KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF STUDIES/EXAMINATIONS

SEMESTER-III (w.e.f. 2025-26 onwards)

B.Tech. Civil Engineering

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of exam (Hours)
						End Semester Exam	Internal Assessment	Practical Exam	Total	
1	B24-BSC-203	Mathematics III	3:1:0	4	4	70	30	--	100	3
2	B24-CVE-201	Structural Mechanics	3:0:0	3	3	70	30	--	100	3
3	B24-CVE-205	Building Construction Materials and Drawing	3:0:0	3	3	70	30	--	100	3
4	B24-CVE-207	Fluid Mechanics-I	3:0:0	3	3	70	30	--	100	3
5	B24-CVE-209	Surveying & Geomatic Engineering-I	3:0:0	3	3	70	30	--	100	3
6	B24-HSM-201	Organizational Behaviour	3:0:0	3	3	70	30	--	100	3
	B24-HSM-302	Intellectual Property Rights (IPR) and Regulatory								
7	B24-CVE-213	Fluid Mechanics-I Lab	0:0:2	2	1	--	40	60	100	2
8	B24-CVE-215	Surveying & Geomatic Engineering Lab-I	0:0:2	2	1	--	40	60	100	2
9	B24-CVE-217	Material Testing Lab	0:0:2	2	1	--	40	60	100	2
10	B24-MAC-201	Environmental Studies	3:0:0	3	1	70	30	--	100	3
TOTAL				**28**	**23**	**490**	**330**	**180**	**1000**	

NOTE:

- **NCC/NSS/SPORTS/YOGA/TECHNICAL OR CULTURAL CLUB/SOCIETY ACTIVITIES WILL BE JOINED BY STUDENTS IN THE SECOND YEAR ALSO AND WILL BE EVALUATED IN THE 7 TH SEMESTER BY THE INSTITUTE BASED UPON A CONTINUOUS EVALUATION MODEL AS PER GUIDELINES.**

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF STUDIES/EXAMINATIONS

SEMESTER-IV (w.e.f. 2025-26 Onwards)

B.Tech. Civil Engineering

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	ExaminationSchedule(Marks)				Duration of Exam(Hours)
						End Semester Exam	Internal Assessment	Practical Exam	Total	
1	B24-CVE-204	Structural Analysis-I	3:1:0	4	4	70	30	--	100	3
2	B24-CVE-206	Soil Mechanics	3:1:0	4	4	70	30	--	100	3
3	B24-CVE-208	Transportation Engineering-I	3:1:0	4	4	70	30	--	100	3
4	B24-CVE-210	Irrigation Engineering-I	3:0:0	3	3	70	30	--	100	4
5	B24-CVE-212	Environmental Engineering-I	3:0:0	3	3	70	30	--	100	3
6	B24-HSM-201	Organizational Behaviour	3:0:0	3	3	70	30	--	100	3
	B24-HSM-302	Intellectual Property Rights (IPR) and Regulatory								
7	B24-CVE-214	Transportation Engineering lab-I	0:0:2	2	1	--	40	60	100	2
8	B24-CVE-216	Soil Mechanics Lab	0:0:2	2	1	--	40	60	100	2
9	B24-CVE-218	Structural Analysis Lab-I	0:0:2	2	1	--	40	60	100	2
10	B24-CVE-220	Environmental Engineering Lab-I	0:0:2	2	1	--	40	60	100	2
11	B24-MAC-202	Essence of Indian Traditional Knowledge	2:0:0	2	1	--	100	--	100	3
TOTAL				**31**	**26**	**420**	**440**	**240**	**1100**	

Note:

- All students have to undertake the industrial training for 4 to 6 weeks after the 4th semester, which will be evaluated in the 5th semest

B24-BSC-203		Mathematics-III					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**1**	**-**	**4**	**70**	**30**	**100**	**3 Hrs.**

Purpose: To familiarize the prospectivestudents with the Laplace Transform to solve differential equations and how to apply the principles of probability & statistics to model and analyze various phenomena in fields like finance, economics, and engineering, aiding in making informed decisions and predicting outcomes

Course Outcomes(CO)

CO1	Introduction about the concept of Laplace transform and how it is useful in solvingdefinite integrals and initial value problems.
CO2	To introduce the fundamental concepts of probability to analyze and predict outcomes in real-life situations.
CO3	Probability theory provides models of probability distributions(theoretical models of the observable reality involving chance effects) to be tested by statistical methods which has various engineering applications.
CO4	To make the students familiar with basic statistics, including measures of central tendency, measures of dispersion, correlation, and regression.

UNIT-I

Laplace Transform: Introduction, Laplace Transform of Elementary Functions, Basic properties of Laplace transform,Laplace transform of periodic functions, finding inverse Laplace transform by different methods, Convolutiontheorem, solving ordinary differential equations by Laplace Transform method.

UNIT-II

Basic Probability: Introduction, additive law of probability, Conditional Probability, Independent Events, Bayes' Theorem.

Random Variables: Discrete random variables, probability distribution, Probability mass function and distribution function, Expectation, Moments, Variance and standard deviation of discrete random variables.

UNIT-III

Continuous Probability distribution:Continuous random variables, probability distribution, Probability density function and distribution function, Expectation, Moments, Variance and standard deviation of Continuous random variables.Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions.

UNIT-IV

Basic Statistics: Measures of Central tendency: Mean, median, quartiles, mode, Geometric mean, Harmonic mean, Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, Skewness and Kurtosis, Correlation, Coefficient of correlation, methods of calculations, Lines of regression.

Suggested Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
5. N.P. Bali and and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
8.Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

B24-CVE-201		Structural Mechanics					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose: It aims to equip students with the knowledge and skills to analyze and design safe and reliable structures							
Course Outcomes							
CO1	Analyze systems under equilibrium conditions, stresses, and strains.						
CO2	Analyze and construct shear force and bending moment diagrams in determinate structures.						
CO3	Calculate deflections in beams using various methods.						
CO4	Analyze the behavior of columns and statically determinate trusses.						

Note: The paper setter will set the paper as per the question paper templates provided.

UNIT-I

Analysis of stresses and strains: Review of Equilibrium of forces, moment of Inertia. Centre of Gravity and centroid. Different types of stresses, Analysis of simple states of stresses and strains, elastic constraints, Principle stresses and strains, stresses and strains in cylindrical shells

UNIT-II

Bending moment and shear force in determinate beams and frames and Theory of simple bending: Bending moment and shear force in determinate beams and frames: Definitions and sign conventions, axial force, shear force and bending moment diagrams for different types of loading and different types of beams Theory of simple bending: Bending stresses, theory of simple bending, flexure formula, composite beams, shear stresses and flexural shear stresses.

UNIT-III

Deflections in beams: Deflections in beams: Introduction, slope and deflections in beams by differential equations concept of strain energy, Strain energy under bending, strain energy under axial force, under torsion, and shear.

UNIT-IV

Theory of Columns and analysis of statically determinate trusses: Theory of Columns: Slenderness ratio, end connections, short columns, Euler's critical buckling loads, eccentrically loaded short columns, cylinder columns subjected to axial and eccentric loading. Analysis of statically determinate trusses: Introduction, various types, stability, analysis of plane trusses by method of joints and method of sections, analysis of space trusses using tension coefficient method.

Textbooks:

1. S Ramamrutham, "Strength of Materials", Dhanpat Rai and Sons, New Delhi.
2. Structural Analysis-I, BhavikattiS.S.,VikasPub.House, N.Delhi
3. Fundamentals of Structural Analysis, M.K.Pant,S.K.Kataria& Sons, N.Delhi

Reference Books:

1. Strength of Materials Part-I, S.Timoshenko, Affiliated East-West Press, New Delhi
2. Mechanics of Solids, Prasad, V. S. Galgotia Pub., New Delhi.
3. Mechanics of materials Beer and Johnston Mc Graw Hill publications

Note: The paper setter will set the paper as per the question paper templates provided.

B24-CVE-205	Building Construction Materials and Drawing						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Course Outcomes							
CO1	Identify and classify various traditional and modern building materials such as stone, brick, timber, cement, mortar, bitumen, paints, polymers, and their applications in construction.						
CO2	To know about the fundamental components and systems in building construction, such as foundations, masonry, walls, joints, and green building concepts.						
CO3	Interpret and categorize structural components like stairs, lintels, arches, domes, trusses, doors and windows, and special construction materials and systems.						
CO4	Analyze and apply concepts related to surface finishes, damp proofing, thermal and sound insulation, and fire protection systems in building projects.						

UNIT – I

Introduction to Building Materials: Classification, properties, selection criteria. Stone aggregates: Types, characteristics, uses, testing of stone aggregates. Bricks: Composition, manufacturing process, classification, properties, defects. Lime and Cement: Types and properties of lime. Manufacturing of cement, types of cement, properties, storage, and testing.

UNIT – II

Advanced and Modern Construction Materials: Timber and Wood Products: Types of wood, defects, seasoning, preservation, plywood, MDF (Medium-Density Fiberboard), and particle board. Metals in Construction: Steel – types, properties, applications, corrosion and protection.

UNIT – III

Foundation and Masonry Construction Techniques: Foundations: Types (shallow and deep), suitability, excavation, and safety. Masonry Construction: Types of masonry (brick, stone, concrete block), Bonds in brickwork, construction techniques Formwork and Scaffolding: Types, materials used, design principles.

UNIT- IV

Structural and Finishing Components of Buildings: Floors and Roofs: Types of floor finishes, materials used, Types of roofs: flat, pitched, trussed – materials and construction techniques Doors and Windows: Types, materials, components, and fixing Dampness, Thermal and Sound Insulation: Materials and basic construction methods

Textbooks:

1. M.L.Gambhir and Neha Jamwal, “Building Materials”, Tata McGraw Hill
2. Shushil kumar, “Building Construction”, Standard Publication.

Reference Books:

1. Building Materials, P.C.Varghese, PHI Publications.
2. Engineering materials S.C. Rangwala, Charotar Publishing House.
3. Building Materials, Duggal, New Age Publication

Note: The paper setter will set the paper as per the question paper templates provided.

B24-CVE-207		Fluid Mechanics-I					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes	
CO 1	Students will understand the basic properties of fluids and analyze the motion of fluids
CO 2	Students will learn to calculate fluid pressure, forces on surfaces, and analyze the stability of floating and submerged objects.
CO 3	Students will apply equations of motion and use flow measurement techniques to solve problems related to fluid flow.
CO 4	Students will study the behavior of boundary layers and use a dimensional analysis model

UNIT-I

Introduction and Kinematics of Fluid Flow: Introduction: Fluid properties, mass density, specific weight, specific volume, specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility, viscosity, Newtonian and Non-Newtonian fluids, real and ideal fluids. Kinematics of Fluid Flow: Steady & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three-dimensional. flows, stream lines, streak lines and path lines, continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential, rotational and irrotational flows, graphical and experimental methods of drawing flow nets.

UNIT-II

Fluid Statics: Pressure-density-height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, center of pressure, Buoyancy, stability of immersed and floating bodies, determination of metacentric height, fluid masses subjected to uniform acceleration, free and forced vortex.

UNIT-III

Dynamics of Fluid Flow: Euler's equation of motion along a streamline and its integration, limitation of Bernoulli's equation, Pitot tubes, venturimeter, Orifice meter, flow through orifices & mouth pieces, sharp crested weirs and notches

UNIT-IV

Boundary layer analysis and Dimensional Analysis: Boundary layer analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation, and its control. Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, Buckingham theorem, important dimensionless numbers and their significance, geometric, kinematic, and dynamic similarity, model studies, physical modeling, similar and distorted models.

Text Books

1. Hydraulic and Fluid Mechanics by P.N. Modi & S.M. Seth
2. Fluid Mechanics and Hydraulic Machines, Sukumar Pati, McGraw-Hill Education (India) Private Limited, New Delhi.
3. Fluid Mechanics and Hydraulic Machines, Dr. R.K. Bansal, Luxmi Publication

Reference Books

1. Introduction to Fluid Mechanics by Robert W. Fox & Alan T. Mc. Donald
2. Introduction to Fluid Mechanics and Hydraulic Machines, S.K.Som, G. Biswas & S. Chakraborty, McGraw-Hill Education (India) Private Limited.
3. Fluid Mechanics Through Problems by R.J. Garde
4. Engineering Fluid Mechanics by R.J. Garde & A.G. Mirajgaoker

Note: The paper setter will set the paper as per the question paper templates provided.

B24-CVE-209	Surveying & Geomatic Engineering-I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes (CO)

CO1	Understand the basic principles and methods of linear, compass, and leveling surveys, including instrument use and error management.
CO2	Apply the principles of theodolite surveying and contouring to prepare topographic maps and calculate earthwork volumes.
CO3	To learn about the techniques of tacheometric methods and plane table surveying for field data collection, mapping, and solving location problems.
CO4	To learn about the triangulation methods and the setting out of curves, including simple, compound, and transition curves.

Unit I

Linear Measurement:
Introduction, Principles of chain survey, use and adjustment of various instruments employed in chain survey, chaining on sloping grounds, Offsets and error in offsets, Obstructions in chaining, chaining angles, Errors and sources of error, Introduction to advance linear measuring instruments, Field book.
Compass Survey:
Use and adjustment of prismatic and surveyor's compass, Methods of surveying with a compass, Magnetic declination, local attraction, Errors in prismatic survey, plotting of compass survey, distribution of closing error.
Levelling:
Definition and working principles of a levelling instrument and its various parts with reference to the bubble tube and the telescope, Use and adjustment of dumpy and tilting levels, Establishment of Benchmarks by levelling, Longitudinal levelling, Cross section levelling, fly levelling and reciprocal levelling, Methods of booking and reduction of levels. Errors in levelling, Curvature and refraction correction, Advanced levelling instruments.

Unit II

Theodolite Survey:
Study of theodolite, Temporary and permanent adjustments, Measurement of horizontal angles, methods of repetition and reiteration, Measurement of vertical angles, advanced electronic and laser theodolites.
Contouring:
Definition of contours, contour interval, characteristics of contours, Direct and indirect methods of contouring, uses of contours, Estimation of volumes of the earthwork by means of contour lines and section, Grade contours, Topographic maps.

Unit III

Tacheometric Surveying Stadia system, Fixed and movable hair methods, staff held vertical and normal, Instrument constants, Analytic lens, Tangential system, direct reading tachometer, subtense bar.
Plane Table Survey:
Instruments employed in plane table survey, Use and adjustment of these instruments including simple alidade. Working operations like fixing, leveling, centering and orientation, Methods of orientation, various methods of plane table survey. Three point and two-point problems. Errors in plane table survey, Contouring using clinometer, Advantages and disadvantages of plane tabling.

Unit IV

Triangulation:
Principal, selection of baseline and stations, order of triangulation, triangulation figures, scaffold and signals, marking of stations, Intervisibility and heights of stations, satellite stations, baseline measurement and corrections, Introduction to adjustment of observations.
Curves: Types of curves, Elements of a curve, Simple curves, different methods of setting out, Introduction to compound, reverse, transition and vertical curves. Introduction to modern surveying Instruments /Techniques like Total station, GPS etc

Textbooks:

1. Punmia B.C., Jain A.K. and Jain A.K., "Surveying", Volume I and II, Laxmi Publications (P) Ltd., New Delhi.
2. Plane Surveying, A.M. Chandra., New Age International Publications

Reference Books:

1. K.R. Arora, Surveying Vol. I and II Standard Book House, New Delhi.
2. Surveying, Arthur Bannister, Pearson Education
3. Surveying, Mimi Das Saikia, Madan Mohan Das, PHI Publications
4. Fundamentals of Surveying, S.K. Roy, PHI Publications

Note: The paper setter will set the paper as per the question paper templates provided.

B24-HSM-201	Organizational Behavior						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**0**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose: The objective of this course is to help students converse with the basic concepts of organizational behaviour to nurture managerial skills.							
Course Outcomes							
CO1	An overview of organizational behaviour as a discipline and understanding the concept of individual behaviour.						
CO2	Understand the concept and importance of personality and emotions and their importance in decision-making and effective leadership.						
CO3	Enabling the students to know about the importance of effective motivation and its contribution in group dynamics and resolving conflicts.						
CO4	Understand how to overcome organizational stress by maintaining proper organizational culture and effective communication.						

UNIT- I

Introduction to organizational behavior: Concept and importance of organizational behavior, role of Managers in OB, challenges and opportunities for OB.

Foundation of individual behavior: Biographical characteristics, concept and types of abilities, concept of values and attitude, types of attitude, attitude and workforce diversity.

UNIT- II

Introduction to personality and emotions: Definition and Meaning of Personality, Determinants of Personality, Personality Traits Influencing OB, Nature and Meaning of Emotions, Emotions dimensions, concept of Emotional intelligence.

Perception and individual decision making: meaning of perception, factors influencing perception, rational decision-making process, the concept of bounded rationality. Leadership-trait approaches, behavioural approaches, situational approaches, and emerging approaches to leadership.

UNIT-III

Motivation: Concept and theories of motivation, theories of motivation-Maslow, two-factor theory, theory X and Y, ERG Theory, McClelland's theory of needs, goal setting theory, application of theories in the organizational scenario, the linkage between MBO and goal setting theory.

Foundations of group behaviour and conflict management: Defining and classifying of groups, stages of group development, Informal and formal groups- group dynamics, managing conflict and negotiation, causes of group conflicts, managing intergroup conflict through resolution.

UNIT-IV

Introduction to Organizational Communication: Meaning and importance of communication process, importance ofeffective communication, organizational stress: definition and meaning sources and types of stress, impact of stress on organizations, stress management techniques.

Introduction to Organization Culture: Meaning and nature of organization culture, types of culture, managing cultural diversity, managing change and innovation-change at work, resistance to change, a model for managing organizational change.

Text Books:

1. Colquitt, Jason A., Jeffery A. LePine, and Michael Wesson. Organizational Behavior: Improving Performance and Commitment in the Workplace. 5th ed. New York: McGraw-Hill Education, 2017.
2. Hitt, Michael A., Miller, and Adrienne Colella. Organizational Behavior. 4th ed. Hoboken, NJ: John Wiley, 2015.
3. Robbins, Stephen P., and Judge. Organizational Behavior. 17th ed. Harlow, UK: Pearson Education, 2017.

Reference Books:

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley.
2. Udai Pareek, Understanding Organisational Behaviour, Oxford Higher Education.
3. Mc Shane & Von Glinov, Organisational Behaviour, Tata Mc Graw Hill.
4. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication

B24-HSM-302	Intellectual Property Rights (IPR) and Regulatory						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose: The course is designed to provide comprehensive knowledge to the students regarding the general principles of IPR, Concepts and Theories, and international regimes relating to IPR.							
Course Outcomes							
CO1	Students will be familiarized with the introduction to the patent concept and legal implications.						
CO2	Students will be able to understand the concept of copyright in detail.						
CO3	Students will be able to understand trademarks and the laws associated with them.						
CO4	Students will be able to learn about geographical Indications, industrial design and IPR in Information Technology.						

UNIT-I

Indian patent law: The Patents Act, 1970,amendments to the patents act, patentable subject matter, patentability criteria, procedure for filing patent applications, patent granting procedure, revocation, patent infringement and remedies, relevant provisions of the biological diversity act, 2002, access and benefit sharing issues, objectives, rights, patent act 1970 and its amendments. The procedure of obtaining patents, working of patents. Infringement.

UNIT-II

Copyrights: Introduction, works protected under copyright law, infringement. Introduction to copyright, international protection of copyright and related rights- an overview Indian copyright act, 1957 with its amendments, copyright works, ownership, transfer and duration of copyright, renewal and termination of copyright Industrial.

Designs: Need for protection of industrial designs, subject matter of protection and requirements, the designs act, 2000,procedure for obtaining design protection, revocation, infringement and remedies.

UNIT-III

Trademarks: Objectives, types, rights, protection of goodwill, infringement, passing off, need for protection of trademark, kinds of trademark , Indian trademarks law, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, assignment under licensing, infringement, right of goodwill, passing off, domain names and effects of new technology (internet).

UNIT-IV

Geographical Indications: Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position. Industrial Designs: Objectives, Rights, Assignments, Infringements, Information Technology Related Intellectual Property Rights, Computer Software and Intellectual Property, Database and Data Protection, Protection of Semiconductor chips, Domain Name Protection, Implications of intellectual property rights on the commercialization of Biotechnology products.

References:

1. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow
David I. Bainbridge, Intellectual Property, Longman, 9th Edition, 2012
2. Susan K Sell, Private Power, Public Law: The Globalization of Intellectual Property Rights, Cambridge Univ. Press, 2003
3. N.S. Gopalakrishnan & T.G. Ajitha, Principles of Intellectual Property, EasternBook Company,2nd Edition, 2014
4. Jayashree Watal, Intellectual Property Rights in the WTO and Developing Countries, Oxford University Press, 2001
5. Lionel Bently & Brad Sherman, Intellectual Property Law, Oxford UniversityPress, 3rd Edition, 2008
6. Duggal Pavan, Legal Framework on Electronic Commerce & Intellectual
7. Property Rights, Universal Publishing House, 2014
8. Paul Torremans, Intellectual Property and Human Rights, Kluwer Law International, 2008
9. Anderman, Interface Between Intellectual Property Rights and Competition Policy, Cambridge University Press, 2007.
10. Philippe Cullet, Intellectual Property Protection and Sustainable Development,Lexis Nexis, 2005.

Note: The paper setter will set the paper as per the question paper templates provided.

B24-MAC-201	Environmental Studies						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**1**	**70**	**30**	**100**	**3 Hrs.**
Purpose: To Introduce Data Structures principles and paradigms for designing and implementing software.							
Course Outcomes (CO)							
CO1	Students will be able to understand the importance of natural resources.						
CO2	Students will understand the concept of an ecosystem, its structure, and its functions.						
CO3	The students will be able to understand the causes and impacts of various environmental pollution.						
CO4	Students will be able to understand the relationship between the human population and the environment.						

UNIT-1

Introduction to Environmental studies: The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.

Natural Resources: Forest resources: Use and Over-exploitation, deforestation. Timber extraction, mining, dams, and their effects, Water resources: Use and over-utilization of surface and groundwater, conflicts over water, dams benefits and problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Energy resources: renewable and non-renewable energy sources, Land resources: land degradation, soil erosion, and desertification.

UNIT-II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Ecological succession, Food chains, food webs, and ecological pyramids. Major types of ecosystem-Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem.

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, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III

Environmental pollution: Causes, effects, and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Nuclear hazards, and Solid waste Management: Causes, effects, and control measures of urban and industrial wastes, Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment: Sustainable development, Water conservation, rainwater harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, and wasteland reclamation. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act., and Forest Conservation Act.

UNIT-IV

Human population and the Environment: Population growth, 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, Drugs and their effects; Useful and harmful drugs; Use and abuse of drugs; Stimulant and depressant drugs. Concept of drug de-addiction. Legal position on drugs and laws related to drugs.

Textbooks & reference books:

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
2. Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India.
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley, India

Note: The paper setter will set the paper as per the question paper templates provided.

B24-CVE-213	Fluid Mechanics Lab – I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	Identify and characterize flow patterns and regimes.
CO2	Demonstrate practical understanding of principles, equations, and instruments of fluid flow-related phenomena.
CO3	Discuss the differences among measurement techniques, their relevance, and applications.
CO4	Demonstrate the ability to write clear lab reports and understand ethical issues associated with decision making.

List of Experiments

1. To determine the metacentric height of a ship model.
2. To verify Bernoulli's theorem.
3. To calibrate a venturi-meter and to determine its coefficient of discharge.
4. To calibrate an orifice meter and to determine its coefficient of discharge.
5. To study the flow over the V-notch and the rectangular notch and to find their coefficient of discharge.
6. To determine the coefficient of discharge of a mouthpiece.
7. To determine the various hydraulic coefficients of an Orifice (Cd, Cc, Cv).
8. To determine the coefficient of friction of pipes of different diameters.
9. To determine the form losses in a pipeline.
10. To verify Darcy's law.

Note: Students are required to complete at least 8 experiments from the above list.

B24-CVE-215	Surveying & Geomatic Engineering Lab-I	Practical	Credit	Practical Exam	Internal Assessment	Total	Duration of Exam
-	-	2	1	60	40	100	3Hrs.

Course Outcomes (CO)	
CO1	To use conventional surveying tools such as chain/tape, compass, plane table, and level in the field of civil engineering applications such as structural plotting and highway profiling
CO2	Conduct surveys using modern instruments like Total Station and Auto Level with accuracy and precision.
CO3	Analyze survey data and prepare detailed maps and drawings to meet project requirements.
CO4	Work collaboratively as part of a team to execute surveying projects and document results effectively.

List of Experiments

1. Linear measurement in tape, chain and tachometric methods.
2. LevellingusingAuto level.
3. Plotting of the using gradation, intersection and linear measurement.
4. Measurementofhorizontal and verticalangles by Theodolite.
5. Tacheometric Survey.
6. Solutionto two-point andthree-pointproblemsusingPlanetable.
7. Plane table survey of an area.
8. Layingoutofsimple circular curve by different methods.
9. Layingoutof transitioncurve by different methods.
10. PreparationofclosetraverseusingTotalStation.

Note: -Atleast8 Experimentsoutofthelistmustbedoneinthesemester.

B24-CVE-217	Material Testing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	Understand the basics of civil engineering materials that are relevant in engineering applications.
CO2	Integrate the hands-on experience on material testing with their theoretical understanding of the mechanical behavior of materials.
CO3	Determine the appropriateness of the material
CO4	Identify the various test procedures carried out for a building material

List of Experiments

1. Tensile test on steel rod
2. Torsion test on the mild steel rod
3. Impact test on metal specimen (Izod and Charpy)
4. Hardness test on metals (Rockwell and Brinell Hardness Tests)
5. Test for the shape and size of the brick
6. Determination of water absorption of bricks
7. Determination of compressive strength of bricks
8. Determination of efflorescence of bricks
9. Determination of fineness of cement
10. Determination of the standard Consistency of cement

Note: -Atleast8 Experimentsoutofthelistmustbedoneinthesemester.

********** **end of semester III** **********

B24-CVE-204		Structural Analysis-I					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**1**	**-**	**4**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes	
CO 1	Understand the statically indeterminate structure by using different methods and analysis of 2-hinged&3-hinged arch.
CO 2	Apply the concepts of moving loads and influence lines to analyse determinate beams and trusses.
CO 3	Analyse indeterminate structures using slope deflection & Moment distribution methods
CO 4	To know about the cable & Suspension bridges.

UNIT-I

Statically Indeterminate Structures:
Introduction, Static and Kinematic Indeterminacies, Unit load method, Principle of virtual work, Maxwell's law of reciprocal Deflections, Williot's Mohr axial force under torsion & Shear.

Analysis of Two-Hinged& 3 hinged Arches:
Parabolic and circular Arches, Bending Moment diagrams for various loadings, Temperature effects, Rib shortening, Axial thrust, and Radial Shear force diagrams.

UNIT-II

Introduction to moving loads: concept of equivalent UDL, absolute maximum bending moment, and shear force,
Concept of influence lines, influence lines for reaction, shear force, bending and deflection of determinate beams, Influence line diagram [ILD] for forces in determinate frames and trusses, analysis for different types of moving loads, single concentrated load, several concentrated loads, uniformly distributed load shorter and longer than span, Application of Muller Breslau Principle for determinate structures.

UNIT-III

Slope Deflection Method:
Analysis of continuous beams, analysis of rigid frames, frames with sloping legs, gabled frames, frames without sway and with sway, settlement effects.

Moment Distribution Method :
analysis of continuous beams, analysis of rigid frames, frames with sloping legs, gabled frames, frames without sway and with sway, settlement effects.

UNIT-IV

Column Analogy Method:
Elastic center, Properties of analogous column, Applications to beam & frames
Cable & Suspension Bridge : Introduction, uniformly loaded cables, Temperature stresses, Analysis of cables under point load and u.d.l length of cables (supports at same level). Three-hinged stiffening Girder and two hinged stiffening Girder.

Textbooks:

1. G.S. Pandit, "Structural Analysis", CBS Publication.
2. Bhavikatti, "Structural Analysis (Vol.I and II)", Vikas Publication
3. C.K.Wang, "Statically Indeterminate Structures", Mc Graw Hill

Reference Books:

1. C.S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
2. R.C. Hibbler, "Structural Analysis", Pearson Education
3. Schodek, "Structures", Pearson Education
4. Vaidyanathan and P Perumal, "Comprehensive Structural Analysis", Laxmi Publications
5. Sujit Kumar Roy, "Fundamentals of Structural Analysis", S. Chand Publication.

Note:The paper setter will set the paper as per the question paper templates provided.

B24-CVE-206		Soil Mechanics					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**1**	**-**	**4**	**70**	**30**	**100**	**3 Hrs.**
Course Outcomes							
CO 1	Understand the basic properties, classification, and identification methods of soils in the field and laboratory.						
CO 2	Analyze permeability, seepage, and stress distribution in soils under various loading and drainage conditions.						
CO 3	Evaluate the compaction and consolidation behavior of soils and their implications in geotechnical design.						
CO 4	Assess the shear strength of different types of soils through laboratory and field testing.						

UNIT-I

Introduction:
Origin of soils, soil formation, geographical distribution of major soils in India, composition of soil, particle size and shapes, interparticle forces, soil minerals / structure and their effect on basic soil properties. Three phase diagram and relationships among void ratio, specific gravity, dry density, porosity, water content, unit weights and degree of saturation.

Laboratory and field identification of soil:
Determination of water content, specific gravity and grain size distribution for coarse grained and fine-grained soils, Atterberg limits and indices, visual identification by simple field test, field density by core cutter and sand, replacement methods.

Classification of soils:
Necessity, principles, Indian and unified classification, plasticity charts.

UNIT-II

Permeability and seepage:
Concept of pore water pressure, Total, effective and neutral stresses. Darcy's law, laboratory and field permeability tests, factors affecting permeability, surface tension and capillary phenomenon in soil, shrinkage and swelling of soil, seepage forces, Laplace equation and its significance, Flow potential, Flow nets and their properties, seepage through earth dams, exit gradient and uplift pressure, mechanics of piping, methods of dewatering, design of filters.

Stress distribution in soil:
Stress at a point, Mohr's circle, stresses due to force of gravity, Point, line and uniformly distributed loads, Influence charts, contact pressure distribution, Boussineque's and Westerguard's equation for vertical pressure due to point loads and uniformly distributed loads.

UNIT-III

Compaction of soils:
Definition, consolidation and compaction, objectives, compactive effort, Laboratory compaction, Standard Proctor test, Modified Proctor test, IS compaction tests [light / heavy], Field compaction and equipment, Concept of optimum moisture content and zero air voids line, Factors influencing compaction, Effect of compaction on soil properties, Compaction specifications and field control.

Consolidation and settlement:
Consolidation test and compressibility characteristics, Terzaghi's theory of one-dimensional consolidation, types of clay deposits, Normal/over/consolidated clays, determination of pre- consolidation pressure and its significance, time factor and coefficient of consolidation, fitting methods, settlement analysis, secondary compression, consolidation settlement and its rates, acceleration of consolidation by sand drains.

UNIT-IV

Stress-strain curve, Mohr-coulomb failure criteria, Peak and residual shear strengths, Laboratory and field measurement of shear strength of soil, Direct, Triaxial and Unconfined compression tests, vane shear tests. Determination of shear strength parameters for different drainage and stress conditions, measurement of pore pressure, choice of test conditions, Shear strength of soils, Pore pressure coefficients, Sensitivity of cohesive soils, use of various types of shear parameters in design.

Textbooks:

1. Basic And Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age international Ltd
2. Soil Engineering, Alam singh,CBS Publication
3. Geotechnical Engg, Gulati and Dutta, McGrawHill Education (I) Pvt. Ltd

Reference Books:

1. Soil Mechanics and Foundation Engg., Purushothama Raj, Pearson Education.
2. Geotechnical Engg, Venkataramaiah, New Age International Publishers.
3. Geotechnical Engineering [Principles and Practices], P. Donald, Coduto, PHI Publications.
4. Soil mechanics in engineering practice by Karl Terzaghi, Ralph Brazelton Peck, Gholamreza Mesri, Wiley.
5. Geotechnical engineering: principles and practices of soil mechanics and foundation engineering, by V. N.S. Murthy, Marcel Dekker.

Note:The paper setter will set the paper as per the question paper templates provided.

B24-CVE-208		Transportation Engineering-I					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**1**	**-**	**4**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes	
CO 1	Students will be able to study the history review of roads and development; traffic engineering and materials used in highways.
CO 2	Students will study about design of flexible and rigid pavements.
CO 3	Students will study geometric design and their cross-sectional elements of highways.
CO 4	Students will study basic concepts of railway and tunnel engineering.

UNIT-I

Introduction: Transportation and its importance. Different modes of transportation. Brief review of the history of road development in India and abroad: Roman, Tresagne, Telford and Macadam constructions. Road patterns. Classification of roads, Objectives of highway planning, Planning surveys.

Highway Plans, Highway Alignment and Surveys:
Requirements of an ideal highway alignment. Factors affecting alignment. Surveys for highway alignment.

UNIT-II

Cross Section Elements and Sight Distance Considerations: Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values. Design speed. Sight distance, stopping sight distance, overtaking sight distance, overtaking zones, intermediate sight distance, sight distance at intersections, headlight sight distance, set back distance.

Design of Horizontal and Vertical Alignment: Effects of centrifugal force. Design of superelevation. Providing super-elevation in the field. Radius of circular curves. Extra-widening. Type and length of transition curves. Gradient, types, values. Summit curves and valley curves.

UNIT-III

Traffic Characteristics and Traffic Surveys: Road user and vehicular characteristics. Traffic studies such as volume,speed and O & D study. Parking and accident studies. PCU, Causes and preventive measures for road accidents.
Traffic Control Devices: Traffic control devices: signs, signals, markings. Types of signs. Types of signals.Design of an isolated fixed time signal by IRC method.

UNIT-IV

Highway Materials: Soil and Aggregates: Subgrade soil evaluation: CBR test, plate bearing test. Desirable properties ofaggregates. Various tests, testing procedures and IRC/IS specification for suitability of aggregates.
Bituminous Materials and Bituminous Mixes: Types of bituminous materials: bitumen, tar, cutback and emulsions.Various tests, testing procedures and IRS/IS specifications for suitability of bituminous materials in road construction. Bituminous mix, desirable properties. Marshall' method of mix design.

Textbooks:

1. Highway Engineering, S. K. Khanna &C.E.G.Justo, Nem Chand &Bros, Roorkee.
2. Railway Engineering, Saxena, S.C. and Arora S. Dhanpat Rai and Sons, New Delhi, India
3. Harbour, Dock and Tunnel Engineering Srinivasan, R. Charotar Publishing House, Anand, India

Reference Books:

1. Principles of Transportation and Highway Engineering., G.V. Rao, Tata McGraw Hill New Delhi.

Note:The paper setter will set the paper as per the question paper templates provided.

B24-CVE-210		Irrigation Engineering-I					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes	
CO 1	Understand the fundamental concepts of irrigation and analyze methods of irrigation.
CO 2	Understand the canal irrigation, its types and also design of lined canals
CO 3	Understanding the causes and effects of water logging and land reclamation techniques.
CO 4	Understand modern water management practices for efficient and sustainable irrigation.

UNIT-I

Irrigation-necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India, crops and crop seasons. Delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period.

UNIT-II

Irrigation methods:

Classification of Irrigation. Flooding method, border strip method, check basin and furrow method, sprinkler irrigation, favorable conditions, sprinkler systems, design and maintenance of sprinkler systems, drip irrigation-components parts, advantages and limitations, suitability of drip irrigation. Assessment of irrigation water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, GCA, CCA, and Irrigation efficiencies

UNIT-III

Canal irrigation:
Components of the canal distribution system, alignment of channels, design discharge, silt theories and design of alluvial channels, comparison of Kennedy's and Lacey's theories, canal section and design procedure, Garrett's and Lacey's diagrams. ,
Losses in canals-Evaporation and seepage, water logging, causes and ill effects of water logging andanti-water logging measures

UNIT-IV

Modernization techniques- Rehabilitation – Optimization of water use-Minimizing water losses- On form development works-Participatory irrigation management- Water resources associations- Changing paradigms in water management-Performance evaluation- Economic aspects of irrigation

Text Book

1. Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2008.
2. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009
3. Garg S. K., “Irrigation Engineering and Hydraulic Structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

Reference Books

1. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers,2005
2. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc,2000

Note:The paper setter will set the paper as per the question paper templates provided.

B24-CVE-212		Environmental Engineering-I					
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes	
CO 1	Evaluate water sources, water quality, and transportation of water.
CO 2	Determine water quality parameters and design of water treatment units.
CO 3	Understand the selection criteria of pumps and water fixtures in buildings.
CO 4	Determine the characteristics of sewage, its variation in flow due to weather, and the design of the sewer.

UNIT-I

Water Sources: Public water supply system - Planning, Objectives, Design period, Population forecasting; Water demand -Sources of water and their characteristics, Surface and Groundwater - Impounding Reservoir - Development and selection of source - Source Water quality -Characterization -Significance -Drinking Water quality standards.

UNIT-II

Conveyance from the Sources: Water supply -intake structures - Functions; Pipes and conduits for water - Pipe materials - Hydraulics of flow in pipes - Transmission main design - Laying, jointing and testing of pipes -appurtenances - Types and capacity of pumps - Selection of pumps and pipe materials.

UNIT-III

Water Treatment: Objectives - Unit operations and processes -Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation –Clar flocculator-Plate and tube settlers - Pulsator clarifier - sand filters -Disinfection -Residue Management -Construction, Operation, and Maintenance aspect.

Advanced Water Treatment: Water softening, Desalination- R.O. Plant, demineralization, Adsorption, Ion exchange, - Membrane Systems, - RO Reject Management, - Iron and Manganese removal, - Defluorination, - Construction and Operation & Maintenance aspects, - Recent advances, -MBR process

UNIT-IV

Water Distribution & Supply: Requirements of water distribution - Components - Selection of pipe material - Service reservoirs - Functions - Network design - Economics - Analysis of distribution networks Computer applications - Appurtenances - Leak detection. Principles of design of water supply in buildings - House service connection -Fixtures and fittings, systems of plumbing, and types of plumbing.

Text Book

1. Environmental Engineering, Vol. I, S.K. Garg, Khanna Publishers, New Delhi.
2. Environmental Engineering, Vol. II, S.K. Garg, Khanna Publishers, New Delhi.
3. Water Supply and Sewerage, McGraw-Hill.

Reference Books

1. Environmental Engineering Peavy, Rowe and Tchobanoglous, McGraw Hill.
2. Water and Waste Water Engineering (Vol. 1&2), Fair, Geyer &Okun, John Wiley, New York.
3. Water Supply Engineering P.N. Modi, Standard Book House,New Delhi.
4. Standard Methods for the Examination of Water and Wastewater, American Public Health Association.
5. Bureau of Indian Standards (BIS). (1981). IS 2490:1981 - Tolerance Limits for Industrial Effluents.
6. Ministry of Environment, Forest and Climate Change (MoEFCC). (1986). Environment (Protection) Rules, 1986 - Schedule VI.
7. Bureau of Indian Standards. (2012). IS 10500:2012: Drinking Water — Specification (Second Revision). New Delhi: BIS.

Note:The paper setter will set the paper as per the question paper templates provided.

B24-CVE-214	Transportation Engineering lab-I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	To demonstrate the physical and mechanical properties of aggregates such as toughness, hardness, crushing strength, shape, and water absorption using standardized laboratory tests.
CO2	To evaluate the suitability of aggregates for various civil engineering applications through proportioning, stripping, and attrition-based tests to ensure material durability and performance.
CO3	To determine the physical properties of bituminous materials like penetration, ductility, viscosity, softening point, and flash/fire point to assess their applicability in pavement design.
CO4	To demonstrate theadvanced bitumen and soil tests such as Marshall Stability Test and CBR Test to aid in pavement material design and performance analysis.

List of Experiments

Test on Aggregates:

To determine the toughness of the aggregate by Impact Test.
To determine the hardness of the aggregate by Los-Angeles Abrasion Test, Dorry's Abrasion test and Deval Attrition test on aggregates
To determine the Crushing Strength Test of Aggregates.
Flakiness and Elongation Index of aggregates.
Proportioning of aggregates.
Stripping test on aggregates.
Specific gravity and water absorption test on aggregates.
CBR lab test on soil.

Test on Bitumen:

To determine the grade and hardness of the bitumen by Penetration Test.
To determine the elastic property of the bitumen by Ductility Test.
To determine the grade and hardness of the bitumen by Viscosity Test.
To determine the Softening Point Test on Bitumen.
To determine the Flash and Fire Point Test on Bitumen.
Determination of bitumen content.
Specific gravity and water absorption test of bitumen.
Marshall’s stability test.

B24-CVE-216	Soil Mechanics Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	Understand the physical properties of soil, including moisture content, specific gravity, and particle size distribution.
CO2	Analyze the consistency and compaction characteristics of soil using Atterberg limits and compaction tests.
CO3	Evaluate the engineering behavior of soil, such as permeability, shear strength, and consolidation.
CO4	Apply field methods and lab procedures to determine field density and validate theoretical concepts through practical applications.

List of Experiments

1. Moisture content determination by the oven drying method.
2. Moisture content determination by pycnometer method.
3. Specific Gravity of soil particles by the Pycnometer method
4. Specific Gravity of soil particles by DensityBottlemethod
5. Particle size distribution of soils (Grainsizeanalysis) by Sieve analysis.
6. Particle size distribution of soils(Grainsizeanalysis)Hydrometer analysis.
7. Atterberg'slimits[liquidLimit,PlasticLimit,andShrinkageLimit] tests
8. Field density tests of soils by the Core cutter method
9. Field density tests of soils by the sand replacement method
10. PermeabilitytestsofsoilsbyVariableheadmethod
11. Permeabilitytestsofsoilsby the Constantheadmethod
12. Soilcompaction test (Densitymoisturerelations)
13. Consolidation test.
14. Directsheartest.

Note: -Atleast10 Experimentsoutofthelistmustbedoneinthesemester.

B24-CVE-218	Structural Analysis Lab-I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	Verify fundamental theorems like reciprocal, moment area, and influence line through experiments on beams, arches, and trusses.
CO2	Analyze structural behavior, including deflections and stresses, in curved members, beams, trusses, and struts under various conditions
CO3	Experimentally determine material properties of construction materials like steel, concrete, and bricks for use in structural analysis.

List of Experiments

1. To find the value of flexible stiffness EI for a given beam andcomparison with theoretical value.
2. To verify the moment area theorem.
3. To study the behavior of different types of columns
4. To verify Clark's Maxwell reciprocal theorem.
5. To calculate horizontal deflection at roller end in two hinged arches.
6. To determine the horizontal thrust in a three hinged arch and verify it.
7. To obtain the influence line diagram for horizontal thrust in a three hinged arch and verify it.
8. To find the value of torsional constant and compare it with theoretical value.
9. Uniaxial tension test for steel (plain & deformed bars) & Uniaxial compression test on concrete & bricks specimens.

Note: -Atleast8 Experimentsoutofthelistmustbedoneinthesemester

B24-CVE-220	Environmental Engineering Lab-I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3Hrs.**

Course Outcomes (CO)	
CO1	Recommend the degree of treatment required for the water.
CO2	Learn techniques for ensuring quality potable water.

List of Experiments

1. To determine the pH value of a given sample of water.
2. To determine the turbidity in the given water sample.
3. To determine the acidity of a given sample of water
4. To determine the alkalinity of a given sample of water.
5. To determine temporary and permanent hardness in a given water sample.
6. To determine the chlorine required for a given water sample.
7. To determine total suspended, dissolved, and dissolved settable solids in a water sample.
8. To determine the chloride concentration in a given sample of water.
9. To determine the sulphate concentration in the given water sample.

Note: Students are required to complete at least 8 experiments from the above list.

B24-MAC-202	Essence of Indian Traditional Knowledge						
Lecture	**Tutorial**	**Practical**	**Credit**	**Internal Assessment**	**End Semester Exam**	**Total**	**Duration of Exam**
2	**-**	**-**	**1**	**100**	**-**	**100**	**3 Hrs.**
Purpose: To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of the roots of the knowledge system, analyze and apply to their day-to-day life.							
Course Outcomes							
CO1	The students will be able to understand, connect and explain the basics of Indian traditional knowledge from a modern scientific perspective.						
CO2	The students will be able to understand Holistic Health using the Indian Knowledge System.						
CO3	The students will be able to Manage their thoughts and Emotions and will learn positivity, self-regulation, and control.						
CO4	The students will be able to Achieve Consciousness through Indian Knowledge System.						

UNIT 1

Introduction to Indian Traditional knowledge: Define traditional knowledge, importance, kinds of traditional knowledge. Philosophical systems, Basics of Rajyoga and Karam yoga, Benefits of Rajyoga and Karamyoga.

UNIT 2

Holistic Health using Indian Knowledge System:Basic principles of natural life style, Benefits through five elements. Healing through food, Chakras and Mudras.Physical, Mental, Emotional and Spiritual health using traditional knowledge.

UNIT 3

Positivity: Traditional approaches. Happiness: objective and subjective measures of wellbeing, life satisfaction. Resilience, Self-regulation and self-control, optimism, self-esteem. Managing thoughts and Emotions with the help of Rajyoga. Achieving Powers for Self-Mastery.

UNIT 4

Achieving Consciousness through Indian Knowledge System: Emotional intelligence, Indian approach to Psychology. Consciousness; levels, body-mind relationship, self-motivation, Self and Identity in modern Psychology and Indian thought., Spirituality and well-being.

Reference and Text Books:

1. Mahadevan, M., Bhat, V.R. & Pavana N. (2022). Introduction to Indian Knowledge System: Concepts and Applications. PHI Learning
2. Baumgardner, SR & Crothers, MK (2009). Positive Psychology. Prentice Hall/Pearson Education.
3. Cornelissen, R.M., Misra G. & Varma S. (2014). Foundations & Applications of Indian Psychology. Pearson Education.
4. Rajyoga Education and Consciousness Improvement Programme for Educators, Rajyoga Educationand Research Foundation.
5. Rajyoga Meditation Course, Thoughkart, Jaipur(Rajasthan), India.
6. PrakartikSwasthya Shastra, Publisher Natural Lifestyle

Note: The paper setter will set the paper as per the question paper templates provided.

B24-HSM-201	Organizational Behavior						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**0**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Purpose: The objective of this course is to help students converse with the basic concepts of organizational behaviour to nurture managerial skills.

Course Outcomes

CO1	An overview of organizational behaviour as a discipline and understanding the concept of individual behaviour.
CO2	Understand the concept and importance of personality and emotions and their importance in decision-making and effective leadership.
CO3	Enabling the students to know about the importance of effective motivation and its contribution in group dynamics and resolving conflicts.
CO4	Understand how to overcome organizational stress by maintaining proper organizational culture and effective communication.

UNIT- I

Introduction to organizational behavior: Concept and importance of organizational behavior, role of Managers in OB, challenges and opportunities for OB.

Foundation of individual behavior: Biographical characteristics, concept and types of abilities, concept of values and attitude, types of attitude, attitude and workforce diversity.

UNIT- II

Introduction to personality and emotions: Definition and Meaning of Personality, Determinants of Personality, Personality Traits Influencing OB, Nature and Meaning of Emotions, Emotions dimensions, concept of Emotional intelligence.

Perception and individual decision making: meaning of perception, factors influencing perception, rational decision-making process, the concept of bounded rationality. Leadership-trait approaches, behavioural approaches, situational approaches, and emerging approaches to leadership.

UNIT-III

Motivation: Concept and theories of motivation, theories of motivation-Maslow, two-factor theory, theory X and Y, ERG Theory, McClelland's theory of needs, goal setting theory, application of theories in the organizational scenario, the linkage between MBO and goal setting theory.

Foundations of group behaviour and conflict management: Defining and classifying of groups, stages of group development, Informal and formal groups- group dynamics, managing conflict and negotiation, causes of group conflicts, managing intergroup conflict through resolution.

UNIT-IV

Introduction to Organizational Communication: Meaning and importance of communication process, importance ofeffective communication, organizational stress: definition and meaning sources and types of stress, impact of stress on organizations, stress management techniques.

Introduction to Organization Culture: Meaning and nature of organization culture, types of culture, managing cultural diversity, managing change and innovation-change at work, resistance to change, a model for managing organizational change.

Text Books:

1. Colquitt, Jason A., Jeffery A. LePine, and Michael Wesson. Organizational Behavior: Improving Performance and Commitment in the Workplace. 5th ed. New York: McGraw-Hill Education, 2017.
2. Hitt, Michael A., Miller, and Adrienne Colella. Organizational Behavior. 4th ed. Hoboken, NJ: John Wiley, 2015.
3. Robbins, Stephen P., and Judge. Organizational Behavior. 17th ed. Harlow, UK: Pearson Education, 2017.

Reference Books:

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley.
2. Udai Pareek, Understanding Organisational Behaviour, Oxford Higher Education.
3. Mc Shane & Von Glinov, Organisational Behaviour, Tata Mc Graw Hill.
4. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication.

Note: The paper setter will set the paper as per the question paper templates provided.

B24-HSM-302	Intellectual Property Rights (IPR) and Regulatory						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Duration of Exam**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose: The course is designed to provide comprehensive knowledge to the students regarding the general principles of IPR, Concepts and Theories, and international regimes relating to IPR.							
Course Outcomes							
CO1	Students will be familiarized with the introduction to the patent concept and legal implications.						
CO2	Students will be able to understand the concept of copyright in detail.						
CO3	Students will be able to understand trademarks and the laws associated with them.						
CO4	Students will be able to learn about geographical Indications, industrial design and IPR in Information Technology.						

UNIT-I

Indian patent law: The Patents Act, 1970,amendments to the patents act, patentable subject matter, patentability criteria, procedure for filing patent applications, patent granting procedure, revocation, patent infringement and remedies, relevant provisions of the biological diversity act, 2002, access and benefit sharing issues, objectives, rights, patent act 1970 and its amendments. The procedure of obtaining patents, working of patents. Infringement.

UNIT-II

Copyrights: Introduction, works protected under copyright law, infringement. Introduction to copyright, international protection of copyright and related rights- an overview Indian copyright act, 1957 with its amendments, copyright works, ownership, transfer and duration of copyright, renewal and termination of copyright Industrial.

Designs: Need for protection of industrial designs, subject matter of protection and requirements, the designs act, 2000,procedure for obtaining design protection, revocation, infringement and remedies.

UNIT-III

Trademarks: Objectives, types, rights, protection of goodwill, infringement, passing off, need for protection of trademark, kinds of trademark , Indian trademarks law, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, assignment under licensing, infringement, right of goodwill, passing off, domain names and effects of new technology (internet).

UNIT-IV

Geographical Indications: Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position. Industrial Designs: Objectives, Rights, Assignments, Infringements, Information Technology Related Intellectual Property Rights, Computer Software and Intellectual Property, Database and Data Protection, Protection of Semiconductor chips, Domain Name Protection, Implications of intellectual property rights on the commercialization of Biotechnology products.

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David I. Bainbridge, Intellectual Property, Longman, 9th Edition, 2012
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5. Lionel Bently & Brad Sherman, Intellectual Property Law, Oxford UniversityPress, 3rd Edition, 2008
6. Duggal Pavan, Legal Framework on Electronic Commerce & Intellectual
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Note: The paper setter will set the paper as per the question paper templates provided.