SYLLABUS PRESCRIBED FOR
FOUR YEAR DEGREE COURSE IN
BACHELOR OF ENGINEERING
MECHANICAL ENGINEERING
SEMESTER PATTERN
(CREDIT GRADE SYSTEM)
SEMESTER : THIRD

3ME01 MATHEMATICS-III

Section-A

UNIT-I : **Ordinary differential equations:-** Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy's and Legendre's linear differential equations. (10 Hrs)

UNIT-II **Laplace transforms :** Definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function. Solution of Linear differential equations. (10 Hrs.)

UNIT-III a) Partial differential equation of first order of following form- (i) f (p,q)=0; (ii) f (p,q,z)=0; (iii)f (x,p)=g(y,q); (iv) Pp+Qq=R (Lagranges form); (v) z=px+qy+f (p,q) (Clairaut form)

b) Statistics : Curve fitting by method of least squares (Straight and parabola only), Correlation, Regression.

c) Probability Distribution:– Binomial distribution, Poisson and normal Distribution. (10 Hrs.)

Section-B

UNIT-IV **Complex Analysis :-** Functions of complex variables, Analytic function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne's method, conformal mappings (translation, rotation, magnification, inversion, bilinear transformation), singular points, expansion of function in Tayler's and Laurent's series. Cauchy's integral theorem and formula, Residue theorem. (12 Hrs.)

UNIT-V **Numerical Analysis :** Solution of algebric and transcendental equations by Newton-Raphson method & method of false position. Solution of system of linear equations by Gauss-Seidal method, Relaxation method. Solution of first order ordinary differential equations by Picard's, modified Euler's, Runge-Kutta and Taylor's method. (10 Hrs.)

UNIT-VI **Vector Calculus :-** Scalar and vector point functions, Differentiation of vectors, Gradient of a scalar point function,

Directional derivatives, Divergence and curl of a vector point function and their physical meaning, line, surface, volume integrals, irrotational and solenoidal vector fields, Stoke's and Divergence theorem (without proof). (10 Hrs.)

Books Recommended:-

Text Books:

1. Text book on Applied Engineering Mathematics, Vol. II, J.N. Wartikar and P.N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering Mathematics, B.S Grewal, Himalaya Publishing House.
3. Applied Mathematics, Vol. III, J.N. Wartikar and P.N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.

Reference Book :

1. Advanced Engineering Mathematics, Erwin Kreyzig, John Wiley.

3ME02/ 3PE02 MECHANICS OF MATERIALS / STRENGTH OF MATERIALS

SECTION-A

Unit-I 1. Mechanical properties: Concept of direct, bending and shear stresses and strains, stress-strain relations, Biaxial and triaxial loading, elastic constants and their relationship, stress-strain diagrams and their characteristics for mild steel, and other metals, factor of safety,

2. Uniaxial stresses and strains: Stresses and strains in compound bars in uniaxial tension and compression, temperature stresses in simple restrained bars and compound bars of two metals only.

Unit-II 1. Axial force, shear force & bending moment diagrams : Beams, loading and support conditions, bending moment and shear force for all types of loadings for simply supported beams, cantilevers, relation between shear force, bending moment and loading intensity.

2. Simple or pure bending theory: Theory of simple bending, section modulus, moment of resistance, bending stresses in solid, hollow and built up section, leaf springs.

Unit-III 1. Torsion: Theory of torsion & assumptions, derivation of torsion equation, polar modulus, stresses in solid & hollow circular shaft, power transmitted by shaft, closed coiled helical spring with axial load.

2. Shear stress distribution on beam rectangular and circular cross sections.

SECTION – B

Unit-IV Thin and thick cylinders and thin spherical shells subjected to internal pressures.

Unit –V 1. Strain energy under uniaxial tension and compression impact loads and instantaneous stresses.

2. Principal Stresses : Biaxial stress system, principal stresses, principal planes, Mohr's circle of stresses.

Unit-VI Deflection of beams

Deflection in statically determinate (simply supported) beams subjected to point loads, uniformly distributed loads, moments by Macauley's method.

Books Recommended:

Text Books :

1. F. L. Singer : Strength of Materials, Harper and Row Publication, New York .
2. Ramamruthm : Strength of Materials, Danpat Rai and Sons, New Delhi .

Reference Books :

1. E.P.Popov : Mechanics of Materials, Prentice Hall of India, New Delhi.
2. S. Timoshenko and O.H.Young : Elements of Strength of Materials, East West Press Private Ltd., New Delhi.
3. Shames, I. H. : Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 1990.
4. Beer and Johston : Mechanics of Materials, McGraw Hill.
5. D. S. Prakash Rao : Strength of Material : A Practical Approach, I ed, University Press, Hydrabad.

3ME03 FLUID POWER-I

Section - A

UNIT-I : - 1) Introduction to the study of fluid motion. Mechanical properties of fluids and their influence on flow characteristics.

2) Fluid Statics:- Fluid pressure, pressure variation in fluids, manometers, forces on plane and curved surface buoyancy. (12 Hrs)

UNIT-II:- Buoyancy, stability of floating bodies. Kinematics and dynamics of fluid flow:- Types of flows, Stream lines, potential lines, flow net, continuity equation. One and two dimensional motion, one dimensional method of flow analysis. Bernoulli's

equation. Venturimeter, Momentum equation for steady flow. Vortex motion. (8 Hrs)

UNIT-III:- Dimensional analysis: Dimensional homogeneity and dimension less ratios. Dimensionless parameters. Similitude and model studies. (6 Hrs)

Section - B

UNIT-IV:- Motion of viscous fluids:-Introduction to laminar and Turbulent flows. Boundary layer concept. Separation. Drag lift on immersed bodies. Reynolds number and its significance. (7 Hrs)

UNIT V:- Darcy weisbach equation i.e. Equation of pipe flow, friction charts and its use, Minor losses in pipes and fittings, losses due to sudden enlargement and contraction, Hydraulic and energy gradient lines, pipes in series and parallel. Elementary concept of water hammer. (8 Hrs)

UNIT VI:- 1. Principles of fluid machinery: Dynamic action of fluid force exerted by fluid jet on plane, curved, stationary and moving vanes. Velocity diagrams, Work done by impact, pressure due to deviated flow.

2. General Theory of Hydrodynamic Machines:- Eulers equation, Degree of reaction, classification of machines according to degree of reaction. Efficiencies: Volumetric efficiency, Hydraulic efficiency, mechanical efficiency and overall efficiency. (7 Hrs)

Books Recommended :-

Text Books:-

1. CSP Ojha, R. Berndtsson, Fluid Mechanics and Machinery; Oxford university.
2. Bansal R.K., Fluid Mechanics and Fluid Machines; Laxmi publications.

Reference Books:-

1. R.K.Rajput; Engineering Fluid Mechanics; S. Chand publications.
2. Dr. Mody & Seth; Hydraulics and Fluid Mechanics; Standard book house
3. S. Ramamrutham, Hydraulic, Fluid Mechanics & Fluid Machines, Dhanpatrai publishing company.
4. Strecter, Fluid Mechanics, Tata McGraw Hill.

3ME04 ENGINEERING THERMODYNAMICS

Section-A

Unit-I Introduction to basic concepts of thermodynamics,

Macroscopic and microscopic approaches, properties of system, state and equilibrium, processes and cycle. Temperatures and Zeroth law of thermodynamics, Quasi-static process, Forms of energy and its conversion.

Gas Laws and Ideal gas equation of states, difference between gases and vapours, equation of state, gas constant and universal gas constant. (08 hrs)

Unit-II Work and Heat: Definition of work, thermodynamic work, displacement work and other forms of work, Definition of Heat, Work and heat transfer as path function, comparison of work and heat, work done during various processes, P-V diagrams.

First law of thermodynamics: Energy of a system, classification of energy, law of conservation of energy law applied to closed system under going a cycle, Joules experiment. Energy a property of system, internal energy-a function of temperature, Enthalpy, specific heat at constant volume and constant pressure. Change in internal energy and Heat transfer during various non-flow processes. (10 hrs)

Unit-III First Law applied to flow processes: Steady state, steady flow process, mass balance and energy balance in steady flow process, steady flow energy equation and its application to nozzles and diffusers, turbine and compressor pumps, heat exchangers, Throttle valve etc. work done and Heat transfer during steady flow processes. (9Hrs)

SECTION - B

Unit-IV Second Law of thermodynamics: Limitations of Ist law, Thermal energy reservoir, heat engines refrigerator and heat pumps. Kelvin-Plank and Clausious statements, their equivalence, reversible and irreversible processes, Carnot cycle, two propositions regarding the efficiency of Carnot cycles. The thermodynamic temperature scale. Reverse carnot cycle. COP of heat pump and refrigeration. Inequality of Clausius. (7 Hrs)

Unit-V Entropy: Entropy-a property of system, entropy change for ideal gases, entropy change of a system during irreversible process, lost work. Principle of increase of entropy.

Availability and irreversibility:- Available energy referred to cycle, decrease in available energy with heat transfer through a finite temperature differences. The Helmhltz and Gibbs functions, Availability, Irreversibility and effectiveness. (8 Hrs)

UnitVI a) Air Standard Cycles: Ottto, diesel, semidiesel, sterling and joule cycles etc., their efficiencies and mean effective pressure.

b) Vapour Cycles:- Rankine and Modified Rankine Cycle. Comparison of Rankine and Carnot cycle, representation on P-V, T-S and H-S diagram. (No numerical on this unit) (8 Hrs)

Books Recommended

Text Books

1. Engineering Thermodynamic - by P.K.Nag.
2. Thermodynamics Volume: I & II; R. Yadav;

Reference Books

1. Basic Engineering Thermodynamics - by Reyner Joel
2. Thermodynamics - by C.P. Arora.
3. Fundamentals of Classical Thermodynamics - by G.J.Vanwylen.
4. Engineering Thermodynamics; P. Chattopadhyay; Oxford
5. Engineering Thermodynamics; Gordon Rogers, Yon Mayhew; Pearson

3ME05 MANUFACTURING PROCESSES-I

Section - A

Unit-I :- Introduction to manufacturing processes & classification; Introduction to pattern making- Pattern materials, pattern making tools, allowances, Types of patterns, functions of patterns, General properties of moulding sands, Mold hardness. Preparation of sand moulds of different types, Moulding processes, core making, core prints, core boxes. Sand casting Processes - Basic principle and Terminology of sand casting, gating system, types of gate, risers, etc. (9Hrs)

Unit-II:- Technology of melting and casting - Melting furnaces, crucibles, pit, open hearth, gas fired cupola, cupola operation and electric hearth furnaces, Electric furnaces - Direct Arc, Indirect arc and electric induction furnace.

Defects in castings and its types, Causes and remedies of casting defects. Origin and classification of defects, shaping faults, Inclusion and sand defects, Gas defects, shrinkage defects, contraction defects, dimensional errors. Inspection and testing of castings:- Radiography, ultrasonic, Eddy current testing, fluorescent penetrant test. (7 Hrs)

Unit III:- Casting processes and their principle of operation and applications permanent mold casting, slush casting, shell

molding, Investment or lost wax casting, vacuum process, centrifugal casting, continuous casting, Die casting equipment and processes for Gravity, pressure and vacuum casting methods, cleaning of castings, Modernisation & Mechanisation of Foundries. (8 Hrs)

Section - B

Unit IV :- Mechanical working of metals: Principle of hot and cold working process and its types, Extrusion, piercing, pipe and tube production, manufacture of seamless pipe and tubing. Shearing operations, tube drawing, wire drawing, spinning, embossing and coining, squeezing and bending operations, rotary swaging, Rolling, types of rolling mills, forging operations, upset forging. (8 Hrs)

Unit V:- Joining processes:- Mechanical joining processes, Mechanical fastening, riveting, soldering, brazing Welding, Types of welding processes-Arc welding: principle and working, Gas welding- principle and working Types and purpose of Electrodes, Electrode coatings(flux). TIG & MIG processes – Working principles and its applications, shielding gases, MIG-Spray transfer and dip transfer processes. (6 Hrs.)

Unit VI:- Submerged arc welding & resistance welding :- Heat generation in resistance welding, operational characteristics of resistance welding processes such as spot welding, projection welding, butt welding.

Principle of operation of friction welding, forge welding, plasma arc, thermit welding. Welding defects, Testing and Inspection of welds, Ultrasonic, Electroslag, Electron Beam, laser welding, weldability.

Surface Treatment-Electroplating, electroforming, and iodising, metal spraying, shot peening, polishing, mechanical cleaning. (9 Hrs)

Books Recommended

Text Books:-

1. Workshop Technology Vol. I by Bawa, Tata McGraw Hill Publication.
2. Workshop Technology Vol I by Hajra Chaudhary, Dhanpat Rai & Sons 2001.

References:-

1. Workshop Technology Vol I by Raghuwanshi.
2. Manufacturing Processes by J.P. Kaushish; PHI
3. Processes and Materials of Manufacture by R.A.Lindberg, PHI Pub 2001.

4. Foundry Technology by Goel Sinha.

3ME06 / 3PE06 MECHANICS OF MATERIAL-LAB. / STRENGTH OF MATERIALS-LAB.

Practicals:

Minimum Six to Eight out of following:

1. Tension test on metals.
2. Compression test on materials.
3. Shear test on metals.
4. Impact test on metals.
5. Hardness test on metals.
6. Torsion test on metals.
7. Deflection of beams.
8. Modulus of rupture test.
9. Deflection of springs.

Practical examination shall be viva-voce based on above practical and the syllabus of the course.

3ME07 FLUID POWER-I-LAB.

Practical Term Work:-

At least six practical's (study/Trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students.

1. Study of Manometers.
2. Measurement of fluid pressure by manometer.
3. Determination of metacentric height.
4. Verification of Bernoulli's equation.
5. Flow measurement by venturimeter.
6. Study of venturimeter.
7. Determination of Reynolds number.
8. Velocity distribution in Boundary layer & thickness of B.L.
9. Determination of co-efficient of friction for pipes.
10. Determination of head loss due to sudden enlargement.
11. Determination of head loss due to sudden contraction.
12. Determination of losses in bends.
13. Determination of losses in elbows.
14. Study of flow through pipes in series & parallel.
15. Verification of momentum equation.

Note :- Practical examination shall consist of oral or Experimentation based on above term work.

3ME08 MANUFACTURING PROCESSES-I –LAB.

Practice:-

1. Study of safety precautions in workshop practices.
2. Foundary:- Any two of the following jobs Sand preparation and practice in moulding of various types of patterns:- Pattern making 1 job, Moulding 1 job Casting 1 job.
3. Joining Processes:- 2 composite jobs involving electric welding, gas welding and resistance welding process.

A journal should be prepared and submitted on above term work.

The practical examination shall consist of a job preparation and college assessment should be based upon the jobs, termwork and viva examination.

SEMESTER : FOURTH

4ME01 /4PE01 BASIC ELECTRICAL DRIVES & CONTROL

Section-A

Unit I : Concept of general electric drives, classification and comparison of electrical drive system, Cooling and heating of electric motors. Introduction to mechatronics, Theory and principle of Power Transistor, SCR

Unit II : Basic characteristics of D.C. motor, Torque equation, Modified speed – Torque characteristics. Starting and braking of Electrical D.C. motors, comparison of mechanical and electrical braking methods. Introduction, Principle, construction and working of Servo motors, stepper motors, Brushless D.C. motors.

Unit III : Classification of A.C. motors, construction, types, principle of working and characteristics of 3 phase Induction motors, applications. Starting and braking of 3 phase induction motors. Classification of single phase induction motors. construction, principle and working and applications. Principle and working of universal motor.

Section-B

Unit IV : Conventional methods of speed control of A.C. and D.C. motors. Thyristorized stator voltage control of 3 phase induction motor, (v/f) control method, slip-power recovery scheme. Thyristorized armature voltage control of D.C. motors using phase control & Thyristorized chopper.

Unit V : Basic principle, construction & applications of sensors and transducers, contact - non- contact type, optical proximity

sensors. Switches, contact type, magnet type, electromagnetic type, sound, light, pressure, vibration transducers, Hall effect-sensors A.C./D.C. Tachogenerators.

Unit VI: Industrial applications - classes of duty selection of an electric drive for particular applications such as steel mill, paper mill, cement mill, textile mill, sugar mill, electric traction, coal mining, etc. Induction heating, surface hardening & Dielectric heating.

Books Recommended

Text Books:-

1. A First Course on Electrical Drives - S.K. Pillai.
2. Basic Electrical Technology (Vol. 11) - B.L. Theraja

Reference Books :

1. Drives and Control - N. Dutta
2. Mechatronics - W.Bolton, Addison Wesley, Longman Ltd., 1997.
3. A Course in Electrical, Electronics Measurement and Instrumentation, By A.K.Sawhney, Dhanpat Rai & Sons, 2006

4ME02 ENGINEERING METALLURGY

Section - A

Unit I : - Introduction to metallurgy: Basic concept of process metallurgy, physical metallurgy, and mechanical metallurgy, Classification of materials & their application, Structure of metals and alloys, formation of Alloys, Solid solutions, types and their formation, lever rule for phase mixtures. Solidification of pure metals, nucleation and growth, ingot structure, dendritic solidification (8)

Unit II : Study of binary equilibrium diagram and invariant reactions, Construction and study of Iron-carbon Equilibrium Diagram, Critical temperatures, Microstructure of slowly cooled steel, Estimation of carbon from microstructure, structure property relation, Introduction to composite materials, advantages and applications. (8)

Section-B

Unit IV : Cast irons **:** Factors governing condition of carbon in cast iron, Maurer's diagram, Solidification of grey and white cast iron, Malleabalizing, Constitution and properties of white, gray, Nodular and Malleable cast irons, their applications, Alloy cast irons.

Non Ferrous Metals and Alloys : Types, Properties and uses of Brasses and Bronzes. Important alloys of

Aluminium, Lead, Tin and Zinc, their applications. Bearing materials, Season cracking, precipitation hardening. (8)

Unit V : Principles of Heat Treatment: - Annealing, Normalizing, Tempering Iso-thermal transformation diagrams(S-curve), super imposition of continuous cooling curves on 's' Curve, pearlite, bainite and martenste transformation, Quenching media, severity of quench, Austempering, Martempering and patenting, Retained austenite and sub-zero treatment. Hardenability. (8)

Unit VI : Methods of surface hardening: Carburizing, Nitriding, Cyaniding, Flame and Induction Hardening.

Mechanical working of Metals: - Hot and cold working, Relative advantages and disadvantages, study of stress strain curve, Luder's bands, Work hardening, strain Ageing; Recovery, Recrystallization and grain growth.

Metallurgical factors affecting various Mechanical working processes, preferred orientation, Deformation mechanisms-Slip& twining, critical resolved shear stress.

Powder Metallurgy: Concept, Methods of Manufacture of metal powders, compaction Process- Single die and double die, sintering, stages of sintering, Manufacture of porous bearings & cemented carbide tip tools by P.M.T. Advantages, limitations and applications of powder metallurgy. (8)

Book Recommended:-

Text Books:-

1. Introduction to physical metallurgy ;Sidney H Avner, TATA Mc-Graw hill
2. Engineering materials & metallurgy R.K.Rajput, S chand publication

Reference Books:

1. Mechanical Metallurgy, G. E. Dieter, Mc- Graw Hill International, London 3rd Edn. 1999
2. Physical metallurgy for engineers, Clarke and Varney, second Edn.,1987.
3. Power metallurgy, A.K Sinha First Edn. 1991.
4. Material Science and Metallurgy; V.D. Kodgire; Everest Publishing House
5. Engineering physical Metallugrgy, Y Lakhtin, Mir Publications. Second Ed. 1999
6. Material Science and Meallurgy- C Daniel Yesudian, Scitech Publication

4ME03 ENERGY CONVERSION-I

Section - A

Unit I Properties of Steam: Triple point and critical point, Sensible heat, latent heat, superheat and total heat of steam. Wet steam, dryness fraction, Internal energy of steam, External work of evaporation, Specific volume, enthalpy, internal energy and entropy of steam. T-S diagram Mollier chart, Steam tables and their use. Work done and heat transfer during various thermodynamics processes with steam as working fluid. Throttling of steam, determination of dryness fraction using various calorimeters. (8 Hrs)

Unit II Flow diagram for steam power plant with basic units such as steam generator, turbine, condenser and pump. Boilers: Introduction to water tube boilers used in thermal power plants, packaged Boilers (fire tube), High pressure boilers; Loeffler, Benson, Lamont Boilers, Boiler mountings and accessories—devices for improving Boiler efficiency. Principle of fluidized bed combustion. Boiler draught; Types of draught, expression for diameter & height of chimney, condition for maximum discharge, efficiency of chimney, reasons for draught loss. (7 Hrs)

Unit III FUEL & ASH HANDLING : Elementary treatment on coal, coal transportation from mine to site and site to boiler house. Fuel bed firing and suspension firing, Equipments of Mechanical grate firing, pulverised coal firing including crushers & pulverisers and burners. Oil handling system,and burner equipment,Elementary treatment on ash handling. Type of dust collectors and disposal of dust. Boiler performance:- Boiler rating, boiler power, equivalent evaporation, efficiency. Effect of accessories on boiler efficiancy and heat balance. (8 Hrs)

Section - B

Unit IV Steam power plant: General features, representation of Ranking cycle on phasediagrams. layout,site selection, concept of co-generation. CONDENSERS : Need,Types of condensers, quantity of cooling water required. Dalton's law of partial pressure, condenser and vacuum efficiency. Sources of air in condensers and its effect on performance. Condensate pump and air extraction pumps, air enjectors Cooling water system: cooling ponds, spray tanks, cooling towers: Natural and mechanical wet type cooling tower. (7 Hrs)

UNIT V Steam nozzles : Flow of steam through nozzles & diffusers, Maximum discharge, critical pressure ratio, Effect of friction. Determination of throat & exit areas, Nozzle efficiency, no

nunmerical on concept of super saturated flow & wilson line Steam Turbines:- Principle of working, Types of steam turbines such as impulse, reaction, axial & radial flow, back pressure & condensing turbines. Compounding. Reheat, regenerative cycles, bleeding. Analysis limited to two stages only. (7 Hrs)

UNIT VI Analysis of steam Turbines : Flow of steam through impulse & impulse reaction turbine blading. Velocity diagrams. Graphical & analytical methods for work & power developed, axial thrust and efficiency. Height of turbine blades. LOSSES IN STEAM TURBINES:- Nozzle losses:- blade friction, partial admission, disc friction, gland leakage losses and velocity losses. Governing of steam turbines. (10 Hrs)

Recommended Books:

Text books

1. Thermal engineering; Mahesh M Rathore; Tata McGraw-Hill
2. Thermal Engineering R.Yadav; Central publication

Reference books:

1. Steam Turbine; Kearton; Oscar *Publications*
2. Thermal Power Engineering; Mathur Mehta; Tata McGraw-Hill
3. Power Plant Engineeirng; R.K.Rajput; Laxmi Publications
4. Thermal Engineering, P.L.Ballaney; Laxmi *Publications*

4ME04 MANUFACTURING PROCESSES -II

Section - A

UNIT I :- Theory of Metal cutting: Mechanics of Metal cutting, Tool material, Tool Geometry, Cutting tool classification, Tool life, Tool wear, Cutting forces and power consumption, Machinability, Cutting fluids, Machine Tool classification. (8 Hrs)

UNIT II:- Construction, Operations and accessories of centre lathe, introduction of capstan & turret lathe, indexing mechanism, bar feeding mechanism, introduction to Automatic screwmachines & Single spindle and multi-spindle automat. (10 Hrs)

UNIT III:- a) Drilling M/cs general purpose, Mass production and special purpose drilling M/cs.

b) Boring M/c :- Horizontal, Vertical and jig Boring M/c.

c) Introduction to Broaching and its types, reaming operation. (8 Hrs)

Section - B

UNIT IV:- a) Milling M/c :- Types, Types of Milling Cutters, Dividing head, Compound and differential indexing.

b) Gear producing M/cs.

c) Study of various parts and operations of power hack saw. (6 Hrs)

UNIT V :- a) Grinding Machines: Bench grinders, surface grinders, centreles grinders, types of bonds & Abrasive modification of grinding wheels.

b) Study of various part & Operation of Shaper, Planer, Sloter. (6 Hrs)

UNIT VI:- Unconventional Machining Processes:-

a) Mechanical Processes:- Ultrasonic Machining - principle and applications. process parameters; Abrasive and water parameters involved.

b) Thermal processes:- Election Beam Machining – Generation of beam, principle and applications : Laser Beam machining applications : Plasma-arc machining- Concept and generation of plasma, principle of PAM, applications.

c) Electro Chemical Machining- Classification, fundamentals: Electro mechanical milling.

d) Electric discharge Machining - Types dis-sie-onking, wire EDM, Mechanism of material removal, process parameters, advantages and applications. (8 Hrs)

Books Recomonded:

Text Books:

1. Manufacturing Technology-Vol 1 & 2; R.L.Timings, S.P. Wilkinson; Pearson Publication.
2. Workshop Technology - By Hajra Choudhaury Vol II.

References:-

1. Pandya & Shah, Modern Machining process, Tata McGraw Hill 1998.
2. Workshop Technology, O.P. Khanna, Dhanpatrai & Sons.
3. Workshop Technology - By Raghuwanshi. Vol II.

4ME05 MACHINE DESIGN & DRAWING-I

Section - A

Unit I- a) Sectional Views

Conversion of pictorial view in to sectional orthographic projections, Sectional views with different types of projections, Missing views (12 Hrs)

Unit II- a) Development of surfaces

Development of surfaces of cubes, prisms, cylinders, pyramids, cones & their cut sections

b) Intersection of solids-prism and prism, cylinder and cylinder, cylinder and prism, cone and cylin-der, cone and prism. (12 Hrs)

Section B

Unit III- a) Meaning of Design, Phases of Design, Design considerations

b) Simple stresses, Thermal stresses, Torsional Stress, stresses in straight & curved beams and its application- hooks, c-clamps

c) Design & drawing of riveted joints- Caulking & fullering, failures, strength & efficiency of riveted joints.

d) Welded joints- Symbolic representation, Strength of transverse & parallel fillet welded section

e) Design & drawing of Knuckle Joints (12 hrs)

Unit IV-a) Design of Helical springs- Types of springs, stresses in helical springs, Wahl's stress factor, Buckling & surge, tension spring

b) spiral & leaf springs

c) Design of power screw-Torque required to raise loads, efficiency & helix angle, overhauling & self locking of screw, acme threads, stresses in power screw. (12 hrs)

Books Recommended

Text Books :

1) Machine Drawing by N. D. Bhatt, Charator Publication
2) Machine Design by R. S. Khurmi & J. K. Gupta , S. Chand Publication

Reference Books :

1) Machine Design by Dr. P. C. Sharma & Dr. D. K. Agrawal, Katsons Books publication
2) Design of Machine elements by C. S. Sharma, Kamlesh Purohit, PHI publication
3) Design of Machine elements by V. B. Bhandari, Tata McGraw Hill Publication
4) Machine Design, Jindal, Pearson publications
5) Design Data Book by- P.S.G. Koimbatore
6) Design Data Book by Mahadevan,

(Use of any data book from the above will be permitted during the examination).

4ME06 / 4PE06 BASIC ELECTRICAL DRIVES & CONTROL-LAB.

List of Experiments

Any eight practicals from the following list:

1. To study the Specification of Various Electrical Machines.
2. To study the D.C. Motor Starters.
3. To study the Running and Reversing of D.C. Motor.
4. Speed Measurements using Magnetic Pick-up.
5. To study the Speed reversal of counter Current Breaking of 3-phase Induction Motor.
6. To control the speed of D.C. Motor by a) Armature Control b) Field Control.
7. To perform Load Test on Induction Motor.
8. To study Dynamic/Rheostatic Breaking of D.C. Motor.
9. To study Characteristics of Thyristor.
10. To study the speed -Torque Characteristic of Servo Motor.

4ME07 ENGINEERING METALLURGY-LAB.

List of Practicals: - (At least eight practicals out of the following list.)

1. Study of metallurgical microscope.
2. Preparation of specimen for micro-examination.
3. Moulding of specimen for micro-examination.
4. Study of micro structures of Annealed and normalized plain carbon steels.
5. Study of micro structures of alloy steels and H.S.S.
6. Study of micro structures of various cast irons.
7. Study of micro structures of non ferrous metals.(brasses, bronzes)
8. Study of micro structures of hardened and tempered steels.
9. Study of Iron carbon Equilibrium diagram & Allotropic forms of iron.
10. Study different Heat Treatment Process for steel.
11. Study of different surface Hardening processes for steels.
12. Study of effect of alloying elements on the properties of steels.
13. Measurement of hardenability by Jominy end quench test apparatus.
14. Study of hardness tester and conversion of Hardness number
15. Industrial visit to study heat treatment plant.
16. Measurement of particle size, grain size, nodularity, coating thickness etc. by using some software like Metzer Microcam 4.0

Practical Examination:

Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

4ME08 ENERGY CONVERSION–I-LAB.

Practical Term Work:-

At least six practicals (Study/trials) based on above syllabus, as given below shall be included in the report by the students.

1. Study of a water tube boiler (Babcock Wilcox boiler)
2. Study of a locomotive boiler.
3. Study of a high pressure boiler.
4. Study of boiler accessories.
5. Trial on a boiler and heat balance sheet.
6. Study of boiler mountings.
7. Study and trial on a steam turbine.
8. Study of condensers.
9. Study of condensate and air extraction pumps.
10. Study of steam power plant.

Practical Examination:- Shall consist of based on above term work and syllabus.

4ME09 MANUFACTURING PROCESSES–II-LAB.

Practicals:-

1. Demonstration of operations related to lathe, shaper, slotter, drilling & grinding m/cs.
2. One job on lathe covering taper turning and threading.
3. One job on shaping covering plane and inclined surfaces.
4. One job on milling machine.

The above jobs should include drilling, grinding, tapping etc.

Term work should be submitted in the form of journal.

N.B. :- The practical examination shall consists of preparation of practical jobs and assessment by external and internal examiner.

4ME10 MACHINE DESIGN & DRAWING-I-LAB.

List of Practical's

Any Six of the following

1) Sectional views & missing views of objects
2) Development of surfaces
3) Intersection of Solids
4) Conventions for various components like bearing, gears, springs, key & key ways, threads, tap holes and materials, Surface roughness etc
5) Design & Drawing of cotter joint
6) Design & drawing of screw jack
7) Design & drawing of flywheel
8) Design & drawing of helical spring

Any one practical from the above list should be done using software.

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Content of the Compulsory Subject "Environmental Studies" are given on Page Nos.* ES-1 *to* ES-4 *i.e. at the end of this syllabus.