UNIT-1
INTRODUCTION:
General consideration relating to chassis layout, power location, types of automobiles, layout of an automobile with reference to power plant, weight distribution, stability, Numerical problems.

6 Hrs

UNIT-2
FRAMES:
Types of frames, general form & dimensions, materials, frame stresses, frame sections, cross members, proportions of channel sections, constructional details, loading points, sub frames, passenger car frames, X member type frame, Box section type frame, testing of frames, bending and torsion test, effect of brake application of frame stresses, truck frames, defects, Numerical problems.

6 Hrs

UNIT-3
FRONT AXLE AND STEERING SYSTEMS:
Axle parts and materials, loads and stresses, centre sections, section near steering head, spring pads, front axle loads, steering heads, factors of wheel alignment, wheel balancing, centre point steering, correct steering angle, steering mechanisms, cornering force, self righting torque, under steer and over steer, Steering linkages, steering gears, special steering columns, power steering, trouble shooting, Numerical problems.

7 Hrs

UNIT-4
PROPELLER SHAFT, DIFFERENTIAL AND REAR AXLE:
construction & types of propeller shafts, whirling of propeller shaft, universal joints, analysis of Hooke’s joint- ratio of shafts velocities, maximum & minimum speeds of driven shaft, condition for equal speeds of the driving & driven shafts, angular acceleration of the driven shaft, maximum fluctuation of speed, double Hooke’s joint, Numerical problems.
Final drive – construction details, types, Differential-Principle, types of differential gears, conventional and non-slip differentials, backlash, differential lock, inter-axle differential, transaxle types.

Rear axle - Torque reaction, driving thrust, Hotchkiss drive, torque tube drive, construction of rear axle shaft supporting- fully floating and semi floating arrangements axle housings, trouble shooting, numerical problems

7 Hrs

UNIT-5
BRAKES
Necessity, stopping distance and time, brake efficiency, weight transfer, brake shoe theory, determination of braking torque, classification of brakes, types, construction, function, operation, braking systems - mechanical, hydraulic, disc, drum, details of hydraulic system, mechanical system and components, types of master & wheel cylinders, bleeding of brakes, brake drums, brake linings, brake fluid, factors influencing operation of brakes such as operating temperature, lining, brake clearance, pedal pressure, linkages etc, Numerical problems. Brake compensation, Parking and emergency brakes, hill holder, automatic adjustment, servo brakes, Power brakes-Air brakes, wagner air brake, vacuum brakes and electric brakes and components brake valve, unloaded valve, diaphragm, air-hydraulic brakes, vacuum boosted hydraulic brakes, trouble shooting, Numerical problems

10 Hrs

UNIT-6
SUSPENSION:
Objects, basic considerations, Types of suspension springs, construction, operation & materials, leaf springs, coil springs, torsion bar, rubber springs, plastic springs, air bellows or pneumatic suspension, hydraulic suspension, constructional details of telescopic shock absorbers, independent suspension, front wheel independent suspension, rear wheel independent suspension, types, stabilizer, trouble shooting, Numerical problems.

UNIT-7
WHEELS AND TYRES:
Types of wheels, construction, structure and function, wheel dimensions, structure and function of tyres, static and dynamic properties of pneumatic tyres, types of tyres, materials, tyre section & designation, factors affecting tyre life, quick change wheels, special wheels, trouble shooting.

5 Hrs.

UNIT-8
CASE STUDIES:
Study of systems (Unit 1-7) used in recent vehicles with advanced technologies

5 Hrs.

TEXT BOOKS:
1. Automotive Chassis – P.M. Heldt, Chilton & Co.

REFERENCE BOOKS:
1. Automotive chassis and body – P.L. Kohli, TMH
2. Automobile Engineering Vol. I - Kirpal Singh, Standard publications, New Delhi,
3. Introduction to automobile engineering – N.R. Khatawate, Khanna pub. New Delhi

AUTOMOTIVE TRANSMISSION
Sub Code: P08AU62 L: T: P: 4:0:0 C I E Marks: 50
Hrs/Week: 04 Exam Hours: 03
Total Lecture Hrs: 52 S E E Marks: 50

PART- A

UNIT-1
POWER REQUIRED FOR PROPULSION
Various Resistances to Motion of the Automobile, Traction, tractive effort Performance curves, acceleration grade ability, drawbar pull, Numerical Problems.

6 hrs

UNIT-2
CLUTCH
Necessity of clutch in an automobile, different types of clutches, friction clutches namely Single plate clutch, multi plate clutch, cone clutch, centrifugal clutch, electromagnetic clutch, hydraulic clutches, Clutch - adjustment, Clutch troubles and their causes, requirements of a clutch, Clutch materials, clutch lining Vacuum operated clutch, Numerical problems c

8 hrs

UNIT-3
FLUID COUPLING & ONE WAY CLUTCHES:
Constructional details of various types, percentage slip, one way clutches (Over running clutch) like sprag clutch, ball and roller one way clutches, necessity and field of application, working fluid requirements, fluid coupling characteristics. 6 hrs

**UNIT-4**
HYDRODYNAMIC TORQUE CONVERTERS:
Introduction to torque converters, comparisons between fluid coupling and torque converters, performance characteristics, slip, principles of torque multiplication, 3 and 4 phase torque converters, typical hydrodynamic transmission. 6 hrs

**PART -B**

**UNIT-5**
GEAR BOX
The need for transmissions, Necessity of gear box, Calculation of gear ratios for vehicles, Performance characteristics in different gears, Desirable ratios of 3speed & 4speed gear boxes, Constructional details of, Sliding-mesh gear box, Constant-mesh gear box, synchromesh gear box, auxiliary transmissions, compound transmissions, numerical problems 8 hrs

**UNIT-6**
EPICYCLIC TRANSMISSION
Principle of operation, types of planetary transmission, Calculation of gear ratio in different speeds, Wilson planetary transmission, Ford-T model gear box, Pre selective mechanism, Vacuum control, pneumatic control, hydraulic control in the planetary gear system, Over drives, Numerical problems 6 hrs

**UNIT-7**
AUTOMATIC & ELECTRIC TRANSMISSIONS
Automatic transmission - Principle, general description and Working of representative types like Borg-warnner and general arrangement & description of electric transmission, their working principle & control mechanisms, limitations. 6 hrs

**UNIT-8**
CASE STUDIES:
Study on Advanced Transmission systems used in recent four wheeled vehicles 6 hrs

**TEXT BOOKS:**

**REFERAENCE BOOKS:**
4. G.B.S.Narang “Automobile Engineering’, Khanna publication, New Delhi
7. P.M. Heldt,”Torque converters”, Oxford & IBH, 1975

**DESIGN OF MACHINES ELEMENTS-II**

**PART - A**

**UNIT - 1**
BENDING STRESSES IN CURVED BEAMS:
Introduction, Analysis of stresses in curved beams, stresses in beams of standard cross sections used in crane hook, punching presses and clamps, closed rings and links.

UNIT - 2
CYLINDERS & CYLINDER HEADS:
Review of Lame’s Equations, Compound cylinders, stresses due to different types of fits, cylinder heads and cover plates.

UNIT - 3
SPRINGS:
Introduction, types of springs, terminology, stresses and deflection in helical coil springs of circular and non-circular cross sections, springs under fluctuating loads, concentric springs. Leaf Springs, stresses in leaf springs, equalized stresses, length of spring leaves.

UNIT - 4
CLUTCHES & BRAKES: Introduction, types of clutches, design of Clutches (single plate, multi plate and cone clutches). Brakes, energy absorbed by a brake, heat dissipated during braking, single block brakes and simple band brakes.

UNIT - 5
SPUR & HELICAL GEARS: Introduction, spur gears, standard proportions of gear systems, stresses in gear tooth, Lewis equation and form factor, design for strength, dynamic load and wear load. Helical Gears: definitions, formative number of teeth, design based on strength, dynamic and wear loads.

UNIT - 6
BEVEL AND WORM GEARS: Bevel Gears: terminology, formative number of teeth, design based on strength, dynamic and wear loads. Worm Gears: terminology, design based on strength, dynamic, wear loads and efficiency of worm gear drives.

UNIT - 7:
Sliding and rolling contact bearings: Introduction, principle of hydro dynamic lubrication, assumptions in hydrodynamic lubrication, bearing characteristic number and modulus, Sommerfeld number, coefficient of friction, power loss, heat generated and heat dissipated, bearing materials, lubricants and properties, design of journal bearing and thrust bearing.

UNIT - 8:
Ball and Roller Bearings: Types of ball and roller bearings, equivalent bearing load, bearing life, selection of ball and roller bearings.

Data Hand Books:
3. P.S.G. Design Data Hand Book- PSG College of Tech Coimbature

TEXT BOOKS:

**REFERENCE BOOKS:**

6. **Machine design-II**: J.B.K. Das, Sapna book house, Bangalore

**CAD/CAM/CAE**

Sub Code: P08AU64  
L: T: P: 3:0:0  
C I E Marks: 50

Hrs/Week: 04  
Exam Hours: 03

Total Lecture Hrs: 48  
S E E Marks: 50

**PART-A**

**UNIT-1**
INTRODUCTION:
Role of computers in design and manufacturing. Influence of computers in manufacturing environment. Product cycle in conventional and computerized manufacturing environment. Introduction to CAD, Introduction to CAM. Advantages and disadvantages of CAD and CAM.  
3 Hrs

**UNIT-2**
HARDWARE FOR CAD:
Basic Hardware structure, Working principles, usage and types of hardware for CAD – Input devices, output devices, memory, CPU, hardcopy and storage devices.  
5 Hrs

**UNIT-3**
COMPUTER GRAPHICS:
Software configuration of a graphic system, function of graphics package, construction of geometry, wire frame and solid modeling, Geometry transformation – two dimensional and three dimensional transformation, translation, scaling, reflection, rotation, CAD/CAM integration. Desirable modeling facilities. Introduction to exchange of modeling data – Basic features of IGES, STEP, DXF, and DMIS  
6 Hrs

**UNIT-4**
INTRODUCTION TO FINITE ELEMENT ANALYSIS:
Introduction, basic concepts, discretization, element types, nodes and degrees of freedom mesh generation, constraints, loads, preprocessing, and application to static analysis.  
5 Hrs
UNIT-5
NC, CNC, DNC TECHNOLOGIES:
NC, CNC, DNC, modes, NC elements, advantages and limitations of NC, CNC. Functions of computer in
DNC 5 Hrs

UNIT-6
CNC TOOLING:
Turning tool geometry, milling tooling system, tool presetting, ATC, work holding. 4 Hrs

UNIT-7
CAM PROGRAMMING: Overview of different CNC machining centers, CNC turning centers, high speed machine tools 3 Hrs

UNIT-8
CNC PROGRAMMING: Part program fundamentals-steps involved in development of a part program. Manual part programming, milling, turning, turning center programming. 9Hrs

UNIT-9
INTRODUCTION TO ROBOTICS: Introduction, robot configuration, robot motion, programming of robots, end effectors work cell, control and interlock, robot sensor, robot applications. 8Hrs

TEXT BOOKS:
1. CAD/CAM Principles and Application by P.N. Rao, Tata McGraw Hill.
2. CAD/CAM by Groover, Tata McGraw Hill.

REFERENCE BOOKS:
9. Introduction to FEM, T Chandra patta Ashok D Bebgundu.

MECHANICAL VIBRATIONS AND VEHICLE DYNAMICS

Sub Code: P08AU65  L: T: P: 4:0:0  C I E Marks: 50
Hrs/Week: 04  Exam Hours: 03
Total Lecture Hrs: 52  S E E Marks: 50

PART - A

UNIT-1
INTRODUCTION:
Types of vibration, Simple harmonic motion and definition of some terms of vibration, Vector method and complex form of representing harmonic motions, addition of simple harmonic motions.

5 Hrs

UNIT-2
UNDAMPED FREE VIBRATION:
Introduction, Newton’s second law of motion method, D’Alembert’s principle, Energy method, Rayleigh’s method, Single degree of freedom systems, Natural frequency of free vibration, equivalent stiffness of springs, effect of spring mass.

8 Hrs

UNIT-3
DAMPED FREE VIBRATION:
Single degree of freedom systems, types of damping, concept of critical damping and its importance, study of viscous damped systems - under damping, critical damping and over damping, logarithmic decrement, structural and coulomb damping.

6 Hrs

UNIT-4
FORCED VIBRATION:
Single degree of freedom systems, steady state solution with viscous damping due to harmonic force, concept of frequency response, reciprocating an rotating unbalance, vibration isolation and transmissibility, energy dissipated by damping, equivalent viscous damping, Structural damping, sharpness of resonance, base excitation.

7 Hrs

PART - B

UNIT-5
VIBRATION MEASURING INSTRUMENTS AND WHIRLING OF SHAFTS:
Vibrometer, Accelerometer and frequency measuring instruments, whirling of shafts with and without air damping, discussion of speeds above and below critical speeds.

6 Hrs

UNIT-6
TWO DEGREE OF FREEDOM SYSTEMS:

6 Hrs

UNIT-7
VEHICLE VIBRATION AND HUMAN COMFORT:
Vehicle vibration with single degree of freedom - free vibration, forced vibration - vibration due to road roughness, vibration due to engine unbalance, transmissibility of engine mounting, vibration with two degrees of freedom - free vibration - compensated suspension system, forced vibration - vibration due to road roughness, vibration absorber.

6 Hrs

UNIT-8
MULTI DEGREE OF FREEDOM SYSTEMS:
Introduction, influence coefficients, Maxwell’s reciprocal theorem, orthogonality principle, Dunker ley’s equation, determination of natural frequencies using matrix iteration method, Holzer’s method for systems with free, fixed free and fixed ends, stodola method, Rayleigh’s method for beam vibration

8 Hrs

TEXT BOOKS:
1. Mechanical Vibrations, G. K. Grover and S. P. Nigam, Nemchand and Brothers, Roorkee
2. Mechanical Vibrations: V.P. Singh, Dhanpat Rai and Sons, New Delhi
REFERENCES:
2. Mechanical Vibration, Church, A. W., John Wiley and Sons, USA
4. Mechanical Vibration Analysis, P. Srinivasan, TMH
5. Vibration and Noise for Engineers, Kewal Pujara and R.S. Pujara, Dhanpat Rai and Sons, Delhi
10. Vibrations, Tse F. S., Morse I. E. and Hinkle T., CBS Publishers and Distributors, Delhi
11. Mechanical vibrations, Den Hertog, McGraw Hill

MECHATRONICS AND MICROPROCESSORS

Sub Code: P08AU661  L: T: P: 4:0:0  C I E Marks: 50
Hrs/Week: 04  Exam Hours: 03
Total Lecture Hrs: 52  S E E Marks: 50

PART - A

UNIT 1:
INTRODUCTION TO MECHATRONIC SYSTEMS:
Measurement and control systems, their elements and functions, Microprocessor based controllers.  
06 Hrs

UNIT 2:
REVIEW OF TRANSDUCERS AND SENSORS:
07 Hrs

UNIT 3:
ELECTRICAL ACTUATION SYSTEMS:
Electrical systems, Mechanical switches, solid-state switches, solenoids, DC & AC motors, Stepper motors and their merits and demerits.  
06 Hrs

UNIT 4:
SIGNAL CONDITIONING:
Introduction to signal conditioning. The operational amplifier, Protection, Filtering, Wheatstone bridge, and Digital signals Multiplexers, Data acquisition, Introduction to Digital system processing Pulse-modulation.  
07 Hrs

PART - B

UNIT 5:
INTRODUCTION TO MICROPROCESSORS:
Evolution of Microprocessor, Organization of Microprocessors (Preliminary concepts), basic concepts of programming of microprocessors.
Review of concepts – Boolean algebra, Logic Gates and Gate Networks, Binary & Decimal number systems, memory representation of positive and negative integers, maximum and minimum integers. Conversion of real numbers, floating point notation, representation of floating point numbers, accuracy and range in floating point representation, overflow and underflow, addition of floating point numbers, character representation.  

07 Hrs

UNIT 6:  
Logic function, Data word representation. Basic elements of control systems 8085A processor architecture terminology such as CPU, memory and address, ALU, assembler data registers, Fetch cycle, write cycle, state, bus, interrupts. Micro Controllers. Difference between microprocessor and micro controllers. Requirements for control and their implementation in microcontrollers. Classification of micro controllers.  

07 Hrs

UNIT 7:  
ORGANIZATION & PROGRAMMING OF MICROPROCESSORS:  
Introduction to organization of INTEL 8085-Data and Address buses, Instruction set of 8085, programming the 8085, assembly language programming.  

06 Hrs

UNIT 8:  
CENTRAL PROCESSING UNIT OF MICROPROCESSORS:  
Introduction, timing and control unit basic concepts, Instruction and data flow, system timing, examples of INTEL 8085 and INTEL 4004 register organization.  

6 Hrs

TEXT BOOKS:  

REFERENCE BOOKS:  
4. Introduction to microprocessor by Mathur.

AUTOMOTIVE AIR CONDITIONING  
Sub Code: P08AU662 L: T: P: 4:0:0 C I E Marks: 50
Hrs/Week: 04  Exam Hours: 03
Total Lecture Hrs: 52  S E E Marks: 50

PART-A

UNIT-1
AIR CONDITIONING FUNDAMENTALS:
Basic air conditioning system,- Air conditioning principles, Air-conditioning types, temperature and pressure fundamentals, types of compressors and refrigerants.  
4Hrs

UNIT-2
AIR CONDITIONING SYSTEMS
Classification, layouts, central / unitary air conditioning systems, components like compressors, evaporators, condensers, expansion devices, fan blowers, heating systems, Automotive heaters, Types, Heater Systems, Air conditioning protection, Engine protection.  
11Hrs

UNIT-3
LOAD ANALYSIS
Outside& inside design consideration, factors forming the load on refrigeration & air conditioning systems, cooling & heating load calculations, load calculations for automobiles, effect of air conditioning load on engine performance.  
11Hrs

PART- B

UNIT-4
AIR DISTRIBUTION SYSTEMS.
Distribution duct system, sizing, supply return ducts, type of grills, diffusers, ventilation, air noise level, layout of duct systems for automobiles and their impact on load calculations.  
8 Hrs

UNIT-5
AIR ROUTING & TEMPERATURE CONTROL
Objectives, evaporator air flow, through the re-circulating unit, automatic temperature control, duct system, controlling flow, vacuum reserve, testing the air control of air handling systems  
6 Hrs

UNIT-6
AIR CONDITIONING SERVICE:
Air conditioner maintenance & service- causes of air conditioner failure, leak testing guide, discharging the system, Evacuating the system, charging the system, servicing heater system, removing & replacing components, trouble shooting of air conditioning system, compressor service, methods of dehydration, charging & testing.  
8Hrs

UNIT-7
AIR CONDITIONING CONTROL
Common control such as thermostats, humidistat, control dampers, pressure cut outs, relays  
4Hrs

TEXT BOOKS:

REFERENCE BOOKS:
### COMPOSITE MATERIALS

<table>
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<th>L: T: P: 4:0:0</th>
<th>C E I Marks: 50</th>
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<td>Total Lecture Hrs: 52</td>
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**PART-A**

#### UNIT-1
**INTRODUCTION TO COMPOSITE MATERIALS**
Definition, classification and characteristics of composite materials – fibrous composites, laminated composites, particulate composites. Properties and types of Reinforcement and Matrix materials.  
**6 Hrs.**

#### UNIT-2
**FIBRE REINFORCED PLASTIC PROCESSING**
**10Hrs**

#### UNIT-3
**FABRICATION OF COMPOSITES**
Cutting, machining, drilling, mechanical fasteners and adhesive bonding, joining, computer aided design and manufacturing, tooling, fabrication equipment.  
**8Hrs**

**PART B**

#### UNIT-4
**APPLICATION OF COMPOSITES**
Automobile, Aircrafts, missiles, Space hardware, Electrical and electronics, marine, recreational and Sports equipment, future potential of composites.  
**2Hrs**

#### UNIT-5
**METAL MATRIX COMPOSITES**
Reinforcement materials, types, characteristics and selection base metals selection – Need for production MMC’s and its application

UNIT-6
FABRICATION PROCESS FOR MMC’S
Powder metallurgy technique, liquid metallurgy technique and secondary processing, special fabrication techniques

UNIT-7
STUDY PROPERTIES OF MMC’S
Physical, Mechanical, wear, machinability and other properties. Effect of size, shape and distribution of particulate on properties

UNIT-8
INTRODUCTION TO SHAPE MEMORY ALLOYS

TEXT BOOKS:
1. Composite Science and Engineering by K.K. Chawla Springer Verlag

REFERENCE BOOKS:
6. Principles of Composite Material mechanics by Ronald. F. Gibron,
MODELING AND FEA

Sub Code: P08AU664 L: T: P: 4:0:0 C I E Marks: 50
Hrs/Week: 04 Exam Hours: 03 S E E Marks: 50
Total Lecture Hrs: 52

PART - A

UNIT 1:
INTRODUCTION:
Equilibrium equations in elasticity subjected to body force, traction forces, stress strain relations for plane stress and plane strain, Boundary conditions, Initial conditions, Euler’s Lagrange’s equations of bar, beams, Principal of a minimum potential energy, principle of virtual work, Rayleigh-Ritz method, Galerkins method., Guass elimination Numerical integration. 7 Hrs

UNIT 2:
BASIC PROCEDURE:
General description of Finite Element Method, Engineering applications of finite element method, Discretization process; types of elements 1D, 2D and 3D elements, size of the elements, location of nodes, node numbering scheme, half Bandwidth, Stiffness matrix of bar element by direct method, Properties of stiffness matrix, Preprocessing, post processing. 7 Hrs

UNIT 3:
INTERPOLATION MODELS:
Introduction, Polynomial form of interpolation functions- linear, quadratic and cubic, Simplex, Complex, Muiltiplex elements, Selection of the order of the interpolation polynomial, Convergence requirements, 2D Pascal triangle, Linear interpolation polynomials in terms of global coordinates of bar, triangular (2D simplex) elements, Linear interpolation polynomials in terms of local coordinates of bar, triangular (2D simplex) elements, CST element. 6 Hrs

UNIT 4:
HIGHER ORDER AND ISOPARAMETRIC ELEMENTS:
Lagrangian interpolation, Higher order one dimensional elements- quadratic, Cubic element and their shape functions, properties of shape functions, Truss element, Shape functions of 2D quadratic triangular element in natural coordinates, 2D quadrilateral element shape functions – linear, quadratic, Biquadric rectangular element( Nodded quad lateral element), Shape function of beam element, Hermite shape function of beam element. 6 Hrs

PART – B

UNIT 5:
DERIVATION OF ELEMENT STIFFNESS MATRICES AND LOAD VECTORS:
Direct method for bar element under axial loading, trusses, beam element with concentrated and distributed loads, B matrices, Jacobian, Jacobian of 2D triangular element, quad lateral , Consistent load vector, Numerical integration. 7 Hrs

UNIT 6:
HEAT TRANSFER PROBLEMS:
Steady state heat transfer, 1d heat conduction governing equation, boundary conditions, one dimensional element, Functional approach for heat conduction, Galerkin approach for heat conduction, hat flux boundary condition, 1D heat transfer in thin fins. 6 Hrs

UNIT 7:
APPLICATIONS I:
Solution of bars, stepped bars, plane trusses by direct stiffness method. Solution for displacements, reactions and stresses by using elimination approach, penalty approach. 

6 Hrs

UNIT 8:
APPLICATIONS II:
Solution of beam problems, heat transfer 1D problems with conduction and convection. 

7 Hrs

TEXT BOOKS:

REFERENCE BOOKS:
4. The FEM its basics and fundamentals: O.C.Zienkiewicz, Elsevier, 6e.

SURFACE FINISHING AND TREATMENT

Sub Code: P08AU665  L: T: P: 4:0:0  C I E Marks: 50
Hrs/Week: 04  Exam Hours: 03  S E E Marks: 50
Total Lecture Hrs: 52

PART – A

UNIT-1
Fundamentals of Electro plating, galvanizing, hot dip metal coating, thin coating, thin coating, chromium plating, Nickel plating. 08 Hrs

UNIT-2
Vacuum coating, PVD & CVD metal spraying – Methods, surface preparation, mechanical properties of sprayed metals, plasma coating. 10 Hrs

UNIT-3
Plastic coating of metal – PVC coating Spherodising process details, phosphate coating-mechanism of formation. 08 Hrs

PART - B

UNIT-4
Testing of surface coating-methods. 08 Hrs

UNIT-5
Heat treatment methods, Annealing, Normalizing, Tempering, Case hardening methods, flame hardening sub zero treatment. 10 Hrs

UNIT-6
Heat treatment methods for gears, spindles, cutting tools. 08 Hrs

TEXT BOOKS:

REFERENCE BOOKS:

STATISTICAL QUALITY CONTROL AND RELIABILITY

Sub Code: P08AU666   L: T: P: 4:0:0   C I E Marks: 50
Hrs/Week: 04   Exam Hours: 03
Total Lecture Hrs: 52   S E E Marks: 50

PART – A

UNIT 1:
INTRODUCTION: Basic concepts of Quality, Meaning and definition of quality, Quality control, objectives of quality control, Quality Characteristics, Quality costs, Quality of Design, Quality of conformance, Concepts in quality management, quality planning, quality measurement, trouble shooting, diagnostic techniques, System approach to quality management.
06 Hrs

UNIT 2:
BASIC STATISTICAL CONCEPTS: Concept of variation and its types, Variables and Attributes, Frequency distribution and its graphical representation (Frequency Polygon, Histogram, and Ogive), Central tendency and Measures of dispersion (Mean, Median, Mode, Range, and Standard deviation), Numerical Problems 06 Hrs

UNIT 3:
PROBABILITY AND PROBABILITY DISTRIBUTIONS: Theory of Probability, Types of Probability distributions: Hyper geometric, Bi-nominal, Poisson and Normal distributions, Numerical Problems 06 Hrs

UNIT 4:
CONTROL CHARTS FOR VARIABLES: Theory and definition of control chart, Control charts for X - Bar and R charts, Type I and Type II errors, Numerical Problems 08 Hrs

PART – B

UNIT 5:
PROCESS CAPABILITY: Methods of calculating process capability, Natural Tolerance limits, Numerical problems 05 Hrs

UNIT 6:
CONTROL CHARTS FOR ATTRIBUTES: Control charts for defects and defectives - p, np, c, and u charts and their applications, Numerical problems 7 Hrs
UNIT 7:
ACCEPTANCE SAMPLING: Basis concepts, Sampling by attributes, single, double and multiple sampling plans, use of sampling table, Sequential sampling plan, construction and use of Operating Characteristic curves, Numerical problems 07 Hrs

UNIT 8:
FAILURE STATISTICS AND RELIABILITY: Failure density, Failure rate, Mean failure rate, Mean time to failure, Mean time between failure, maintainability, Availability, Concepts and meaning of reliability, Reliability prediction, Bath tub curve, component and system reliability, redundancy and its uses, interaction between reliability and maintenance, Numerical problems 07 Hrs

TEXT BOOKS:
2. Concepts in Reliability Engineering, L.S. Srinath

REFERENCE BOOKS:
1. Statistical Quality Control, R. C. Gupta, Khanna Publishers, Delhi
2. Statistical Quality Control, Manohar Mahajan, Dhanpat Rai and Sons, New Delhi
5. Introduction to Statistical Quality Control, Montgomery Douglas C., John Wiley and Sons, Inc., Hoboken
6. Quality Planning and Analysis, Juran, Tata Mc Graw Hill
8. Introduction to Reliability and Quality, Thomson.R
AUTOMOTIVE WORKSHOP  (CHASSIS AND TRANSMISSION)

Sub Code: P08AUL67  
Hrs/Week: 03  
Total Lecture Hrs: 36  

1. Writing technical specifications and description of all types of chassis and transmission components of automobiles, including body and interiors (two wheeler, four wheeler and heavy vehicle – one each)

2. Trouble shooting charts for major parts like clutch, gear box, differential, brakes, and wheels with tyres, steering system and suspension

3. Testing and servicing of electrical components like battery, starting system, ignition system, central locking system, lighting system, and alternator. Experiments on microprocessors related to automobiles

4. Dismantle and assemble of major systems (clutch system, Gear boxes, Propeller shaft, Differential, Front and Rear axles, brake system, steering system and suspension system) and identifying remedies (like backlash adjustment, brakes adjustment, bleeding of brakes) for the possible problems based on trouble shooting charts.

5. Draw sketch of seating arrangements, seats for commercial vehicle and study the comfort levels provided for driver and passengers.

6. Draw sketches of different mechanisms of door, seat adjustments mechanisms.

Scheme of Examination

ONE Question from Chapter 1&2  10 Marks
ONE Question from Chapter 3 & 4  20 Marks
ONE Question from Chapter 5 & 6  10 Marks
Viva-Voce  10 Marks

AUTOMOTIVE WORKSHOP (DIAGNOSIS AND RECONDITIONING)

Sub Code: P08AUL68  
Hrs/Week: 03  
Total Lecture Hrs: 36  

1. Inspection of vehicles and preparation of test charts.

2. Tuning of Engines: Check for ignition timing, valve tappet clearance, Radiator flushing and check for leaks etc.,

3. Study and practice on
Connecting rod alignment  
Cylinder reboring machine  
Valve refacing machine  
Nozzle grinding machine  
Brake drum skimming machine  

4. Servicing of components like FIP, Carburetor, Fuel pump, Exhaust pipes and Silencer, Lubricating system, Air compressor, shock absorber, Calibration of FIP.  
5. Study and practice of wheel alignment (Mechanical and computerised) and wheel balancing  
6. Testing of Two wheeled vehicles on chassis dynamometer  
7. Study of tyre retreading and vulcanizing  
8. Study and practice on body repairs – tinkering and painting  
9. Head light focusing test and visibility test  
10. Students have to visit at least five different automotive industries in which at least one automotive manufacturing unit & one body building unit. Report to be submitted on Industrial visit.

Scheme of Examination:  

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<tr>
<th>TWO Question from Chapter 1 to 9</th>
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<tr>
<td>Report on Industrial Visit</td>
<td>10 Marks</td>
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