B. Tech. (Third Semester) Automobile Engg.

HUM-201E: Basics of Economics and Management

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Unit-I

Meaning of Industrial Economic, production function, its types, least cost combination, law of variable proportion, law of returns; increasing, constant & Diminishing.

Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC. U-shaped short run AC curve.

Price & output determination under monopoly in short run & long run, price discrimination, price determination under discriminating Monopoly, comparison between Monopoly & perfect competition.

Unit- II

Meaning of management, characteristics of management, management Vs administration, management – Art, Science & Profession, Fayol’s principles of management. Human relations approach. Functions of management.
Unit-III

Planning & Organizing

Planning, steps in planning. Planning premises, difference between planning policy & strategy. Authority & responsibility, centralization & decentralization.

Unit-IV

Staffing, directing & controlling – Manpower planning, Recruitment & section styles of leadership, communication process and barriers, control process and steps in controlling.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.
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<tr>
<th>S. No</th>
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<td>ME-305 E</td>
<td>Heat Transfer</td>
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Note: Students will be allowed to use Non-Programmable scientific calculator. However, sharing of calculator will not be allowed.
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Note: Students will be allowed to use Non-Programmable scientific calculator. However, sharing of calculator will not be allowed.
## Scheme of Studies & Examination

### B.Tech. 4th Year Automobile Engg. Semester – VII

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Note: Students will be allowed to use Non-Programmable scientific calculator. However, sharing calculator will not be allowed.
B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-301E DESIGN OF AUTOMOBILE COMPONENTS-1

L T P Sessional : 50 Marks
3 1 - Theory : 100 Marks

Total : 150 Marks

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

Introduction:- Problem identification - problem statement, specifications, constraints, Feasibility study-technical feasibility, economic & financial feasibility, societal & environmental feasibility, Generation of solution field (solution variants), Design Procedure, System Design Cycle, Life cycle costs, selection of fits and tolerances and analysis of dimensional chains, Human factors engineering. Concept of tearing, bearing, shearing, crushing, bending etc, Stress concentration, factor of safety under different loading conditions.

Selection of Materials:- Mechanical properties of the commonly used Engg materials, hardness, and Strength parameters with reference to stress-strain diagram. Introduction to various theories of failure; selection of Engg Materials.

UNIT- II

Mechanical Joints:- Bolted joints in tension, eccentrically loaded bolted joints in shear and under combined stresses, Design of Power Screw; Coupling design; Design of various types of welding joints under different static load conditions, eccentrically loaded riveted joints; design of cotter and knuckle joint

Brakes :- Self energizing condition of brakes, design of shoe brakes - internal & external expanding, band brakes, and disc brakes, Braking lever design, Thermal considerations in brake designing

UNIT- III

Clutch :- Design of single plate clutch, multi plate clutch, design of centrifugal clutch, cone clutch, energy dissipated, torque capacity of clutch, design of clutch components, design details of roller and sprag type of clutches
**Vehicle Frame** :- Study of loads, moments, and stresses on frame members. Design considerations for frame of passenger and commercial vehicles, materials for automobile structure.

**UNIT- IV**

**Front Axle and Steering Systems** :- Analysis of loads, moments and stresses at different sections of front axle, determination of loads at kingpin bearings and wheel spindle bearings, determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

**Final Drive and Rear Axle** :- Detailed design of shafts for static and dynamic loading, Rigidity and deflection consideration, design of propeller shaft, design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

**Books**

9. Automobile Chassis Design by Dean Averns, Illiffe Books Ltd. – 1992
10. Mechanical Engg. Design by Joseph Edward Shigley, MGH
B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-303E AUTO ELECTRICAL SYSTEMS

L T P Sessional : 50 Marks
3 1 -

Theory : 100 Marks
Total : 150 Marks

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

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


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.

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.

Books


8. “Basic Automotive Electrical Systems”, C.P.Nakra, Dhanpat
ME-305E  Heat Transfer

L  T  P  
3  1  -  

Sessional : 50 Marks

Theory : 100 Marks

Total : 150 Marks

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

Heat Exchanger  Function, Classification, types and applications of heat Exchangers, heat rejection ratio  elements of heat exchanger, Working fluid: Liquid and Gas, Dalton’s law of partial pressures; Effect of leakage of air. Methods to check and prevent air infiltration, selection of heat exchangers, heat exchanger design methodology. Single Phase Heat Exchangers: LMTD and NTU methods for evaporator and condenser tubes, and parallel and counter flow heat exchangers, calculation of number and length of tubes in a heat exchanger. Rating and sizing methods, design criteria, geometry, process parameters, pressure drops and applications Condensation Mechanism, types of condensers and design procedures, Evaporators, Design procedures, augmented surface heat exchangers, Heat transfer coefficients, pressure drops, compact heat exchangers and air coolers, plate heat exchangers and plate fine heat exchangers

Heat Pipe

Heat Exchangers: Types and design procedure and applications Installation, Operation and Maintenance: Fouling factors, type of fouling, and cleaning methods

UNIT-II

Air Conditioning  Basic Concept Natural and Mechanical refrigeration; Application of Refrigeration; Units of refrigeration and Coefficient of performance; Refrigeration effect, cooling capacity and COP of a refrigerator; Reversed Carnot cycle and its limitations, Meaning of air conditioning,

Refrigerants  Classification, properties, selection criteria, commonly used refrigerants, alternative refrigerants, eco-friendly refrigerants, and applications of refrigerants. Refrigerants used in automobile air conditioning, Basic vapour compression system.

UNIT-III
**Air Conditioning Concept and Applications;** Psychometric properties of air; Dry bulb, wet bulb and dew point temperatures; Relative and specific humidity; degree of saturation adiabatic saturation temperature, enthalpy of air and water vapours; psychometric chart. Human requirement of comforts; effective temperature and comfort charts; Industrial and comfort air conditioning.

**Psychometric Processes** Sensible heating and cooling, cooling with dehumidification; Heating with dehumidification; by-pass factor; chemical dehumidification; adiabatic mixing, air washer.

**UNIT-IV**

**Calculations for Air conditioning Load and for Rate and state of Supply** Air Sources of heat load; sensible and latent heat load; sensible heat factor; apparatus dew point temperature; Rate and state of air supply for air-conditioning of vehicles.

**Air Conditioning Equipment** Brief description of compressors, condensers, evaporators and expansion devices; Cooling towers; Ducts; dampers; grills; air filters; fans; room air conditioners; split units; automotive air conditioning systems-HVAC model

**Text Books:**

1. Fundamentals of Heat and Mass transfer by DS Kumar, SK Kataria and Sons, Delhi
2. A Course in Heat and Mass Transfer by S Domkundwar; DhanpatRai and Sons, Delhi
4. Refrigeration and Conditioning by Manohar Prasad, Wiley Eastern Limited

**Reference Books:**

3. Refrigeration and Conditioning by Jordan and Priester, Prentice Hall of India
4. Refrigeration and Conditioning by WF Stoecker, McGraw
5. Automotive Air conditioning by Paul Lung, CBS Publisher & Distributor, New Delhi.

**B-Tech 3rd Year (5th Semester) (Automobile Engineering)**
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
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, Guidelines, Techniques Elements of MRP
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 Buffa
- 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 Sharma
UNIT-I

Introduction:- 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


UNIT-III

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 Jenny hydrostatic drive.

UNIT-IV


References:


4. SAE Transactions 900550 & 930910.


B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-311E Applied numerical technique & computing

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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


UNIT- II

Interpolation: Newton’s divided difference formula, Lagrange and Hermit’s polynomials. Newton forward and backward difference formulae, Stirling’s and Bessel’s central difference formulae.

Numerical Differentiation and Integration: Numerical differentiation with interpolation polynomials,

UNIT-III


UNIT- IV

Boundary value problems for ordinary and partial differential equations: Finite difference solution for the second order ordinary differential equations. Finite difference solution for one-dimensional heat equation one-dimensional wave equation and two-dimensional Laplace and Poisson equations.
**BOOKS:**


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: Any 8 experiments from the above list and other 2 from others (developed by
institute) are required to be performed by students in the laboratory.

B-Tech (5th semester) (Automobile Engineering)

AE-315E AUTO ELECTRICAL SYSTEMS LAB

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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: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
B-Tech 3rd year (5th Semester) (Automobile Engineering)

ME-317E HEAT TRANSFER LAB

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List of Experiments

1. Determination of thermal conductivity of:
   - a solid insulating material by slab method
   - powder materials by concentric spheres method / or by some transient heat transfer technique
   - liquids by employing thin layer
   - a metal by comparison with another metal by employing two bars when kept in series and / or in parallel under different boundary conditions

2. Determination of coefficient of heat transfer for free/forced convection from the surface of a cylinder / plate when kept
   - along the direction of flow
   - perpendicular to the direction of flow
   - inclined at an angle to the direction of flow

3. Determination heat transfer coefficient by radiation and hence find the Stefan Boltzman's constant using two plates/two cylinders of same size by making one of the plates/cylinders as a black body

4. To plot the temperature profile and to determine fin effectiveness and fin efficiency for
   - A rod fin when its tip surface is superimposed by different boundary condition
• Straight transfer fins of various sizes and optimization of fin proportions
• Circumferential fins of rectangular/triangular section

5. Study of various elements of an air conditioner system through cut sections models / actual apparatus
6. Study of design of an AC condenser / evaporator as an heat exchanger.
7. Calculation/ Estimation of cooling load for a vehicle
8. Study and performance of car air conditioner (HVAC model)

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (5th Semester) (Automobile Engineering)

ME-319E INDUSTRIAL ENGINEERING LAB

L T P Class Work : 25 Marks
- - 2 Exam : 25 Marks

Total : 50 Marks

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 near by 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.
10. A case study on Quality Improvement Techniques (e.g. Hostel Mess/ Workshop / Canteen etc.)

11. A market survey and analysis.


Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech (VTH semester) (Automobile Engineering)

AE-321E Applied Numerical Techniques & Computing Lab

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List of Experiments

1. To develop computer program to determine roots of a given equation using method of Newton -Raphson method,

2. To develop computer programs for solution of system of simultaneous linear equations using Gauss Elimination Technique

3. Numerical Integration with Simpson’s rule and Gaussian Integration


5. Develop a computer program to generate random numbers.

6. Develop a computer program to carry out a numerical integration using Monte Carlo Method.

7. Develop a computer program to find the value of pi using Monte Carlo method with different total number of computations.

8. Develop a computer program to simulate the car wash station problem.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
B-Tech 3rd year (6th semester) (Automobile Engineering)

AE-302E TWO AND THREE WHEELER VEHICLES

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Theory : 100 Marks

Total : 150 Marks

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


UNIT- II


UNIT- III


UNIT- IV

B-Tech 3rd year (6th semester) (Automobile Engineering)

**AE-304E ENGINEERING MATERIALS**

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**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**

**Atomic structure of metals & crystal system:** crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

**UNIT-II**

**General principles of phase transformation in alloys:** phase rule and equilibrium diagrams, Equilibrium diagrams of (i) Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. (ii) systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature(iii) alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (iv) system whose components are subject to allotropic change. Iron carbon equilibrium diagram and their Phase transformation

**UNIT-III**

**Engineering materials and their properties:** classification. Classification of ferrous and non-ferrous materials. Classification of cast iron-properties and their applications. Effects of alloying elements on properties of steel, carbon steel, low alloy steels, stainless steel, tool steels and die steels. Alloys of Ni, Al, Cu, Mg; properties and their applications. Classification of composite materials and their properties and applications.
UNIT-IV


Selection of materials: Cryogenic wear, corrosion, fatigue, creep and oxidation resistance application. Criteria of selecting materials for automotive components viz cylinder block, Cylinder head, piston, piston ring, Gudgeon pin, connecting rod, crank shaft, crank case, cam, cam shaft, engine valve, gear wheel, clutch plate, axle, bearings, chassis, spring, body panel - radiator, brake lining etc. Application of non-metallic materials such as composite, ceramic and polymers in automobile.

References:

1. Khanna.O.P., "Material Science and Metallurgy", DhanapalRai& Sons,
2. Kapoor, "Material Science and Processes", New India Publishing House,
3. Raghavan.V., Physical Metallurgy, Principle and Practice, Prentice Hall,
5. Avner S.H”. Introduction to Physical Metallurgy" McGraw-Hill, New York,
7. Heat treatment of metals B. Zakharv
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-306E DESIGN OF AUTOMOBILE COMPONENTS-II

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UNIT-I

Belts and Chains systems

Design for the selection of V-belt, toothed belt and chains. Design of pulley for belt, and sprocket for chain.

UNIT-II

Suspension Systems

Type of springs and their uses, Design for helical springs, under tension, compression and fluctuating loads,

design of leaf springs, Belleville springs, Air (Pneumatic) springs, Surging phenomenon in springs.

UNIT-III

Transmissions

Basics of gears and gear trains, nomenclature, design of spur, helical, straight bevel gears, worm and worm wheel.

UNIT-IV

Bearing

Basics of bearings, their types, nomenclature. Selection criteria, Design of sliding and rolling type of bearings, Details of design of bearing housings Design of Lubrication systems for different assemblies in vehicles.
UNIT-IV

Engine Components


Text Books

5. An Introduction to Modern Vehicle Design, Julian Happiah Smith, SAE Publication
7. Mechanical Engg. Design by Joseph Edward Shigley, MGH
9. Automobile Chassis Design by Dean Averns, Illiffe Books Ltd.
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-308 AUTO PULLUTION AND CONTROL

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UNIT-I

Introduction: General Scenario on automotive Pollution, Pollutants-sources-formation-effects-transient operational effects on pollution.

Engine Combustion and Pollutant Formation: HC, CO, NOx, Particulate Matters, Aldehyde emissions, Effect of operating variables on emission formation.


UNIT-II


UNIT-III

Control Techniques for SI and CI: Design changes, optimization of operating factors, Control of Crankcase emission, Evaporative emission, Exhaust emission - exhaust gas recirculation, air injector PCV system, thermal reactors, catalytic converters.
UNIT-IV

**Test Procedure & Instrumentation for Emission Measurement:** Test procedures-
  Measurements of invisible emissions - ORSAT apparatus, NDIR analyzer, Flame ionization
detectors, Chemiluminescent analyzer, Gas analyzer, Measurements of visible emissions
– Comparison methods & Obscure methods - Smoke meters, Emission standards.

**Reference:**

   1995.
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

INTRODUCTION :-Introduction to Tribology, general tribological considerations in design of gears, cams, reciprocating components, Engine tribology basics – importance, tribological aspects of engine components such as bearing, piston assembly, valve train, transmission drive line-transmission, traction drive, universal and constant velocity joints, wheel bearings, drive chains, lubrication regims in the engine.

UNIT -II

FRiction AND WEAR :-Nature of metal surface, surface properties, surface parameters and measurements, types, sliding friction, rolling friction, theories of friction, modified adhesive theory, engine friction, losses and engine design parameters. Introduction to wear, types of wear, theories of wear, mechanism of wear, wear testing and methods of wear measurements, factors affecting wear.

UNIT-III

BEARINGS, LUBRICATION AND AUTOMOTIVE LUBRICANTS:- Theory of hydrodynamics, lubrication, generalized Reynolds’s equation & physical significance of terms, pressure distribution and load carrying capacity equations for hydrodynamic journal bearing-ininitely long and short bearing approximations, thrust bearings, Raleigh bearing sintered bearings. Automotive Lubricants- introduction, properties, standard test methods for automotive lubricants, testing, classification, engine oil performance designations, tests, transmission fluids, gear lubricants, axle lubricants, solid lubricants, automotive engine oils, EP lubricants, Lubricant monitoring, SOAP, ferrography and other rapid testing methods of lubricant contamination
HYDROSTATIC AND ELASTOHYDRODYNAMIC LUBRICATION:- Hydrostatic bearings, basic concepts, bearing characteristic number and performance coefficients, flat, conical & spherical pad thrust bearing, air & gas lubricated bearing, squeeze film lubrication. Elastohydrodynamic Lubrication, introduction, rolling of two cylinders, lubrication of ball & roller bearings, cams and gears, selection and life estimation, fatigue and diagnosis.

UNIT-IV

INTRODUCTION TO PREVENTIVE MAINTENANCE:- Definition of preventive maintenance, difference between regular maintenance and preventive maintenance, preventive maintenance schedule for passenger vehicles and commercial vehicles, Noise, wear and corrosive maintenance.

PERIODIC MAINTENANCE:- Maintenance of batteries, Lead acid battery, Factor affecting battery life, testing and battery troubles Maintenance of auxiliaries Lubrication system, greasing of vehicle, lubrication charts, Cooling system Maintenance, Maintenance of Electrical system, testing of starters, alternators, ignition coils, wiring harness, horns, wipers, maintenance of drive line system.

Reference Books

7. Automotive Chassis – P. M. Heldt, Chilton Co. NK
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-312E MICROPROCESSORS & INTERFACING

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UNIT-I


UNIT-II

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.

UNIT-III

**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.

UNIT-IV

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

Body control systems: Remote central locking, Keyless entry, Automatic Air conditioning systems.


Text Books:


5. Bechtold., "Understanding Automotive Electronic", SAE Publication


B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-314E Microprocessor & Interfacing Lab

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1. Study of 8085 Microprocessor Kit.
2. Write a program to add and subtract two 8-bit number using 8085
4. Write a program for multiplication of two numbers using 8051
5. Write a program to interface the ADC.
6. Write a program to control a stepper motor in direction, speed and number of steps.
7. Write a program to control the speed of DC motor
8. Write a program to control the traffic light system using 8085/8086 microprocessors and 8255 PPI
9. Programming of a PLC based system to control speed of DC motor
10. Programming of a PLC based system to control stepper motor

**Note:** Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
List of experiments

1.To study and prepare report on the constructional details, working principles and operation of
the following Automotive Steering Systems.
(b) Power steering Systems, e.g. Rack and Pinion Power Steering System.
(c) Steering Wheels and Columns e.g. Tilt & Telescopic steering Wheels, Collapsible Steering Columns.

2. To study and prepare report on the constructional details, working principles and operation of
the following Automotive Tyres& wheels.
(a) Various Types of Bias & Radial Tyres.
(b) Various Types of wheels.

3. To study and prepare report on the constructional details, working principles and operation of
the Automotive Brake systems.
(a) Hydraulic & Pneumatic Brake systems.
(b) Drum Brake System.
(c) Disk Brake System.
(d) Antilock Brake System.
(e) System Packing & Other Brakes.
4. To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.

5. Modeling of any two automotive systems on 3D CAD using educational softwares (eg. 3D modeling package/Pro Engineering/I-Deas/ Solid edge etc.)

6. Crash worthiness of the designed frame using Hypermesh and LS-Dyna solver or other software.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-318E AUTO POLLUTION & CONTROL LAB

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List of Experiments:

1. To Study of Pressure pickups, charge amplifier, storage oscilloscope and signal analysers used for IC engine testing.

2. Performance study of petrol and diesel engines both at full load and part load conditions.

3. Determination of compression ratio, volumetric efficiency and optimum cooling water flow rate in engines.

4. Testing of 2 and 4 wheelers using chassis dynamometers.

5. Study of NDIR Gas Analyzer and FID

6. Study of Chemiluminescent NOx analyzer

7. Measurement of HC, CO, CO2, O2 using exhaust gas analyzer

8. Diesel smoke measurement.


References:


Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-320E GRAPHICS LAB

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1. AutoCAD or similar drafting software

2. Computer Aided Drafting – introduction

3. Learning standard tools of Computer Aided Drafting with exercise

4. Creating 2D drawings of simple automotive component like gaskets, brackets, valves etc.

5. Applying dimension and tolerance on entities.

6. Creating 2D detail drawing, cross sections & partial views of automotive components like flywheel, piston etc.

7. Concept of multi layer system with exercise.

8. Applying geometrical tolerance on drawing.

References:


Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.
B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-322E TRIBOLOGY LAB.

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1. To study the pressure distribution of a journal bearing using journal bearing apparatus.
2. To determine abrasion index of a material with the help of dry abrasion tester.
3. To determine the rate of wear of metal and plot displacement v/s time curves by friction & wear monitor apparatus.
4. To evaluate the load wear index & weld point with the help of four ball stream pressure tester.
5. Analysis of various properties of lubricant of using lubricant oil analyzer.
6. Compare and analyze the wear characteristics of different materials.
7. To study different types of bearing used in industries.
8. To study the effect of axial and circumferential grooves in cases of oil bearing.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.