B. Tech. (Fifth Semester) Mechanical Engineering (Auto)
Microprocessors and Applications
MEA 301 E

L	T	P/D	Total
3	1	-	4

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT - I

Introduction To Microprocessors And Microcontrollers: Introduction to Microprocessors and Microcontrollers, Number Systems and Binary arithmetic, Microprocessor Architecture (8085 and 8086) and Microcomputer Systems, memory map and addressing, memory classification, review of logic device for interfacing, Memory Interfacing, Overview of 8085 Instruction Set, stacks and Interrupts.

UNIT – II

The 8051 Architecture: 8051 Microcontroller hardware, oscillator and clock, Prog. Counter and Data Pointer, Registers and Program Status word, Internal Memory RAM, Stack and Stack Pointer, Special Function Registers, Internal ROM. Input / Output Pins, Ports and Circuits, External Memory, Counters and Timers, Serial Data Input and Output, Interrupts.

UNIT – III

Assembly Language & Programming The 8051: Assembly Language programming, Programming the 8051, Moving Data, Logical Operations, Arithmetic Operations, Branching Operations, Interrupts.

UNIT – IV

Microcontroller 8051 design: Microcontroller specification and Design, External Memory and Memory space decoding, Memory – mapped I/O, Memory Access times, Timing Subroutines, Lookup Tables for 8051, Serial Data Transmission.

Interfacing Peripheral Devices To 8051 And Applications: Interfacing A/D Converters and D/A Converters, 8255, 8259. Application to interfacing Scanned Displays, Matrix Keyboard, Memory Design, Data Acquisition System Design.

Text Books:

1. K.J. Ayala, “The 8051 Microcontroller, Architecture, Programming & Applications”, Thomsom Delmer Learning.
2. RS Gaonkar, “Microprocessors Architecture, Programming and Applications”, Penram International.

Reference Books:

1. M.A. Mazidi. & J.G Mazidi, “The 8051 Microcontroller & Embedded Systems”, Pearson Education.
2. B.Ram, “Fundamentals of Microprocessors and Microcomputers”, Dhanpat Rai and Sons.

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)
Motor Vehicle Technology

MEA 303 E

L	T	P		
3	1	-	Sessional	: 50 Marks
			Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam. :	3 Hrs.

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

I.C ENGINES (INTRODUCTION):

Working and difference between SI and CI Engines, Two and four stroke cycles, Theoretical heat cycles, ideal and actual Otto and diesel cycle, mixed cycle; Numerical, Working of two and four stroke SI and CI engines, Scavenging methods of two-stroke petrol engines, Comparison of two and four stroke cycle engines.

ENGINE PERFORMANCE:

Bore and stroke, swept and clearance volume, compression ratio, effect of C.R, engine torque, mean effective, bmep, bhp, Ihp, fhp, Engine efficiencies - air standard, mechanical, thermal, indicated thermal, brake thermal, volumetric, requirements of high volumetric efficiency, Factors.; Specific fuel consumption, Numerical

UNIT-II

ENGINE COMPONENT PARTS:

Cylinder block Types, Crankcase, liners: wet and dry, Gaskets, Timing covers, oil pan, cylinder head; SI engines combustion chambers: types and comparison, CI engine combustion chambers: Direct and Indirect injection, Intake & exhaust ports, lubricating passages, Intake & Exhaust valves and mechanisms, Camshafts, Side & overhead, advantages and disadvantages, Valve seat and conical angles, Valve seat insert, Valve springs, locks, Rocker-shaft, rocker arm, push rod, Cam followers-types, Timing of valves, Intake and exhaust manifold, Mufflers-types, Crankshaft :Nomenclature; Flywheel-functions; Oil seals; Engine Bearings : Thrust, ball, taper roller, needle, split, journal; Bearing materials, properties; Connecting rod; Piston : function, types, materials, piston rings: types, design details, Piston Pins, Component material chart :All engine components.

UNIT-III

.

REAR AXLES AND TYRES:

Axle Casing, types, rear axle shafts - stresses and load taken, semi floating, ¾ floating and fully floating; Comparative data : axles; Automobile wheel :loads, torques and stresses, types of wheels, requirements, specifications, Types of rims, Advantages of smaller wheels; Requirement of tyres. Types : conventional, radial and tubeless, Inner tubes; Merits of

tubeless tyres over pneumatic tyres; Pneumatic tyres: constructional details: plies, tread designs, characteristics, aspect ratio, inflation pressure : comfort, braking, cornering, cost, fuel consumption, tyre materials; Tyre specifications; Points to increase tyre life : load, vehicle handling, speed, wheel balancing, tyre rotation, wheel alignment Procedure: Tyre retreading.

UNIT-IV

PROPELLER SHAFT AND DIFFERENTIAL:

Propeller shaft : requirement, construction, maintenance, critical speed vibration, double propeller shaft, Maruti half shafts; Universal Joints : types, rubber doughnut, hookes, constant velocity (Birfield), speed variation of hookes coupling, coupling with driven shaft; Numericals, Differential: requirements, principle, construction and working; Bevel gears, hypoid gear, worm and warm wheel, Differential lock, limited slip differential, double reduction. Numericals

CHASSIS AND BODY:

Types - unitized and separate body and chassis, Advantages, Designs: chassis frame; Chassis side and cross member, sections and joints; Body: requirements, main parts, Material composition, Body shape-aerodynamic design, CD for different types of vehicles; Vehicle component's attachments, Front and Rear wheel drive component locations: advantages and disadvantages; Rear mounted engine and rear wheel drive : advantages; Definitions : wheel base, wheel track, minimum radius, front and rear overhang, ground clearance, grade ability, laden and unladen weight; Car seat and seat belt mounting and adjustment.

TEXT BOOK:

Crouse, W.H, "Automobile Technology", Tata Mc Graw Hill

REFERENCE BOOKS

Sethi, H. M, "Automotive Technology", Tata McGraw Hill, 2003

Gupta R. B, "Automobile Engineering", Dhanpat Rai & Sons, 1998

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)

Heat Transfer

ME 305 E

L	T	P/D	Total	
3	1	-	4	Sessional: 50 Marks Theory : 100 Marks Total : 150 Marks Duration of Exam: 03Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Definition of heat; Modes of Heat Transfer; Basic Laws of heat transfer, Electrical Analogy of heat conduction; Conduction through composite Walls; Overall heat transfer coefficient. The general conduction equation in Cartesian, cylindrical and spherical coordinates Steady one dimensional heat conduction without internal heat generation; The plane slab; 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; Cylindrical and spherical systems; Fins of uniform cross section; Governing equation; Temperature distribution and heat dissipation rate; Efficiency and effectiveness of fins.

UNIT II

Free and forced convection; Newton's law of cooling, Convective heat transfer Coefficient; Nusselt number; Dimensional analysis of free and forced convection; Analytical solution to forced convection problems; The concept of boundary layer; Hydrodynamic and thermal boundary layer; Momentum and Energy equations for boundary layer; Exact solution for laminar flow over an isothermal plate using similarity transformation; The integral approach; Integral momentum and energy equations; Solution of forced convection over a flat plate using the integral method. Analysis of free convection; governing equations for velocity and temperature fields. Relation between fluid friction and heat transfer, Reynolds analogy Dimensionless numbers; Reynolds, Prandtl Nusselt , Grashoff and Stanton Numbers and their significance, Heat transfer with change of phase; Nusselt theory of laminar film Condensation.

UNIT III

Theories of thermal radiation; Absorption, Reflection and transmission, Monochromatic and total emissive power; Black body concept; Planck's distribution law; Stefan Boltzman law; Wien's displacement law; Lambert's cosine law; Kirchoff's law; Shape factor; Heat transfer between black surfaces.

UNIT IV

Introduction; Classification of heat exchangers; Logarithmic mean temperature Difference; Area calculation for parallel and counterflow heat exchangers; Effectiveness of heat exchangers; N T U method of heat exchanger design; Applications of heat exchangers.

Reference and Text books:

A Text book of Heat Transfer by S.P Sukhatme, university press Heat transfer by Holman, TMG
Heat and Mass transfer by D.S Kumar

B. Tech. (Fifth semester) Mechanical engineering
INDUSTRIAL ENGINEERING
ME 307 E

L	T	P/D	Total	
3	1	–	4	

Theory : 100 Marks
Sessional: 50 marks
Duration of Exam : 03 hours

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

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; 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 Text books:

- Production planning and control by S.Elion
- Modren production Management by S.S Buff
- Industrial engg. and management manufacturing system by Surender kumar, Satya prakashan
- Essence of Supply Chain Management by R.P mohanty and S.G Deshmukh
- Industrial engg. and management by S Sharma and Savita sharama

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)
Machine Design- 1
ME 309 E

L	T	P/D	Total
2	-	5	7

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Properties: Chemical, Physical, Mechanical and Dimensional; Ferrous metals, Non-ferrous metals, Plastics, Composite materials etc.; Selection of Engineering Materials. Design methodology; Design criterion based on fracture; Deformation and elastic stability design stresses; Factor of safety; Significant stress and significant strength; Stresses-concentration; Causes and mitigation; Endurance limit; Effect of concentration; Notch sensitivity; Size and surface finish; Goodman diagram; Gerber's parabola and Soderberg line.

UNIT II

Supports and retainment of rotating assemblies; manufacturing considerations of design, design of castings and weldments.Riveted joints for boiler shell according to I. B. R.; riveted structural joint; and riveted joint with eccentric loading; Types of welded joints; strength of welds under axial load; Welds under eccentric loading; Designation of various types of bolts and nuts, Design of bolted joints, Bolts of uniform strength, Bolted joints with eccentric loads, Design of Keys, Cotter joint and knuckle joints.

UNIT III

Design of shafts subjected to pure torsion; Pure bending load; Combined bending and torsion; Combined torsion; Bending and axial loads.
Introduction, hand and foot levers, cranked lever, lever for a lever safety valve, Bell crank lever. Miscellaneous levers.

UNIT IV

Types of shaft couplings, Design of sleeve or muff coupling; Flange coupling and bush type flexible couplings.Introduction, Design of circular, oval shaped and square flanged pipe joints. Function, types of power screws, stresses in screws, design calculations.

References and text books:

Design of machine element By Bhandari
Machine design by Malvee and Hartmann, CBS publication Machine design by Sharma and Aggarwal
PSG Design Data Book by PSG College of Engg PSG Publication
Machine Design an integrated Approch Robert l Norton, prentice hall
Fundamental of machine component design R.C Juvinnal, Johan wiley& sons

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)
Automotive Transmissions
MEA 307 E

L	T	P/D	Total
4	1		5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Introduction of transmission system

Need for transmission system. Tractive effort and resistances to Motion of a vehicle. Requirements of transmission system. Classification of Transmission systems. Single, two or four wheel drive systems. Multi axle drives. Chain, Shaft and Electric drives. Location of transmission system. Different transmissions in scooter, car, MUVs and transport vehicles of Indian make.

UNIT II

Gear box

Necessity of gearbox, Overdrive, torque converter: principle and performance curves; Automatic gearbox; synchronizing rings : materials and construction, Continuously variable transmission(CVT), Gear box lubrication, Grade of oil, topping : up procedure, leakage prevention : static and dynamic seals; Final drive :Hotch Kiss and Torque tube.

Determination of gear ratios for vehicles. Performance characteristics in different speeds. Need for double declutching. Power and economy modes in gearbox. Transfer box. Transaxles. Overdrives. Gear shifting mechanisms – mechanical link and wire types

UNIT III

Hydrodynamic drive

Fluid coupling- principle of operation, constructional details. Torque capacity. Performance characteristics, Reduction of drag torque. Torque converter-working, constructional details converter coupling, multistage torque converters and Polyphase torque converters with applications.

Hydrostatic drive

Hydrostatic drive - Various types of hydrostatic systems - Principles of hydrostatic drive system, Advantage and limitations, Comparison of hydrostatic drive with hydrodynamic drive - Construction and working of typical Janny hydrostatic drive.

UNIT IV

Electric drive

Electric drive Principle of early and modified Ward Leonard Control system. Advantage & limitations. Performance characteristics. Study of drive system in an electric and hybrid vehicle.

Automatic transmission applications

Chevrolet "Turboglide" Transmission, Powerglide Transmission Toyota "ECT-i" Automatic

Transmission with Intelligent Electronic controls system, Hydraulic Actuation system.

References:

1. Heldt.P.M., " Torque converters ", Chilton Book Co.
2. Newton and Steeds, " Motor vehicles ", llliffe Publishers.
3. Judge.A.W., " Modern Transmission systems ", Chapman and Hall Ltd.
4. SAE Transactions 900550 & 930910.
5." Hydrostatic transmissions for vehicle applications", I Mech E Conference,1981-88.
6. Crouse. W.H., Anglin., D.L., " Automotive Transmission and Power Trains construction ", McGraw-Hill.
7. Automobile Engineering Vol-1 by Kirpal Singh.

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)
Automotive Transmissions Lab
MEA 313 E

P/D	Total
2	2

Sessional : 25 Marks
Practical : 25 Marks
Total : 50 Marks
Duration of Exam: 3 Hrs

List of Experiments:-

1. Study of a layout of transmission system for a front wheel drive, rear wheel drive and a four wheel drive arrangement
2. Trouble shooting in different types of friction clutches
3. Study of layout of gears and shafts in a manual type gearbox and a transaxle.
4. Trouble shooting in manual type of gearbox and a transaxle
5. Study of layout in a manual & automatic gearbox for a two wheeler
6. Trouble shooting in gearbox of two wheeler of previous experiment
7. Study of layout of an automatic gearbox.
8. Study of gear shifting controls in an automatic gearbox
9. Trouble shooting in an automatic gearbox
10. Study of performance of an automatic gearbox.
11. Study of a manual and electric Transfer Case.
12. Trouble shooting in Transfer Case of previous experiment.
13. Study of an electric drive in an Electric vehicle

Note: At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

B. Tech. (Fifth Semester) Mechanical Engineering (Auto)

Heat Transfer (Practical)

ME 317 E

L	T	P/D	Total
-	-	2	2

Sessional : 25 Marks
Practical : 25 Marks
Total : 50 Marks
Duration of Exam: 03 Hrs

List of Experiments

1. Determination of thermal conductivity of a metal rod
2. Determination of thermal conductivity of an insulating powder
3. Determination of thermal conductivity of a liquid using Guard plate method
4. Determination of thermal resistance of a composite wall
5. Temperature distribution of a pin fin in free-convection
6. Temperature distribution of a pin fin in forced-convection
7. Forced convection heat transfer from a cylindrical surface
8. Determination of Electiveness of a Heat exchanger
9. Determination of Stefan-Boltzman constant
10. Performance of Solar still
11. Determination of critical heat flux
12. Performance of solar water heater
13. Measurement of solar radiation using solar integrator.

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B. Tech. (Fifth semester) Mechanical engineering (Auto)
Industrial Engineering (Practical)
ME 319 E

L	T	P/D	Total	
-	-	2	2	Theory: 25 Marks Sessional: 25 marks Duration of Exam: 03 hours

List of Experiments

1. To study various Rating Factor systems and find standard time for making small sand mould.
2. To study various plat layouts and suggest improvements in existing Machines Shop layout.
3. To study and draw organizational structure of a nearby industry and suggest changes.
4. To draw X and R charts for a given sample of products to check their acceptance.
5. To draw p chart for a given product lot and verify its acceptance
6. Draw a flow process chart with time estimates for a simple welding process.
7. Draw a two handed process chart for a simple process of a job preparation on a lathe.
8. To study various purchase procedures and draw organizational structure of college purchase department.
9. A case study on ABC/VED analysis.
10. A case study on Quality Improvement Techniques (e.g. Hostel Mess/ Workshop / Canteen etc.)
11. A market survey and analysis.
12. A “preliminary project report” preparation for any small-scale unit.

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)

Refrigeration and Air Conditioning

ME 302 E

L	T	P/D	Total		
				Sessional	: 50 Marks
				Theory	: 100 Marks
3	1	-	4	Total	: 150 Marks
				Duration of Exam: 03 hours	

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

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; Vapor 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 Vapor 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; cold storage and ice-plants.

UNIT III

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.

Psychometric chart, construction and use, mixing of two air streams; sensible heating and cooling; latent heating and cooling; humidification and dehumidification; cooling with dehumidification; cooling with adiabatic humidification; heating and humidification; by-pass

factor of coil; sensible heat factor; ADP of cooing coil; Air washer.

UNIT IV

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. Inside design conditions; comfort conditions; components of cooling loads; internal heat gains from (occupancy, lighting, appliances, product and processes); system heat gain (supply air duct, A.C. fan, return air duct); external heat gain (heat gain through building, solar heat gains through outside walls and roofs); solar air temperature; solar heat gain through glass areas; heat gain due to ventilation and infiltration.
Transport air conditioning; evaporative condensers, cooling towers; heat pumps.

References and Text books

1. Refrigeration and air-conditioning by C.P arora
2. Basic Refrigeration and air-conditioning by Annanthana and Rayanan, TMG
3. Refrigeration and air-conditioning BY Arora and Domkundwar, Dhanpat rai

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
Automotive Electricals & Systems
MEA 305 E

L	T	P/D	Total
3	1	-	4

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Introduction

Earth returns and insulated return systems, 6, 12, and 24-volt systems. Positive & negative earth systems. Fusing of circuits, relays, switches, low and high voltage automotive cables, wiring diagram for typical automotive wiring systems, maintenance and servicing.

Batteries

Principles of lead acid cells and their characteristics - construction and working of lead acid battery, types of batteries, testing of batteries, effect of temperature on: capacity and voltage, battery capacity, voltage, efficiency, charging of batteries, sulphation and desulphation, maintenance and servicing, Battery failures & checking, Maintenance free Batteries, High energy and power density batteries for electric vehicles.

UNIT II

Charging system

Principle of generation of direct current. Shunt generator characteristics. Armature reaction. Third brush regulation. Cut-out. Voltage & current regulators, compensated voltage regulator. Alternators - principle, constructional and working aspects, bridge rectifiers. Principle of Magneto, Flywheel Magneto, Maintenance and servicing. Trouble shooting in charging systems.

Starting system

Condition at Starting – starting torque and power requirements, behavior of starter during starting. Series motor and its characteristics. Principle & construction of starter motor. Working of different starter drive units, care & maintenance of starter motor. Starter switches. Safety mechanism. Maintenance, servicing and trouble shooting.

UNIT III

Ignition system

Types, construction & working of battery & coil and magneto ignition systems. Relative merits, Ballast Resistor, Ignition coil, Distributor, Contact breaker Point, centrifugal and vacuum advance mechanisms, Limitations of conventional ignition systems, Transistorized Ignition systems, Spark plugs - construction, different types, plug fouling, maintenance, servicing and fault diagnosis, Electronic Ignition system. Programmed ignition, distributor less ignition.

Lighting system

Principle of automobile illumination, headlamp construction and wiring, reflectors – types,

signaling devices- flashers, stop lights, fog lamps, auxiliary lighting-engine, passenger, reading lamp. Regn-plate lamps. Automatic illumination system. Head light levelling devices. Study of a modern headlight system with improved night vision.

UNIT IV

Electrical Equipment and Accessories

Oil pressure gauge, fuel level gauge, engine temperature gauge, electrical fuel pump, speedometer, odometer, trip meter, engine rpm meter, Headlamp & Windshield washer and wiper, heaters and defrosters, horns, stereo/radio, power antennae. Central locking, power window winding. Sun/Moon Roof. Motorized rear view mirrors, reverse warning, Bumper collision warning. Other accessories in modern vehicles.

Fuel cell

Thermodynamic aspects; types-hydrogen and methanol, power rating and performance. Various components and working of fuel cell. Heat dissipation.

Drive Motors and controllers:

Drive arrangements in Hybrid and Electric vehicles. Drive motors: types and construction. Controlling of motor operations. Motor-generator in hybrid vehicles and its controls.

Books

1. "Automotive Electrical Equipment ", P.L. Kohli, Tata McGraw-Hill Co. Ltd. New Delhi, 1975.
2. “Principles of Electricity and electronics for the Automotive Technician”, Chapman, Thomson Asia, 2000.
3. "Modern Electrical Equipment of Automobiles", A.W. Judge. Chapman & Hall, London.
4. "Automobile Electrical and Electronic Equipments ", A.P. Young. & L. Griffiths, English Languages Book Society & New Press, 1990.
5. "Storage Batteries ", G.W. Vinal. John Wiley & Sons Inc., New York, 1985.
6. "Automobile Electrical Equipment ", W.H. Crouse. McGraw Hill Book Co. Inc., New York,
7. "Electrical Ignition Equipment ", F.G. Spreadbury, Constable & Co Ltd., London, 1962.
8. “Basic Automotive Electrical Systems”, C.P.Nakra, Dhanpat Rai
9. Fuel Cells by Bockris and Srinivasan; McGraw Hill
10. Automobile Engineering Vol –II by Kirpal Singh

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
Fundamentals of Management
HUT 302E

L	T	P/D	Total		
3	1	-	4	Sessional	: 50 Marks
				Theory	: 100 Marks
				Total	: 150 Marks
				Duration f Exam:	3 hours

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.

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 : Nature, scope and importance of marketing management. Modern Marketing concepts. Role of marketing in economic development. Marketing Mix. Marketing Information System. Meaning, nature and scope of International Marketing.

Text Books:

1. Operations Management – SCHOROEDER, MGH, New York.
2. Production Operations Management – CHARY, TMH, New Delhi.

Reference Books:

1. Production Operations Management – ADAM & EBERT, PHL, New Delhi
2. Operational Management –MONKS, McGraw Hill, Int.
3. Production & Operations Management – I. Hill, Prentice Hall, Int.
4. Production Planning & Inventory Control – NARASIMHAM etal, PHL, New Delhi
5. Production & Operation Management- Panneerselvam, PHI, New Delhi

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
Computer Aided Design and Manufacturing
ME 308 E

L	T	P/D	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Introduction to CAD/CAM, Historical Development, Industrial look at CAD/CAM, Introduction to CIM Basic of Geometric & Solid modeling, Coordinate systems, Explict, Implict, Intrinsic and parametric equation Part families, Part classification and coding, product flow analysis, Machine cell Design, Advantages of GT

UNIT II

Introduction, Transformation of points & line, 2-D rotation, Reflection, Scaling and combined transformation, Homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, Orthographic and perspective projections Algebric and geometric forms, tangent & normal blending functions, reparametrization Straight line, conics, cubic splines, bezier curves and B-spline curves

UNIT III

Algebraic and geometric forms, tangent & twist vectors, normal blending function, reparametrization, Sixteen point form, four Curve form, Plane surface, ruled surface Surface of revolution, tabulated cylinder Bi -cubic surface, bezier surface, B-spline surface Solid models and representation scheme B-rep & CSG, sweep representation ,Cell decomposition, spatial occupancy enumeration

UNIT IV

Introduction, fixed programmable and flexible automation, 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 Introduction, FMS component, Types of FMS, FMS layout, Planning for FMS, advantage and applications Introduction, conventional process planning, Steps in variant process planning, types of CAPP, planning for CAPP

Suggested Reading:

CAD/CAM theory & practice (Ibrahim Zeid)
CAD/CAM (Groover & Zimmer)
Numerical control and computer aided manufacturing by RAO and Tiwari, TMG

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)

Machine Design-II

ME 310 E

L	T	P/D	Total
2	-	6	8

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 04 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Classification of Gears; Selection of type; Law of Gearing, Standard system of Gear tooth, Various Failure modes, Interference, undercutting & minimum no. of teeth Force Analysis ,Beam strength of Gear tooth, Effective load on tooth, Estimation of module based on beam strength and wear strength, Gear lubrication, materials; Design Procedure, Gear Box design Terminology, Force Analysis, Virtual no. of teeth, Beam strength, Effective load, Wear strength Terminology, force analysis, beam strength & wear strength, effective load on gear tooth Terminology, properties, force analysis, friction, material selection

UNIT II

Design of flat belts &Pulleys, Design /selection of V belts &Pulleys, Design/selection of wire ropes, Design/selection of chains Single &multiple Plate clutch, Cone clutch External shoe brake, Internal shoe brakes

UNIT III

Coil Springs, Leaf Springs Hydro dynamically lubricated bearings, Selection of ball bearings, Selection of roller bearings, Selection of taper roller bearings Mechanism Design, Design of cam & Follower

UNIT IV

Design of Cylinder, Design of Piston, Design of Crank shaft, Design of connecting rod Design of Crane Hook Design of Flywheels

SUGGESTED READING:

Design of Machine Elements Bhandari TMH
Machine Design Sharma Aggarwal Katson Publishers
PSG Design Data Book PSG College of Engg PSG Publication
Machine Design an integrated Approach Robert l Norton, prentice hall
Fundamental of machine component design R.C Juvinnal, Johan wiley& sons

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
IC Engines, Emissions and Pollution Control
MEA 312 E

L	T	P/D	Total		
3	1	-	4	Sessional	: 50 Marks
				Theory	: 100 Marks
				Total	: 150 Marks
				Duration f Exam: 3 hours	

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT – I

I.C. Engines: Valve Timings. Actual indicated diagrams. Combustion calculations. Carburetion and fuel injection. Supercharging. Lubrication and cooling methods. Governing methods. Engines performance & Testing.

Auto engines classifications-arrangement of cylinders, valves and camshaft, Types of fuels used, engine speed, methods of cooling, engine balance, Combustion in S.I. and C.I. Engines: Normal & Abnormal Combustion. Pre-ignition. Detonation. Knocking. Comparison of knocking in S.I. and C.I. Engines. Rating of Fuels.

UNIT – II

Engine Fuels: Types of Hydrocarbon, Gasoline, Diesel specifications, Emission and air pollution: Automotive emissions and their role in air pollution, photochemical smog, Chemistry of smog formation. Combustion in homogeneous mixtures, emission formation, Incomplete combustion. Formation of hydrocarbons (HC), carbon monoxide and oxides of nitrogen. Aldehyle. Emissions of unregulated toxic pollutants such as benzene; 13butadiene etc. Influence of engine design and operating parameters on S.I. engine exhaust emissions. Hydrocarbon Evaporation Emissions: Various sources and method of their control, canisters for controlling evaporative emission control system for S.I. engines, blow-by control closed PCV system, reduction of exhaust emissions, various methods. Fules system design.

UNIT – III

Exhaust Treatment devices: Air injection into exhaust system. Thermal reactors, Catalytic converters- construction, efficiency, effect of equivalence ratio, additives on efficiency of 3-Way converter.; Advances in Converter design, plasma Catalyst Stratified charged engines. Gasoline Direct injection, Various Methods for stratification;, Honda CVCC engine.

Diesel engine emissions: Source of emissions during combustion, effect of Air injector timing on performance and formation. D.I and I.D.I. engines emissions. Diesel smoke, PM and RSPM emission. Methods of reducing emission, Exhaust gas re-circulation, smoke emission from diesel engines, Particulate Traps, Continuous Regeneration Traps (CRT). Methods for control of NOx

UNIT – IV

Emission from CNG and LPG engines. Emission Instruments: Non – dispersive infrared analyzer. Gas chromatography. Flame Ionisation Detector. Chemiluminescent analyzer. Emission Standards: Ambient Air Quality Standards, Mass emission standards, Air pollution cost benefit analysis.

Text Books:

1. R.P. Sharma and M.L. Mathur, “Internal Combustion Engine”, Dhanpat Rai Publications
2. V. Ganeshan, “Internal Combustion Engine”, Tata McGraw Hill

Reference Books:

1. Angli M Course., “Automotive Engines”, CBS Publications
2. Harper, “Fuel Systems Emission Control”, CBS Publications

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)

Refrigeration and Air Conditioning (Practical)

ME 312 E

L	T	P/D	Total
-	-	2	2

Sessional : 25Marks
Practical : 25 Marks
Total : 50 Marks
Duration of Exam: 03 Hrs

List of Experiments

1. Study & Performance of basic vapour compression Refrigeration Cycle.
2. To find COP of water cooler.
3. To study the walk in cooler.
4. To study and perform experiment on vapour absorption apparatus.
5. Perform the experiment & calculate various. Performance parameters on a blower apparatus.
6. To find the performance parameter of cooling tower.
7. To study various components in room air conditioner.
8. To find RH of atmosphere air by using sling Psychometric and Psychometric.
9. To find performance of a refrigeration test rig system by using different expansion devices.
10. To study different control devices of a refrigeration system.
11. To study various compressor.
12. To find the performance parameters of Ice Plant.

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
Computer Aided Design & Manufacturing Lab
ME 316 E

L	T	P/D	Total
-	-	2	2

Sessional : 50Marks
Practical : 25 Marks
Total : 75 Marks
Duration of Exam: 03 Hrs

List of Experiments

Note: Practical will base on course no. ME 308 E

B. Tech. (Sixth Semester) Mechanical Engineering (Auto)
Automotive Electricals & Systems Lab
MEA 318 E

L	T	P/D	Total
-	-	2	2

Sessional : 25Marks
Practical : 25 Marks
Total : 50 Marks
Duration of Exam: 03 Hrs

List of Experiments

1. To understand the layout of complete wiring system of an automobile.
2. Perform the various tests for checking the battery condition.
3. To understand and test the charging circuit and charging motor.
4. To conduct performance test on a dynamo, alternator & starter motor.
5. To understand & test the starting circuit and trouble shooting in it.
6. Understand and test the conventional ignition system, setting of contact breaker points and spark plug gap.
7. Understand the working and testing of an Electronic Ignition system
8. Understand and test the lighting circuit of a car.
9. Conduct headlamp focusing as per the procedure.
10. Study the working of different accessories of a modern car
11. To study the layout / working of a Fuel Cell powered electric car.

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B.Tech. (Seventh Semester) Mechanical Engineering (Auto)
Advanced Manufacturing Technology
ME 419 E

L	T	P/D	Total
4	I	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

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, Vacuum Mould Process. 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.

UNIT II

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 Introduction, casting, thread chasing, Thread Rolling, Die Threading and Tapping, Thread Milling, Thread Measurement and Inspection

UNIT III

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

Introduction, Product Application, Limitation of Die Casting, Die Casting Machines,Molten metal Injection systems, I lot chamber machines, Cold chamber machines, Die casting Design, Design of Die casting Dies, Types of Die casting Dies, Die design, Die material, Die Manufacture, Die Lubrication and Coating, Preheating of Dies, Vacuum Die Casting, Recent trends In Die Casting Process.Definition, Cost accounting or costing, Elements of costing, cost structures, Estimation of cost elements, Methods of estimating, Data requirements of cost estimating, Steps in making cost estimate, Chief factors in cost estimating, Numerical examples, calculation of machining times, Estimation of total unit time.

Reference and Text Books:

1. Principles of Manufacturing - By J.S.Campbell, Tata McGraw-Hill
2. Production Engineering Sciences - By Pandey and Sinh Standard Pub.
3. A text book of Production Technology - By P.C. Sharma S.Chand & Company.
4. Manufacturing Materials and Processes - By Lindberg Prentice Hall
5. A text book of Production Engineering - By P.C. Sharma S.Chand & Company.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Numerical / Methods and Optimization Technique

MEA 401 E

L	T	P/D	Total
4	1	-	5

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam: 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

Unit-I

Interpolation and Curve Fitting : Errors in numerical computation, Interpolation problems, Lagrange's interpolation Divided Differences And Newton's Divided Difference Interpolation, Finite Differences, Newton Forward and Backward Interpolation, Least Square Approximations of Degree One and Two , Linearization of Approximations by the Curves Of The Type ax^b , ab^x and ae^{bx}

Unit -II

Non Linear Equations Intermediate value theorem. Bisection method, fixed point method and its convergence, false position method, secant method, Newton Raphson method and its convergence, modified Newton Raphson method (multiple roots)
Simultaneous linear equations: Direct methods: Guass elimination method (matrix approach), gauss Jordon method iterative methods: gauss Jacobi's method, Guass Sedial method and their convergence. Eigen values by power and inverse power method

Unit-III

Numerical Differentiation and Integration : Numerical differentiation formulae (i) differences tables (ii) operator method (iii) undetermined parameter method. Order of numerical differentiation rules and their errors. General numerical quadrature formula, Newton cote's formulae (closed and open type)

Unit-IV

Numerical Solution of Ordinary Differential Equations : Taylor series method , Euler and modified Euler method, Range kutta method of order two, classical method , Simplex Method and Dual Simplex Method Linear programming: Formulation of linear programming problems, solving linear programming problem using Graphical method. Simplex method and Dual simplex method

Text books:

1. Fundamentals of numerical techniques and computations (using C):R. S Goel and Poonam Sethi, Manav Rachna Publishing House Pvt Ltd.
2. Numerical methods in Engineering & Science: B.S. Grewal, Khana Publishers.
3. Numerical Methods for scientific and Engineering Computation : M.K Jain , R.K Jain, S.R.K. Iyengar, New Age International Publishing House.

Reference Books:

1. Numerical Analysis: B.S Goel and S.K Mittal, Pragati Prakashan

2. Linear Programming: C.P. Sethi and S.K. Mittal, Pragati Prakashan

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)

Automation in manufacturing

MEA 403 E

L	T	P	Total
3	1	-	4

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

.**NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.**

UNIT-I

Introduction:
Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations, introduction to automation productivity.

Material handling systems:
Overview of Material Handling Systems- Rotary feeders, oscillating force feeder, vibratory feeder, elevator type and Centrifugal type feeders, Principles and Design Consideration, Material Transport Systems, Storage Systems.

UNIT-II

Automated Manufacturing Systems:
Components, Classification and Overview of Manufacturing Systems, Manufacturing Cells, GT and Cellular Manufacturing, FMS, FMS and its Planning and Implementation, Flow lines & Transfer Mechanisms, Fundamentals and Analysis of Transfer Lines, product design for automatic assembly.

Control Technologies in Automation:
Industrial Control Systems, Process Industries Verses Discrete-Manufacturing Industries, Continuous Verses Discrete Control, Computer Process and its Forms. Sensors, Actuators and other Control System Components.

UNIT-III

Evaluation of automatic production:
product manufacturability, orientation devices- active and passive devices, parts orientation and Rocapement.

Pneumatic and hydraulic components and circuits:
Boolean algebra, pneumatic sensors and amplifiers, jet destruction devices, logic devices, schimit triggering devices, developing pneumatic circuits for automatic die casting machine.

UNIT-IV

Modeling and Simulation for manufacturing Plant Automation:
Introduction, need for system modeling, Building Mathematical Model of a manufacturing Plant, Modern Tools- Artificial neural networks in manufacturing automation, AI in manufacturing, Fuzzy decision and control, robots and application of robots for automation.

Reference Books:

1. Handbook of design, manufacturing & Automation : R.C. Dorf, John Wiley and Sons.
2. Automation, Production Systems and Computer Integrated Manufacturing, M.P. Groover,
   Pearson Education.
3. Industrial Automation : W.P. David, John Wiley and Sons.
4. Computer Based Industrial Control, Krishna Kant, EEE-PHI
5. An Introduction to Automated Process Planning Systems, Tiess Chiu Chang & Richard A. Wysk
6. Manufacturing assembly Handbook:- BrunoLotter
7. Anatomy of Automation, Amber G.H & P. S. Amber, Prentice Hall.
8. Performance Modeling of Automated Manufacturing Systems, Viswanandham, PHI

.**B. Tech. (Seventh Semester) Mechanical Engineering (Auto)**

Basics of Mechatronics Engineering
MEA 405E

L	T	P	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

.**NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.**

UNIT I

Introduction to mechatronics, a measurement system with its constituent elements, open and closed loop systems, sequential controllers, and micro processor based controllers.

Basics of electrical technology such as resistors, inductors, capacitors, Impedance, semiconductor devices, diodes and transistors.

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 motors, stepper motors, problems.

UNIT III

Continuous and discrete process- lag, steady state error, control modes, two step mode, proportional mode-electronic proportional controllers, derivative control- proportional plus derivative control, integral control-proportional plus integral control, PID controller operational amplifier PID circuits, digital controllers -implementing control modes, control system performance, controller tuning, process, reaction method and ultimate cycle method, velocity control, adaptive control, problems.

UNIT IV

Signal Conditioning: Basic definition, multi domain representation, representation and analysis of periodic / non periodic analog signals, Signal conditioning process, various types of amplifiers, Op-amp, inverting, Non-inverting, Summing amplifiers, comparators, amplifier errors, temperature compensations, A/D conversion, D/A conversion.

Recommended Books:

1. Mechatronics by W. Bolton, published by Addition Wesley.
2. Mechatronics, by **Bolton**, Pearson Education.
3. Introduction to mechatronics by **Alciatore and Michael B. Histant**, TMH.
4. Mechatronics systems design by **Devdas**, Thomson Learning.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Project I
ME 409 E

P/D	Total
7	7

Sessional : 100 Marks
Practical : 100 Marks
Total : 200 Marks
Duration of Exams. : 03 Hrs

The students expected to take up a project under the guidance of teacher from the college. The project must be based on Mechanical Engineering Auto problems, which can be extended up to the full academic session. The students may be asked to work individually or in a group not more than four students in a group. Viva- voce must be based on the preliminary report submitted by students related to the project.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Numerical/Methods and Optimization Technique lab
MEA 411 E

L	T	P/D	Total
-	-	2	2

Theory : 25 Marks
Sessional : 25 Marks
Total : 50 Marks
Duration of Exam: 03 hours

List of Experiments:-

1. Write Programs in 'C' Language: to deduce error envolved in polynomial equation.
2. Write Programs in 'C' Languagefor finding out the unknown values with the help of given set of observations using Newton's Forward Interpolation formula.
3. Write Programs in 'C' Languagefor finding out the unknown values with the help of given set of observations using Newton's Backward Interpolation formula.
4. Write Programs in 'C' Languagefor finding out the unknown values with the help of given set of observations using Langranges Interpolation formula.
5. Write Programs in 'C' Languagefor finding the root of an equation of the form f(x)=0 using Bisection method.
6. Write Programs in 'C' Languagefor finding the root of an equation of the form f(x)=0 using false position.
7. Write Programs in 'C' Language for finding the root of an equation of the form f(x) =0 using Iteration method.
8. Write Programs in 'C' Languagefor finding the root of an equation of the form f(x) =0 using Newton- Raphson method.
9. Write Programs in 'C' Language to fit a straight line for a given set of data points.
10. Write Programs in 'C' Language to fit a second-degree parabola for a given set of data points.
11. Write Programs in 'C' Language to find out a numerical integration using Trapezoidal rule.
12. Write Programs in 'C' Language to find out a numerical integration using Simpson's 1/3 rule.
13. Write Programs in 'C' Language to find out a numerical integration using Simpson's 3/8 rule.
14. Write Programs in 'C' Language to Compute the solution of differential equation by Taylor's series Method.
15. Write Programs in 'C' Language to compute the solution of differential equation by Euler's modified method.

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
In Plant Training Report
ME 413 E

P/D	**Total**	Sessional : 125 Marks
-	-	Duration of Exams. : 03 Hrs

Student will submit summer training (about 8 weeks' industrial training) report for his/her assessment.

Elective-I Seventh Semesters
Mechanical Engineering (Auto)

ELECTIVE – I

ME 421E	Finite Element Method
ME 423E	Applied Numerical Techniques and Computer Programming
ME 427E	Machine Tool Design
ME 435 E	Renewable Energy Resources
ME 437E	Maintenance Engineering

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Finite Element Method
ME 421 E

L	T	P/D	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

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 Hermite polynomials.

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

Variational approach, Galerkin approach, one-dimensional and two-dimensional steady-state problems for conduction, convection and radiation, transient problems. In viscid incompressible flow, potential function and stream function formulation, incompressible viscous flow, stream function, velocity-pressure and stream functionvorticity formulation, Solution of incompressible and compressible fluid film lubrication problems

Reference and Text Books:

1. The Finite Element Method - By Zienkiewicz, Tata McGraw
2. The Finite Element Method for Engineers -By Huebner, John Wiley
3. 3. An Introduction to the Finite Element Method -By J.N.Reddy, McGraw Hill

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Applied Numerical Techniques and Computer Programming
ME 423 E

L	T	P/D	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE:

1. The Instructor of the course may cover the use of software MATHEMATICA, in the tutorial class.
2. In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

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-Kutta Methods, Miline's Method. The adams-Moulton Method, Convergence Criteria, Errors and error Propagation. Flow Chart for Computer Programmes.

Unit IV

Boundary-Value and Characteristic- Value Problems: The Shooting Method, Rayleigh-Ritz Method, Collocation Method, Galerkin Method, The Power Method for Eigenvalues by Iteration. Flow Chart for Computer Programmes. Numerical Solution of Partial Differential Equations: (A) P.D.equation representation as a difference equation, Iterative Methods for Laplace's Equation. The Possion Equation, Derivative Boundary Conditions. (B) The Crank-Nicolson Method for Parabolic Partial Differential Equations. Flow Chart for Computer Programmes.

Text Books :

1. Applied Numerical Analysis by Curtis f. Gerald and Patrick O. Wheatley – Published by Addison Wesley.
2. Introductory Methods of Numerical Methods – S.S. Sastry, PHI, New Delhi.

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, New York.
3. Numerical Solution of partial differential equations by Smith, G.D. Published by Oxford University Press London.
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 Khanna Publishers.
6. Numerical Methods in Engineering by M.G. Salvadori and M.L. Baron- Published by Prentice Hall India.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Machine Tool Design
ME 427 E

L	T	P/D	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Definition and classification, Corking and auxiliary motion in m/c tools, parameters of working motion, machine tool drive, selection of electric motor, hydraulic and mechanical transmission and their elements, general requirement of m/c tool design. Engineering design process for m/c tool, and techno-economical consideration for design of new m/c tool. Aims, stepped and stepless speed regulation, design of speed and feed gear box, m/c tool drives using multiple speed motors, gear box kinematics design, gearing diagram, no. of teeth, no. of teeth on gears in the gear train, classification speed and feed boxes, numerical problems.

UNIT II

Function and requirements, design criteria, criteria of selection of materials, static arid dynamic stiffness, profiles for m/c tool structure, stiffness, design procedure for m/c tool structure, numerical problems. Function and types, profiles, material and clearance in slide ways, analysis of design of slide ways for wear and stiffness design of hydrostatic guide ways, aerostatic slide ways and antifriction guide or sliding friction power screws for wear, strength, friction bucking stability design of rolling friction, power screw for stiffness, numerical problems.

UNIT III

Function and requirements, material for spindle, effect of m/c tool compliance on machining accuracy, design of spindles for bending, permissible deflection strength, optimum spacing for spindle support, antifriction and different types of sliding bearings and their general characteristic, air lubricated bearing, numerical problems.

UNIT IV

Equivalent Elastic System (EES), general procedure for accessing dynamic stability of EES cutting process closed loop system dynamic characteristics of elements, systems, EES and culling process, stability analysis, forced vibration of machine tools. Function requirements and classification, control system for forming and auxiliary motion, manual control systems, ergonomic considerations, automatic control systems and adaptive control system.

Text Books:

- Machine Tool Design & Numerical Control by N.K. Mehta, Published by TMH.
- Production Technology by R.K. Jain, Published by Khanna Publishers.

References Books:

1. Design of M/c Tool by S.K. Basu, Allied Publisher, New Delhi.
2. Principles of M/c Tool by Ballacharya A. and Sen. G.C., Published by New Central Book Agency, Calcutta.
3. Machine Tool Design -Vol-IV- by Acherkean N., Published by Mir Publication.
4. Design principles of Metal Cutting Machine Tools by Koenigsberyer F., Published by Pergrnan Press, Oxford.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Renewable Energy Resourses
ME 435 E

L	T	P	Total
4	1	-	5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03 Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Introduction and Essential of Fluid Mechanics and Meat Transfer Fundamentals and scientific principles of renewable energy resources, technical and social implications, Bernoulli's, equation, conservation of momentum, viscosity, turbulence, friction and pipe flow, heat circuit analysis and terminology, conductive, convective and radiative heat transfers, properties of transparent materials, heat transfer by mass transport, multimode heat transfer and circuit analysis, problems.

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. 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 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), heal exchangers, pumping requirements, other practical considerations, introduction to geothermal energy, geophysics, dry rock and hot aquifer analysis, harnessing geothermal resources, problems.

Text Books:

1. Renewable Energy Rsources by John W. Twidell and Anthony D. Weir, published by E.& F. N. Spon Ltd. London.

B. Tech. (Seventh Semester) Mechanical Engineering (Auto)
Maintenance Engineering
ME 437 E

L	T	P/D	Total
4	1		5

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exams. : 03Hrs

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Evolution of maintenance, objective of maintenance, maintenance policies and philosophies, maintenance concept, maintenance management & terotechnology, relationship with other functional areas, importance of maintenance, elements of good maintenance, economics of maintenance, training and safety aspects in maintenance. Classification of maintenance programs, corrective preventive and predictive maintenance, comparison of maintenance programs, preventive maintenance-concept, functions, benefits, limitations.

UNIT II

Objectives, what to monitor, when to monitor, principles of CBM, condition based maintenance techniques, manual inspections, performance monitoring, vibration monitoring, current monitoring, coil debris/spectroscopy, thermography and corrosion monitoring, steps in implementation of CBM, benefits of CBM. RCM logic, maintenance and RCM, benefits of RCM, total productive maintenance (TPM), introduction, key supporting elements of TPM, methodology, evaluation and benefits.

UNIT III

Purpose and challenges: Techniques, visual aids-boroscopes, endoscopes, fiber optics scanners, magnetic particles inspection, liquid penetrants, eddy current, ultrasonic radiography, selection of NDT technique, metrits/demerits and applications of various techniques. Basic ingredients, basic steps in maintenance management, maintenance planning and control system, documentation, maintenance-productivity areas for improvement

UNIT IV

Techniques for improvement of operational reliability, safety and availability of machines and production systems, maintainability criteria, checklist to assess the maintainability of a system, maintainability programs, objectives, key issues in availability improvements program, fault diagnosis, Pareto principle Ishikawa diagram. Data processing systems for integrated maintenance, maintenance information and reporting systems.

Text Books:

1. Maintenance Planning and Control by Higgin L.R., McGiaw Hill Book Co1, 1900
2. Maintenance Planning and Control by Kelly Anthony, East West Press Private Ltd, New Delhi, 1991.
3. Maintainability principle and practices by Blanchard B.S. and Lowey E.E. McGrawHill Book co.
4. Practical NOT by Raj B. Jaya Kumar T and Thavasimulyi K., Narora Publishing House, New Delhi, 1996.
5. Engineering Maintenance Management by Niebel Benjamin W. Marcel Dekher, 1994.

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Fundamental of robotics Engineering
MEA-402E

L	T	P	Total		
3	1		4	Sessional	: 50 Marks
				Theory	: 100 Marks
				Total	: 150 Marks
				Duration of Exam: 3 Hrs.	

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

INTRODUCTION

Robot components, robot classification and specification, Work envelopes, other basic parameters of robots.

ROBOT END-EFFECTORS

Types, mechanical grippers, gripper force analysis, gripper selection, process tooling, compliance.

UNIT-II

ROBOT DRIVES AND ACTUATORS

Characteristics of actuating systems, Drives - electric, hydraulic, pneumatic and their relative merits. Speed reduction.

ROBOT SENSORS

Robot sensors, sensor classification, micro-switches, proximity sensors, photo-electric sensors, rotary position sensors, sensor usage and selection, sensors and control integration

UNIT-III

ROBOT MECHANICS

Robot kinematics - spatial descriptions and transformations, inverse transformation matrices, conventions of fixing frames to links, inverse robot kinematics – solvability, algebraic vs geometric solutions, examples of inverse manipulator kinematics. Differential motion and velocities - Differential motions of a robot and its hand frame, tool configuration jacobian, resolved motion rate control, manipulator jacobian, static forces and moments Robot dynamics - Lagrangian mechanics, effective moments of inertia, dynamic equations for multi-degree of freedom robots.

UNIT IV

ROBOT APPLICATIONS

Robot applications in manufacturing-Material transfer and machine loading/unloading, Processing operations like Welding & painting, Assembly operations, Inspection

automation, Robot cell design and control, Robot cell layouts-Multiple robots & Machine interference, Economics and social aspects of robotics, Future applications.

Text Books:

1. Introduction to Robotics: Analysis, systems and applications by S.Y. Niku, Pearson Education.

References:

1. Introduction to Robotics by J.J. Craig, Pearson Education
2. Robotics: Control, sensing, vision and intelligence by KS Fu, P Gonzalez, CSG Lee, McGraw Hill

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Measurement and Instrumentation
MEA-404E

L	T	P	Total		
4	1		5	Sessional	: 50 Marks
				Theory	: 100 Marks
				Total	: 150 Marks
				Duration of Exam: 3 Hrs.	

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Basic Statistical Concepts: Types of Measured Quantities (Discrete and Continuous), Central Tendency of Data,Mode, Median, Arithmetic Mean, Best Estimate of true Value of Data, Measures of Dispersion, Range, Mean Deviation, Variance, Standard Deviation, Normal Distribution, Central Limit Theorem, Significance Test, Method of Least Squares, Graphical Representation and Curve Fitting of Data.

Instruments and Their Representation: Introduction, Typical Applications of Instrument Systems, Functional Elements of a Measurement System, Classification of Instruments, Standards and Calibration

UNIT-II

Static and Dynamic Characteristics of Instruments: Range and span, accuracy and precision, calibration, hysteresis and dead zone, sensitivity and linearity, threshold and resolution; speed of response, lag, fidelity and dynamic error, dead time and dead zone. Zero, first and second order systems and their response to step, ramp and sinusoidal input signals.

Errors in Measurement: Sources of errors, systematic and random errors; statistical analysis of test-data, probable error and probability tables, ejection of test data; curve fitting, error propagation; Design and planning of experiments and report writing.

Force, Acceleration and Torque Measurement : Seismic Devices, Spring Mass & Force Balance Type, Calibration, Hydraulic Load Cell, Pneumatic Load Cell, Elastic Force Devices, Separation of Force Components, Electro Mechanical Methods, Strain Gage, Torque Transducer, Toque Meter.

UNIT-III

Sensors and Transducer: Introduction, Analog and Digital Transducers, Electromechanical; Potentiometric,Inductive and reluctance type, Electromagnetic, Electrodynamic, Eddy Current, Magnetostrictive, Variable Inductance, Linearly Variable Differential Transformer, Variable Capacitance, Piezo-Electric Transducer and Associated Circuits, Unbonded and Bonded Resistance Strain Gages. Strain Gage Bridge circuits, Temperature Compensation, Balancing and Calibration, Opto-Electrical Transducers, Photo Conductive Transducers, Photo Voltaic Transducers, Digital Transducers, Frequency domain transducer, Vibrating string transducer, Data Acquisition Systems, Data processing, Data Display and Storage. Modern Automotive Instrumentation, Study of automotive sensors and actuators.

Position, displacement, and velocity Measurement: Introduction, Relative motion Measuring Devices, Electromechanical, Optical, Photo Electric, Moire-Fringe, Pneumatic, Absolute Motion Devices.

UNIT-IV

Pressure Measurement: Moderate Pressure Measurement, Monometers, Piezo Transducer, Dynamic Effects of Connecting Tubing, High Pressure Transducer, Low Pressure Measurement, Calibration and Testing,

Flow Measurement: Quantity Meters, Positive Displacement Meters, Flow Rate Meters, Variable Head Meters, Variable Area Meters, Rotameters, Pitot-Static Tube Meter, Drag Force Flow Meter, Turbine Flow Meter, Electronic Flow Meter, Electro Magnetic Flow meter. Hot-Wire Anemometer.

Temperature Measurement : Introduction, Measurement of Temperature, Non Electrical Methods, Solid Rod Thermometer, Bimetallic Thermometer, Liquid-in-Glass thermometer, Pressure Thermometer, Electrical Methods, Electrical Resistance Thermometers, Semiconductor Resistance Sensors (Thermistors), Thermo–Electric Sensors,Thermocouple Materials, Radiation Methods (Pyrometry), Total Radiation Pyrometer, Selective Radiation Pyrometer.

Text Books :

1. Measurement systems Application and Design. Ernest 0. Doebelin, Tata McGraw Hill Edition (Fourth Edition) 2002.
2. Measurement and Instrumentation in Engineering, Francis S. Tse and Ivan E. Morse, Marcel Dekker.
3. Principles of Measurement and Instrumentation – Alan S. Morris, Prentice Hall of India.
4. Mechanical Measurements: T.G. Beckwith, W.L. Buck and R.D. Marangoni
Addison Wesley.
5. Instrumentation, Measurement and Analysis – B.C. Nakra and K.K. Chaudhary, Tata McGraw Hill
6. Mechanical Measurements by D. S. Kumar, Kataria & Son
7. Instrumentation devices & systems: Rangan, Mani, Sarma
8. A course in mechanical instrument & instrumentation: A.k.Sawhney

B. Tech (Eighth Semester) Mechanical Engineering (Auto)
Total Quality Management
ME 426 E

L	T	P/D	Total	
4	1	-	5	Sessional: 50 marks Theory: 100 marks Total: 150 Marks Duration of Exams: 03 hours

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Concept of Quality, Quality as the basis of market competition, Historical review, Quality philosophy of Deming, Juran, crossby etc., Obstacles, Integrating productivity and Quality. Organization of Quality, Quality council, Total Quality Culture, Quality leadership, Quality awards, Total employee involvement, Quality circles, Attitude of top management, executives and workers, Operators responsibility of Quality, causes of operator's errors, Motivation.

UNIT II

Introduction lo TQM, Models for TQM. TQM implementation, Advantages of TQM, Obstacles to TQM, TQM in service sector. Concepts of Quality function deployment, cause and effect diagram, SWOT analysis, Continuous improvement, PDCA cycle, Supplier partnership, Supplier certification, Pareto diagram, Scalier diagram, Benchmarking, Taquchi's Quality Engineering, Failure mode and effect analysis, Total productive maintenance, Introduction to JIT, JIT Quality management, SQC, SPC.DPR, Kaizen, Six sigma concept.

UNIT III

Introduction to ISO 9000 series of standards, other quality systems, Implementation, Documentation, Internal audits', Registration, Closing Comments.

UNIT IV

Beyond ISO 9000 horizon, Introduction to ISO 14000, Series standards, Concepts of ISO 14001, EMS Benefits, ISO 10011- 10014, Quality systems.

Suggested Books:

1. Total Quality Management: By Bosterfied el al., Pearson Education India, 2001.
2. The Essence of Total Quality Management: By Johan Bank, Prentice Hall of India 2000.
3. Managing for Total Quality: By Logothelis Prentice Hall of India, 2000.
4. Total Quality Management: By Sundra Raju, Tata Mcgraw Hills publishing company, 1997.
5. TQM and ISO 9000: By K.C. Arora, S.K. Kataria & Sons 2000.
6. ISO 9000 Quality System: By Dalde & Saurabh, Standard Publishing, 1994.

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Automotive Electronics and Microcontrollers
MEA 406E

L	T	P	Total	
3	1		4	

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam : 3 Hrs.

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT I

Basic Electronics
Introduction, Electronic devices and circuits, Amplifiers, Converters, Digital Electronics.

Microprocessors
Block diagram of microcomputer, Architecture of Intel 8085, Importance of Data, Address and Control buses, Instruction formats, Addressing modes and types of instructions in Intel 8085, Instruction set of 8085. Memory Devices, RAM, ROM Types, Microprocessor interfacing with memory chips. LAN and CAN Network basics

UNIT II

Microcontrollers
Comparison of microprocessor & microcontrollers, survey of 4,8,16 & 32 bit microcontrollers. Architecture of 8051:Block Diagram, oscillator & clock, Program Counter, registers, Flags, Internal memory, stack & stack pointer, special function register, Input/Output Pins, Ports and Circuits, External memory, Counters & Timers, Serial Data input/output interrupts. DC Motor and Stepper motor controls.

Chassis Control system
Electronic management of chassis system, Cruise control systems. Electronic suspension system, antilock braking controls system, traction control system, and vehicle stability control system. Electronic Steering control. Body controls and Security

UNIT III

Electronic fuel control system
Introduction, components, Open loop and closed loop control systems, intake manifold pressures, mass air flow rate sensor, Throttle body injection and multi port or point fuel injection, Fuel injection system, Injector operations, Injection system controls.

Digital engine control system
Motivation for electronic engine control, concept, parameters, variables, Engine mapping, control strategy, Electronic engine management components, layout. Engine cranking and warm up control, Acceleration enrichment, Deceleration leaning and idle speed control. EGR control, Variable valve timing control, Electronic Ignition control, Electronic spark timing control. Exhaust emission control engineering, Integrated engine control system.

UNIT IV

Transmission control systems:

Electronic transmission management: components, layout. Electronic control of automatic transmissions, valve actuating control system, two-wheel drive control, four-wheel drive control, all wheel drive auto control system. Electric vehicle drive controls: Electronic control of hybrid and electric vehicles. Digital controllers for drive-motor, motor-generator, battery and fuel cell.

Body control systems: Remote central locking, Key less entry, Automatic Air conditioning systems. Security systems: immobilizer, and warning systems. Telematics, GPS Systems, Electronic control system diagnostics.

Text Books:

1. William B.Riddens, “Understanding Automotive Electronics ", 5th Edition, Butterworth, Heinemann Woburn, 1998.
2. William L Husselbee, " Automotive Computers and Control System: Fundamentals and Service ". Hartcourt Brace Professional Publications.
3. Thomas H Denton, "Automobile Electrical and Electronic Systems", SAE Publication.
4. Bosch Automotive Handbook, Latest Edition, SAE Publication
5. Bechtold., " Understanding Automotive Electronic ", SAE Publication
6. Ronald K Jurgen, “Automotive Microcontrollers” SAE Publications
7. Ronald K Jurgen, “ Passenger Safety and Convenience Systems” SAE Publications
8. T.Mellard, " Automotive Electronics ".

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Auto Fuel and Lubricant
MEA 408E

L	T	P	Total
3	1		4

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam : 3 Hrs.

NOTE: In the semester examination, the paper setter will set 8 questions in all, two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

Unit-I

Manufacture of Fuels:
Structure of petroleum, refining process, fuels, thermal cracking, catalyticcracking, polymerization, alkylation, isomerisation, blending, products of refining process.

Properties and Testing of Fuels:
Thermo-chemistry of fuels, properties and testing of fuels, Lubricant relative density, calorific value, fire point distillation, vapour pressure, flash point, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index, API gravity, aniline point, viscosity index etc. B.I.S specification for diesel, petrol, biodiesel and CNG

Unit-II

Alternative Fuels:
Use of alternate fuels in engines-LPG, CNG. Need of Alternate Fuels, availability & their properties, general use of alcohols, LPG, CNG, LNG, hydrogen, ammonia, vegetable oils, biodiesel and biogas. Merits and Demerits of alternate fuels. Introduction to alternate energy sources like electric vehicle, hybrid, fuel cell & solar car.

Unit-III

Fuel rating:
Cetane rating, fuel requirements. Additive - mechanism, requirements of an additive, petrol fuel additives and diesel fuel additives – specifications of fuels SI Engines – flame.

Additives and Combustion:
propagation and mechanism of combustion, normal combustion, knocking, octane rating, fuel requirements. CI Engine, mechanism of combustion, diesel knock.

Unit –IV

Lubricants: Manufacture of lubricating oil base stocks, manufacture of finished automotive lubricants Classification of lubricating oils, properties of lubricating oils, tests on lubricants. Grease,classification, properties, test Specific requirements for automotive lubricants, oxidation deterioration and degradation of lubricants, additives and additive mechanism, synthetic lubricants.

Theory of Lubrication: Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction to design of a lubricating system.

TEXT BOOKS

1. V.Ganesan,"Internal Combustion Engines" Tata McGraw-Hill Publishing Co. Newdelhi
2. M.L.Mathur and P.Sharma "A course in internal combustion engines", Dhanpatrai Publications
3. Raymond.C.Gunther – Lubrication – Chilton Book Co., - 1971.
4. Obert.E.F "Internal Combustion Engineering and Air Pollution", International book Co., 1988.

REFERENCES

1. Brame, J.S.S. and King, J.G. – Fuels – Solids, Liquids, Gaseous.
2. Francis, W – Fuels and Fuel Technology, Vol. I & II
3. Hobson, G.D. & Pohl.W- Modern Petroleum Technology
4. A.R.Lansdown – Lubrication – A practical guide to lubricant selection – Pergamon press – 1982.
5. Raymond.C.Gunther – Lubrication – Chilton Book Co., - 1971.

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Measurement and Instrumentation Lab
MEA 410E

L	T	P	Total	
	-	2	2	

Sessional : 50 Marks
Practical : 25 Marks
Total : 75 Marks
Duration of Exam : 3 Hrs.

List of Experiments:-

1. Measurement with the help of vernier caliper and micrometer
2. Measurement of an angle with the help of sine bar
3. Measurement of surface roughness
4. Measurement of speed and torque of a shaft
5. Measurement of acceleration and vibrations
6. Calibration of a pressure guage with the help of a dead weight guage tester
7. Measurement of temperature using RTD / thermocouple
8. Determination of frequency & phase angle using C.R.O.
9. Measurement of Inductance by Maxwell's Bridge.
10. Measurement of flow rate and quantity

Note: Total Ten experiments must be performed. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or outside the list.

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Project-II
ME 410 E

L	T	P/D	Total
-	-	9	9

Sessional : 100Marks
Practical : 100 Marks
Total : 200 Marks

Duration of Exam: 3 Hrs.

The student is expected to finish the remaining portion of the project

B. Tech. (Eighth Semester) Mechanical Engineering (Auto)
Seminar
ME 411 E

P/D	Total	
2	2	Sessional: 25 marks

Student will give a talk on some technical topics.