classification, Purpose and Process of Business Communication; Effective Communication Skills and Barriers to Effective Communication. Emerging issues and challenges in Business Communication, Communication Skills: Negotiation Skills, Presentation Skills, Interview skills, Group Discussion, Body Language. Listening and its importance. Business Etiquettes, Legal aspects of business communication. Organizational Communication: Components of Organization Communication, Internal and External communication in Organization, Importance of Communication Management, and Communication Structure in an Organization. Ethics and business communication.

Suggested Readings:

1. Sinha,K.K :Business Communication , Galgotia Publishing company.
2. Pradhan,Homai, et al : Business Communication, Himalaya Publishing House
3. Paul, Rajendra and : Business Communication, Sultan Chand and Sons
   Korthalli, J.S.
4. Murphy and Hilderbranth : Business Communication
5. M.K. Sehgal, Vandana Khetarpal : Business Communication

BFSI- 104: Mutual Fund Operations – I

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Mutual Funds- Introduction to Mutual Funds, Structure and Constituents of Mutual Funds, Types of Mutual Funds, Factors Affecting Mutual Fund Performance, Mutual Fund Products, Products Similar to Mutual Funds-ULIP, Mutual Fund Vs. Shares, Mutual Fund Vs. Bank Deposits, Types of Risk associated with Mutual Fund.

Market Research- Determining Top Performing Funds, Analyzing the Features of Top Performing Mutual Funds and Factors affecting them, Documentation Required, Applicable NAV and Cut-Off Time.

Mutual Fund Industry - Growth, prospects and hurdles, SEBI's Role and Relevant Regulations related to Mutual fund, Investor Right's and Protection.

Suggested Readings

1. The Rise of Mutual Funds: An Insider's View, By Matthew P. Fink Oxford University Press, 2008
2. Common Sense On Mutual Funds, John C. Boglewiley, 2010
3. Scientific Investment Analysis, Austin Murphy Quorum Books, 2000 (2nd Edition)
4. Mutual Fund Performance During Up And Down Market Conditionsby Rao, S. P. Uma Maheswar Review of Business, Vol. 22, No. 1, Spring 2001
5. Commandments of Mutual Fund Investing, Thomas, Robert R.; Musar, Richard Cjournal of Accountancy, Vol. 188, No. 2, August 1999
6. Frank J. Fabozzi, *Bond Markets Analysis & Strategies*, Pearson
7. Securities Market (Basic) Module. NSE Academy
8. Mutual Market (Basic) Module. NSE Academy

BFSI 105: Micro Finance Operations

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Micro Finance: Worldwide History & Development of Micro Finance, History of Micro finance in India, Status of Micro Finance in India, Status of Various Committees framed for Microfinance, Potential of Micro Finance in India

Need & Importance of Micro Finance, Major Components of Micro Finance System, Major Operations in Micro Finance, Different Models of Micro Finance. Models of International Micro Finance, Aspects of MFI Credit, Credit delivery Methodologies.

Self Help Groups (SHGs)-Meaning and importance, Micro finance Institution and Legal forms, Organisation Structure of Micro Finance organisations and their Products & Services.

Banking Potential of Micro Finance in India; Loan Application, Loan Prospecting, Loan Approvals; Loan Documentation; Loan Disbursements

Loan Collections & Recoveries – Process of Loan Collection, Factors Affecting Loan Collection, Recoveries Criteria of Loan, Aspects of Loan Recoveries.

Suggested Readings:

1. Sapovadia, Vrajlal K., Micro Finance: The Pillars of a Tool to Socio-Economic Development. Development Gateway, 2006.
2. Wright, Graham A.N., Micro Finance Systems: Designing Quality Financial Services for the Poor. The University Press, Dhaka, 2000.
3. United Nations Department of Economic Affairs and United Nations Capital Development Fund. Building inclusive Financial Sectors for Development. United Nations, New York, 2006.
4. Yunus, Muhammad. Creating a World without Poverty: Social Business and the Future of Capitalism. Public Affairs, New York, 2008.

BFSI-106: General English (Foreign Students)

Max. Marks: 100
External Assessment: 80
Internal Assessment: 20

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Grammar and Usage

A Detailed Study of Nouns, Pronouns, Adjectives, Articles, Verbs, Adverbs, Prepositions, Conjunctions and their Correct Usage.

Grammar and Usage

Tenses: Active and Passive Voice; Transformation of Sentences from Simple to Compound/Complex Sentences; Narration/Reported Speech.

Vocabulary

Antonyms and Synonyms; words Often Confused; Important Latin and English Prefixes and Affixes; Common Legal Terms (Their Meaning and Usage).

Composition Skills

a) Formal Letter Writing, Writing of Business Letters, Official Letters and CVs.
b) Paragraph Writing
c) Punctuation

Suggested Reading:

1. Wren and Martin : High School English Grammar and Composition
2. Tickoo and Subramaniam : A Functional Grammar with Usage and Composition
3. Murphy, Raymond : Essential English Grammar, Cambridge University Press
4. Maison, Margaret M. : Examine Your English
5. Allen. W. S. : Living English Structure
6. Flewings. Hartin : Advanced English Grammer, Cambridge University Press

BFSI-106: Hindi (Indian Students)

Max. Marks: 100
External Assessment: 80
Internal Assessment: 20

उद्देश्य : प्रस्तुत प्रश्न-पत्र का उद्देश्य वाणिज्य एवं प्रबन्धन से जुड़े विद्यार्थियों को राजभाषा /राष्ट्रभाषा हिन्दी का व्यावहारिक ज्ञान प्रदान करना है, ताकि वे जनसामान्य तक अपनी बात, उनकी अपनी भाषा में, समझा सकें ।

राजभाषा अधिनियम, राष्ट्रपति के अध्यादेश तथा केन्द्रीय सरकार की हिन्दी शिक्षण –योजना ।

पत्राचार के विविध रूप (मूल पत्र, पत्रोत्तर, पावती, अनुस्मारक, अर्द्धसरकारी, ज्ञापन, परिपत्र, आदेश, पृष्ठांकन, अन्तःविभागीय टिप्पण, निविदा सूचना, विज्ञापन, प्रैस विज्ञप्ति, प्रैस नोट, प्रतिवेदन)

अनुवाद : स्वरूप, प्रकृति, प्रकिया, वर्गीकरण, व्यावहारिक अनुवाद (प्रदत्त अंग्रेजी/हिन्दी अनुच्छेद का अनुवाद), अनुभाषण (आशु अनुवाद)
पल्लवन : परिभाषा, प्रकिया और गुण
संक्षेपण : परिभाषा, विधि और गुण

पारिभाषिक शब्दावली (मंत्रालयों, उपकर्मों, निगमों, बैंकों, रेलवे-क्षेत्रों, रोडवेज तथा दूरदर्शन में प्रयुक्त पारिभाषिक शब्दों और वाक्यांशों का अध्ययन)

निबन्ध-लेखन (निम्नलिखित विषयों में से चार-पांच विषय दिए जायेंगे, जिनमें से लगभग 300 शब्दों पर आधारित एक निबन्ध लिखना होगा)

1. वाणिज्य अध्ययन में हिन्दी की उपयोगिता
2. उपभोक्ता, बाजार और वाणिज्य
3. बैंक और वाणिज्य
4. कुशल प्रबन्धन और वाणिज्य
5. विज्ञापन और वाणिज्य
6. वाणिज्य विकास में कम्प्यूटर की भूमिका
7. श्रमिक असंतोष का उद्योग जगत पर प्रभाव
8. जनसंख्या – वृद्धि का राष्ट्र-समृद्धि पर प्रभाव
9. अन्तर्राष्ट्रीय व्यापार और अन्तर्राष्ट्रीय मुद्रा-कोष
10. निजीकरण का भारतीय अर्थव्यवस्था पर प्रभाव
11. वैश्वीकरण और भारतीय उद्योग
12. महंगाई
13. काला धन
14. ऊर्जा संकट
15. लघु उद्योगों का भविष्य

संदर्भ ग्रन्थ

1. प्रयोजनमूलक हिन्दी : राजनाथ भट्ट, हरियाणा साहित्य अकादमी, पंचकूला–2004.
2. अनुवाद विज्ञान : राजमणि शर्मा, हरियाणा साहित्य अकादमी, पंचकूला –2004.
3. प्रामाणिक आलेखन और टिप्पण : विराज, राजपाल एण्ड सन्ज़, दिल्ली –2005.
4. प्रयोजनमूलक हिन्दी के छः अध्याय, दर्शन कुमार जैन, लिपि प्रकाशन, अम्बाला छावनी–1996.

BFSI-107: Vocational Practical

Max. Marks: 50
Internal: 50

1. Follow the Work Instructions and Operating Instructions
2. Understanding of Account Opening Process
3. Understanding of Operating Standards and Standard Operating Procedures

BFSI-201: Banking and Financial Institutions

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Financial System: Nature, Structure, Role and functions of Financial System. Reforms and recent developments in Indian Financial System.

RBI- Functions, working and Provisions of RBI's Operations; Credit and Monetary Planning. Development Banks; Role of Development Banking in Industrial Financing in India, NABARD, Objectives and Functions of Different Financial Institutions in India Like IFCI, ICICI, IDBI, LIC, SFCs and SIDBI.

Money Market: Meaning, significance, types; Call Money Market, Treasury Bill Market. Commercial Bills Market and Commercial papers.

Suggested Readings:

1. Meera Sharma, 'Management of Financial Institutions' Prentice Hall of India, 2008.
2. Bhole L. M 'Financial institutions and Markets' Tata McGraw Hills,2008.
3. Khan M. Y. ' Indian Financial System' Tata McGraw Hills
4. S. Gurusamy, 'Financial Markets and Institutions' 3rd edition, Tata McGraw Hills

BFSI-202: Managerial Economics

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Managerial economics: meaning nature and scope, Objectives of firm, basic concepts of economics: opportunity cost, marginal and incremental principles.

Theory of demand: Nature of demand for a product, individual demand, market demand, determinants of demand, Law of demand, Elasticity of demand and its determinants, utility analysis- cardinal analysis.

Theory of production and costs: production with one and two variable inputs, theory of cost in short run and long run, economies of scale.

Theory of firm and market organization: pricing under perfect competition, pricing under monopoly, pricing under monopolistic competition, pricing under oligopoly.

Suggested Readings:

1. Peterson, Lewis, Managerial Economics, Prentice Hall of India, N. Delhi.
2. Salvatore, Managerial Economics in Global Economy; Thomson learning; Bombay.
3. EF. Brigham And J,L. Pappas, Managerial Economics, Dryden Press, illinois.
4. Dwivedi, D.N. Managerial Economics, Vikas Publishing House, New Delhi.
5. Mehta, P.L. Managerial Economics, Sultan Chand, New Delhi.

BFSI-203: Basics of Statistics

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Statistics: Introduction, definition, scope, functions, importance; types of statistical methods. Measures of central tendency: meaning and definition; Types of averages, median, mode, arithmetic mean, geometric mean, harmonic mean, quadratic mean, moving average, progressive average; relation between mean, median and mode.

Measures of dispersion and Skewness: absolute and relative measures of dispersion range, quartile deviation, mean and standard deviation, empirical relation among various measures of dispersion, Sampling: introduction, census versus sample, sampling methods, errors in sampling.

Suggested Readings:

1. Anderson, Sweeney and Williams, Statistics for Business and Economics, Cengage Learning.
2. Ken Black, Business Statistics, Wiley.
3. Levin, Richard I and David S Rubin, Statistics for Management, Prentice Hall, Delhi.
4. Aczeland Sounderpandian, Complete Business Statistics, Tata McGraw Hill, New Delhi.
5. Hooda, R.P., Statistics for Business and Economics Macmillian, New Delhi.
6. Heinz, Kohler, Statistics for Business & Economics, Harper Collins, New York.
7. Lawrence B. Morse, Statistics for Business & Economics, Harper Collins, NY.

BFSI-204: Organisational Behaviour

Max. Marks: 100
External: 80
Internal: 20
Time 3 Hours

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Understanding and Managing Individual Behaviour: Personality; Perception and Attribution; Values and Attitudes; Emotions & Emotional Intelligence, Learning, Decision Making, Leadership, Managing Group and Teams. Conflict Management and Stress Management.

Suggested Readings

1. Robbins, S.P. Management Concepts, Pearson Education India, New Delhi.
2. Mullins. J, Management and OB, 8th Edn. Pearson Education
3. Stoner, J., Management, Prentice Hall of India., New Delhi
4. Koontz.Essentials of Management, Tata McGraw-Hill, 8th Ed.,
5. Chandan, J.S. Management Concepts and Strategies, Vikas Publishing House.

BFSI-205: Principles of Accounting

Max. Marks: 100
External Assessment: 80
Internal Assessment: 20

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks.

Course Contents:

Basic Accounting- Nature, scope and objectives of accounting; Accounting as information system, users of accounting information, GAAP Vs FSAB, Accounting equation: Accounting concepts and conventions, capital and revenue expenditure.

Journal and Ledger: Double Entry System; Journal and recording of entries in journal with narration; Ledger – Posting from Journal to respective ledger accounts.

Trial Balance: Need and objectives; Application of Trial Balance; Different types of errors escaped in trial balance preparation.

Final Accounts: Concept of adjustment; Preparation of Trading Account and Profit and Loss Account. Preparation of Balance Sheet.

Suggested Readings

1. Anthony, R.N. & Reece J.S., Accounting Principles, Homewood, Illinois, Rd Irwin.
2. Bhattacharya, S.K. & Dearden, J., Accounting for Management: Text and Cases, Vikas Publishing House.
3. Gupta, R.L. & Ramaswmy, Advanced Accountancy, Volume I&II, Sultan Chand & Sons.
4. Hingorani, N.L. & Ramanathan, A.R., Accounting, Sultan Chand & Sons.
5. Jawahar Lal, Cost Accounting, Vikas Publishing House.
6. Maheshwari, S.N., Advanced Accounting, Vikas Publishing House.

BFSI-206: Fundamentals of Management

Max. Marks: 100
External Assessment: 80
Internal Assessment: 20

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks

Course Contents:

Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System.

Planning- concept, types process and techniques, Decision making- concept, types process and techniques.

Organizing: nature, importance, process, formal & informal organizations, organization chart, organizing principles.

Staffing: concept, manpower management, factors affecting staffing, job design, recruitment and selection process, techniques.

Directing: Communication- nature, process, formal and informal, barriers to Effective Communication.

Controlling: concept, ways of controlling, control process, barriers to control making

Suggested Readings

1. Business Organization and Management – Basu ; Tata McGraw Hill
2. Management and OB-- Mullins; Pearson Education
3. Essentials of Management – Koontz, Tata McGraw-Hill
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
5. Prasad, Lallan and S.S. Gulshan. Management Principles and Practices. S. Chand & Co. Ltd., New Delhi.
6. Chhabra, T.N. Principles and Practice of Management. Dhanpat Rai & Co., Delhi.
7. Organizational behavior – Robins Stephen P; PHI.

BFSI-207: Vocational Training

Max. Marks: 50
Internal: 50

1. Understand the List of Documents for Account Opening
2. Understand the document verification process
3.Understand types of errors
4. Understand the escalation process
5. Execution of work

BFSI-208: Environmental Studies

Max. Marks: 100
Theory: 80
Practical: 20

The examination of this paper will be conducted by the college concerned at its own level earlier than the semester examination and each student will be required to score minimum of 35% marks each in theory and practical. The marks obtained in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these will be shown in the detailed marks certificate of the student.

Note: There will be eight questions in all. A candidate is required to attempt five questions including the question no. 1 which is compulsory. Question no. 1 will comprise of six short answer questions. All questions shall carry equal marks

The multidisciplinary' nature of environmental studies: Definition, Scope and Importance. Need for public awareness.

Natural Resources: Renewable and non-renewable resources : Natural resources and associated problems; Forest Reources; Water Resources; Mineral Resources; Food Resources; Energy and Land Resources.

Environmental Pollution: Definition Cause, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution. Role of an individual in prevention of pollution

Human Population and the Environment; Population growth, variation among nations; Population explosion- Family Welfare Programme; Environment and human health; Human Rights and Value Education

Field work:

- Visit to a local area to document Environment, asset-river/forest/grassland/hill/mountain.
- Visit to Local polluted site-Urban/Rural Industrial/Agricultural.
- Study of common plant, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work equal to 5 lectures hours)

DEPARTMENT OF POLITICAL SCIENCE

KURUKSHETRA UNIVERSITY KURUKSHETRA

(Established by the State Legislature Act XII of 1956)

*("**A +**"Grade, NAAC Accredited)*

M.Phil. Political Science

Scheme & Syllabus of Examination w.e.f. 2018-19 (Under CBCS)

(Passed in PGBOS) Meeting held on 22.10.2018

Scheme of Examination for M.Phil. Political Science (CBCS)

- The M.Phil. Political Science Course is an Annual Course spread over 1year.
- Every Student of M.Phil. Political Science Course has to pass **12 Credits (8 Core Courses Credits + 4 Elective Course Credits.**
- The M.Phil. Political Science Course is of 12 Credits and every student has to pass 12 credits to earn the Degree under Choice Based Credit System.
- Every Student of M.Phil. Political Science has to prepare and submit a Dissertation under the Supervision of an eligible teacher. After submission of Dissertation every candidate shall appear in Viva-Voce Examination and the Grade will be given to the candidate by the examiner.

PAPER CODE	NOMENCLATURE	EXTERNAL	INTERNAL	CREDITS	Time
CORE PAPERS					
M.Phil-101	Research Methodology	80	20	4	3 Hours
M.Phil-102	Seminars (Two)		100	4	
M.Phil-103	Dissertation	The workload for Dissertation would be counted on the basis of number of Students X 2 hours per week		Grade System	
ELECTIVE PAPERS					
M.Phil-104	**Choose any one of the following:**				
	Option (i) Contemporary Political Theory	80	20	4	3 Hours
	Option (ii) Comparative Foreign Policy Analysis With Special Reference to South Asia	80	20	4	3 Hours
	Option (iii) Context and Dynamics of Indian Politics	80	20	4	3 Hours
Total		300		12	

Total Marks: 300

- The Students shall present two seminars before DRAC once in six months to make a presentation progress of his/her Dissertation work. Prior to the submission to the

Dissertation again he/she has to present a pre-submission Seminar. The Student shall also present at least one Research Paper in a conference/seminar/workshop.

- At least 75% attendance in each paper is must to appear in major test (end term examination)

- Internal Assessment (Minor Test)
  - Two Class Tests : 50% Marks
  - Assignment : 25% Marks
  - Attendance : 25% Marks
- In paper 102, there will be two seminars out of which one will be on the topic approved for the Dissertation.
- The minimum percentage of marks/grade required to pass:
  - 50% marks in each major test.
  - 50% marks in each seminar.
  - 55% marks in aggregate of minor and major tests for each theory paper.
  - Grade B+ in Dissertation.

Paper I : Research Methodology

Max. Marks :100
Written Exam: 80
Internal Assesment:20
Credits =4
Time : 3 Hrs.

Note : 8 Questions will be set - 2 from each unit. The candidates are required to attempt four questions, selecting one question from each unit.

Unit-I Philosophy of the social sciences.
Nature of Social Research, Types of Social Research.
Scientific Study of Politics: Nature of Scientific Enquiry, Characteristics of Scientific Knowledge, Induction – Deduction Controversy, The Case for and Against Scientific Study of Politics.
The Building Blocks of Social Scientific Research: Hypotheses, Concepts, Variables, Measurement.

Unit-II Identification and Formulation of Problem: Sources and Methods.
Research Design: Formation; Experimental and Non-Experimental Designs.
Archival and Library Research; Literature Review: Reasons and Procedures.
Document Analysis: Using the Written Record, Scrutinizing the Evidences, Content Analysis.

Unit-III Sampling: Principles and Methods.
Survey Research, Techniques and Tools of Data Collection: Interview, Questionnaire, Observation.
Quantitative Data Processing and Analysis: Quantification of Data, Developing Code Categories, Code-Book Construction, Data Entry Computer Programme for Quantitative Data (SPSS).
Univariate Analysis: Distributions, Central Tendency, Dispersion.
Subgroup Comparison: Collapsing Response Categories, Handling Don't Knows, Numerical Description in Quantitative Research.
Bivariate Analysis: Percentaging a Table, Constructing and Reading Bivariate Table; Multi-Variate Analysis.

Unit-IV Statistics: Meaning, Purpose, Use.
Descriptive Statistics: Data Reduction, Measures of Association, Regression Analysis.
Inferential Statistics: Univariate Inferences, Test of Statistical Significance, the Logic of Statistical Significance, Chi Square.
Research Report Writing: Purpose, Format, theory Construction, Generalisation; Planning and Writing a research Paper.

Books Recommended :

1. Johan Galtung, Theory and Methods of Social Research.
2. W.J. Goode and P.K. Hatt, Methods of Social Research.
3. Ole P. Holsti, Content Analysis for the Social Sciences and Humanities.
4. Fred N. Kerlinger, Foundations of Behavioural Research.
5. John Madge, The Tools of Social Science.
6. Eugane J. Meehan, The Theory and Practice and Political Analysis.

7. C.A Moser and G. Kalton, Survey Methods in Social Investigation.
8. Gunner Myrdal, Objectivity in Social Research.
9. Maurice Natanson, (ed.), Philosophy of Social Sciences.
10. D.C. Phillips, Philosophy, Science and Social Inquiry.
11. V.P. Shah, Research Design.
12. C.H. Backstrom and G.D. Haush, Survey, Research.
13. H.M. Blalock, Social Statistics.
14. L. Festinger and D. Katz (ed.), Research Methods in the Behavioural Sciences.
15. K. Janda, Data Processing.
16. P.V. Young, Scientific Social Surveys and Research.
17. D.J. Champion, Basic Statistics for Social Research.
18. S.P. Gupta, Statistical Methods.
19. J. Lewin, Elementary Statistics in Social Research.
20. S. Siegel, Non-parametric Statistics for Behavioural Sciences.
21. F.I., Greenstein and N.W.Polsy, (eds.), The Handbook of Political Science, Vol. I.
22. B.L. Smith, et.al., Political Research : Method, Foundations and Techniques.
23. J.T. Doby, et.al., An Introduction to Social Research.
24. V.P. Shah, Report Writing.
25. Alan C. Isaak, Scope and Methods of Political Science.
26. Herbert M. Blalock Jr., Casual Inferences in Non Experimental Research.
27. W. Philips Shively, The Craft of Political Research.
28. Edward G. Carmines and Richard A Zeller, Reliability and Validity Assessment.
29. Alan Bryman, Social Research Method.
30. Earl Babie, The Practice of Social Research.
31. Ajai S. Guar and Sanjaya S. Guar, Statistical Methods for Practice and Research.
32. Matt Henn, Mark Weinstein, A Short Introduction to Social Research.
33. Roger Sapsford, Survey Research.

Paper II: Option: (i), Contemporary Political Theory

Max. Marks :100

Written Exam: 80

Internal Assesment:20

Credits =4

Time : 3 Hrs.

Note : 8 Questions will be set - 2 from each unit. The candidates are required to attempt four questions, selecting one question from each unit.

Unit-I Liberalism, Contemporary Liberalism, Libertarianism, Communitarianism.

Unit-II Post-Modernism, Post-Colonialism, Multiculturalism, Theories of Conflict.

Unit-III Structuralism and Post-Structuralism, Post-Marxism, Social Democracy.

Unit-IV Feminism, Environmentalism, Civil Society, Alternative Societies: Risk Society, Knowledge Society.

PART: B

Books Recommended :

1. S. Avineri and A. de Shalit (eds.), Communitarianism and Individualism.
2. S. de Beauvoir, The Second Sex.
3. M. Bookchin, Remaking Society, Pathways to a Green Future.
4. A. Bramwell, Ecology in the 20th Century : A History.
5. B. Devall and G. Sessions, Deep Ecology.
6. A. Dobson, Green Political Thought.
7. J. B. Elshtain, Public Man, Private Women : Women in Social and Political Thought.
8. B. Friedan, The Feminine Mystique.
9. R.E. Goodin, Green Political Theory.
10. J. O'Neill, Ecology, Policy and Politics : Human Well-being and the Natural World.
11. E. Patridge (ed.), Responsibilities to Future Generations.
12. J. Porritt, Seeing Green : The Politics of Ecology Explained.
13. D. Worster, Nature's Economy : A History of Ecological Ideas.
14. B. Ashcroft, The Post Colonial Studies Reader.
15. S. de Beauvoir, The Second Sex.
16. V. Bryson, Feminist Political Theory.
17. W. Connolly, Identity/Difference : Democratic Negotiations.

18. F. Fanon, Black Skin, White Masks.
19. S. Firestone, The Dialectic of Sex.
20. J. Gray, Post-Liberalism : Studies in Political Thought.
21. R. Guha and G.C. Spivak, Selected Subaltern Studies.
22. Gutman (ed.), Multiculturalism.
23. L. Hutcheon, The Politics of Postmodernism.
24. W. Kymlicka, Multicultural Citizenship.
25. J.S. Mill, The Subjection of Women.
26. K. Millett, Sexual Politics.
27. B.Parekh, Rethinking Multiculturalism : Cultural Diversity and Political Theory.
28. C.Pateman, The Disorder of Women.
29. A.Phillips, Engendering Democracy.
30. E.Said, Orientalism.
31. Q. Skinner, The Foundations of Modern Political Thought, Vol. I : The Renaissance.
32. C.Taylor, Multiculturalism : Examining the Politics of Recognition.
33. P. Williams and L. Chrisman, Colonial Discourse and Post- Colonial Theory.
34. S.K. White, Political Theory and Postmodernism.

Paper: II, Option: (ii), Comparative Foreign Policy Analysis with Special Reference to South Asia

Max. Marks :100

Written Exam: 80

Internal Assesment:20

Credits =4

Time : 3 Hrs.

Note : 8 Questions will be set - 2 from each unit. The candidates are required to attempt four questions, selecting one question from each unit.

Unit-I The Development of the field of Comparative Foreign Policy; Logic, Content and Method; Approaches- Constructivist, Analytical Decision Making and Input-Output; Concepts of Comparative Foreign Policy-Power, National Interest, Linkage and Issue Area, Conflict, Conflict Resolution.

Unit-II Nature and Types of Foreign Policy; Influences on Foreign Policy Making-Domestic and International; Instruments of Foreign Policy; Models of Foreign Policy Behaviour, Making of Foreign Policy- Institutions, Process, Role of Personality.

Unit-III Geo-Politics of South Asian System; Core States of South Asia- India & Pakistan: Determinants and Basic Tenants of Foreign Policy, Phases of Development in Foreign Policy, Issues of Conflict & Cooperation, External Variables.

Unit-IV Peripheral States of South Asia: Bangla Desh, Nepal, Sri Lanka, Bhutan, Determinants and Basic Phases of Development in Foreign Policy, Issues of Conflict & Cooperation, External Variables, SAARC.

Books Recommended :

1. J. Bandyopadhyaya, The Making of India's Foreign Policy : Determinants, Institutions, Processes, Personalities.
2. Michael Brecher, The Foreign Policy System of Israel.
3. Christopher Clapham, (ed.), Foreign Policy Making in Developing States : A Comparative Approach.
4. Bhagat Korany, "Foreign Policy Models and their Relevance to Third World Countries," International Social Science Journal, March 1974.
5. J.N. Rosenau, The Scientific Study of Foreign Policy.
6. Sundeep Waslekar, Conflict Resolution in South Asia.
7. R.J. Rummel, The Dimensions of Nations.
8. R.F. Hopkins & R. W. Mansbach, Structure and Process in International Politics.

9. Theodore A. Couloumbis & James H. Wolfe, Introduction to International Relations.
10. S.P. Verma and K.P. Misra (ed.) Foreign Polices in South Asia.
11. R. B. Farrell (eds.), Approaches to Comparative and International Politics.
12. J. Frankel, The Making of Foreign Policy.
13. A.G. McGrew and M.J. Wilson, (eds.), Decision-Making : Approaches and Analysis.
14. P.A. Renolds, An Introduction to International Relations.
15. J.N. Rosenau, Domestic Sources of Foreign Policy.
16. J.N. Rosenau, (ed.), International Politics and Foreign Policy : A Reader in Research and Theory.
17. J. Wilkenfied, et.al., Foreign Policy Behaviour.
18. D.O. Wilkinson, Comparative Foreign Relations : Framework and Methods.
19. R.S. Yadav, ed., India's Foreign Policy Towards 2000 A.D.
20. R.S. Yadav, Bharat Ki Videsh Niti: Ek Vishleshan.

PAPER: II, Option: (iii), Context and Dynamics of Indian Politics

Max. Marks :100

Written Exam: 80

Internal Assesment:20

Credits =4

Time : 3 Hrs.

Note : 8 Questions will be set - 2 from each unit. The candidates are required to attempt four questions, selecting one question from each unit.

Unit –I Social composition and foundations of Indian Politics:
Systemic Cleavages – Princely States and British Provinces
Primordial Cleavages – Religion, Caste, Language, Region,

Unit – II Federalism in India,
Reorganisation of States in India
Demands for separate states,
Secessionism in India

Unit -III Judiciary in India: Judicial Review,
Judicial Activism
Gender and Society: Women's issues,
LGBTQ issues

Unit –IV Politics of Defection and Anti – defection law
Problems of Nation Building and integration
Emerging Trends in Indian Politics

Books Recommended :

1. Atual Kholi, (ed), The Success of India's Democracy.
2. Susanne Hoeber Rudolph and Lloyd Rudolph, In Pursuit of Lakshmi: Political Economy of the State of India .
3. Partha Chatterjee (ed.), State and Politics in India.
4. Atual Kholi, (ed), Indian Democracy: An Analysis of Changing State-Society Relations.
5. Rajeev Bhargava, Secularism and Its Critics.
6. Paul Brass, Language, Religion and Politics in North India.
7. Robert L. Hardgrave, Indian Under Pressure.
8. Upendra Bakshi and Bhikhu Parekh, (ed.), Crisis and Change in Contemporary India.

9. Francine Frankel, et al, Transforming India: The Social and Political Dynamics of Democracy.
10. Marc Galanter, Competing Equalities: Law and the Backward Classes.
11. Manoranjan Mohanty, Caste, Class and Gender.
12. Nivedita Menon, Gender and Politics in India.
13. Partha Chatterjee, (ed.), Wages of Freedom: Fifty Years of the Indian Nation State.
14. Biplab Dasgupta, Naxalite Politics in India.
15. Rajni Kothari, Democratic Polity and Social Change in India.
16. Akhtar Majeed, (ed.), Regionalism and Development Tensions in India.
17. Robert L. Hardgrave, Jr. and Stranley A. Lochanek, India: Government and Politics in a Developing Nation.
18. Dharma Kumar, "The Affirmative Action Debate in India", Asian Survey, 32, March 1992.
19. Sunil Khilnani, "The Development of Civil Society", in Sudipta Kaviraj and Sunil Khilnani (eds.), Civil Society: History and Possibilities.
20. Sagarika Dutt, "India Unmarked: The Construction of a (Nation)-State", Contemporary Politics, 8, no. 3, 2002.
21. Z. Hasan, Politics and State in India, Sage, New Delhi, 2000.
22. R. Chatterjee, (ed.), Politics in India: The State-Society Interface, South Asian Publishers, New Delhi, 2001.
23. Rajni Khothari, Politics in India, Orient Longman, 1970.
24. Iqbal Narain, (ed.), State Politics in India, Meenakshi Prakashan, Meerut, 1976.
25. S. Pal, State Politics: New Dimensions: Party System, Liberalization and Politics of Identity, Delhi, 2000.
26. K.C. Yadav, Haryana Pradesh Ka Itihas, Manohar Publications, New Delhi, 1997.
27. Budh Prakash, Haryana Through the Ages, Kurukshetra University Press, Kurukshetra, 1976.
28. H.B. Bathla, Panchayati Raj and Political Parties: An Empirical Study of Grass Root Level in Haryana, Nirmal Book Agency, Kurukshetra, 1994.
29. Vasant Desai, Panchayati Raj: Power to the People, Himalaya Publishing Home, Bombay, 1990.
30. Muni Lal, Haryana-On High Roads to Prosperity, Vikas Publishing Home, New Delhi, 1974.
31. Hargian Singh, Panchayati Raj Administration in Haryana, Indira Publications, Gurgaon, 1985.

IMS-206 :Environment Studies

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Maximum Marks:100 (Theory: 75Marks, Practical/Field Work: 25 Marks)

ExamPattern: Thequestionnumberwillbeconsistingoftwoparts.**Part-A**willconsistsof five Shortanswer patternquestionsof*five* markseach.**Part-B**willconsists of fiveEssaytypequestionsof*ten* marks each with inbuilt choice.

Note: ThepaperisaspertheguidelinesofHon'bleSupremeCourt.ThisisCoremodule syllabusasapproved byUGC.Theexaminationofthispaperwillbeconductedby the Institute atitsownlevelearlierthanthesemesterexaminationandeachstudentwillbe required to scoreminimum of35%marks each in theoryand practical. Themarks obtainedinthisqualifyingpaperwillnotbeincludedindetermining thepercentageof marksobtainedfor the award of degree.However, these willbe showninthedetailed marks certificate ofthestudent.

CourseContent:

Unit-1 : The multidisciplinary' nature of environmental studies, Definition, Scope and Importance.Needforpublic awareness.

Unit-2 : NaturalResources:Renewableandnon-renewableresources,Naturalresourcesand associated problems.
(a)Forestresources:Useandover-exploitation,deforestation,casestudies.Timber extraction, mining, dams and their effects on forests andtribal people.
(b)Waterresources:Useandover-utilizationofsurfaceandgroundwater,floods, arouht, conflicts over water, dams-benefits and problems.
(c)Mineralresources:Useandexploitation,environ-mentaleffectsofextractingand usingmineral resources,casestudies.
(d)Foodresources:Worldfoodproblems,changescausedby agricultureand overgrazing, effects of modern agricuture, fertilizer-pesticide problems, water logging, salinity, casestudies.
(e)Energyresources:Growingenergyneeds,renew-ableandnon-renewableenergy sources, use of alternateenergysources. Casestudies.
(f)Landresources:Landasaresource,landdegrada-tion,maninduced landslides, soilerosion and desertification.
-Role of an individual in conservation ofnatural resources.
-Equitable useof resources forsustainable lifestyle.

Unit-3:Ecosystems

Concept of an ecosystem.
Structure and function ofan ecosystem.
Producers, consumers and decomposers.
Energyflow in theecosystem.
Ecological succession.
Food chains, foodwebs and ecological pyramids.
Introduction, types, characteristic features, structure and function ofthe following ecosystem:(a)Forest ecosystem, (b)Grasslandecosystem, (c) Desert ecosystem, and Aquaticecosystems (ponds, streams, lakes,rivers, oceans, esturaries).

Unit-4:Biodiversity andits conservation

Introduction–Definition; genetic, species andeco- system diversity.
Biogeographical classification ofIndia.
Value ofbiodiversity: consumptiveuse,productiveuse,social, ethical, aesthetic and option values.
Biodiversityofglobal, National and local levels,India as a mega-diversitynation.
Hot-spots of biodiversity.
Threats to biodiversity:Habitatloss, poachingofwildlife, man-wildlife conflicts.
Endangered and endomicspecies ofIndia.
Conservation ofbiodiversity:In-situ and Ex-situ conservation ofbiodiversity.

Unit-5:EnvironmentalPollution Definition

Cause, effects andcontrol measuresof: a. Air Pollution
b. WaterPollution
c. Soil Pollution
d. Marine Pollution e. NoisePollution.
f.Thermal Pollution. g. Nuclear hazards.
- Solid waste management: Causes, effects and
- control measures of urban and industrial wastes.
- Role of an individual in prevention ofpollution.
- Pollution casestudies

- Disaster management: floods, earthquake,cyclone and landslides.

Unit-6:SocialIssues andtheEnvironment

- From unsustainableto sustainable development.
- Urban problems related to energy.
- Water conservation, fainwaterharvesting, watershedmanagement.
- Resettlement and rehabilitation of people: Its problems and concerns. Case studies.
- Environmental ethics:Issues andpossible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.Casestudies.
- Wasteland reclamation.
- Consumerism and wasteproducts.
- Environment Protection Act.
- Air (Prevention and Control ofPollution) Act.
- Water (Prevention and Control of Pollution) Act.
- WildlifeProtection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.

Public awareness.

Unit-7:

Human Population and theEnvironment
Population growth, variation amongnations.
Population explosion- FamilyWelfareProgramme.
Environment and humanhealth.
Human Rights.
Value Education.
MV/AIDS.
Women and Child Welfare.
Role ofhiformation Technologyin Environment and
Human health.
Case Studies.

'Drug Abuse'

Unit-8: Fieldwork

Visit to a local area to document Environment assets-river/ forest/grassland/ hill/ mountain.

Visit to Local polluted site-Urban/Rural Industrial/Agricultural.

Studyof common plant, insects, birds.

Studyof simple ecosystems-pond, river, hill slopes, etc. (Field work equal to 5 lectures hours)