MATHEMATICS - III

Sub Code: P08MA31 **CIE Marks :** 50
Hrs/week: 04 **L:T:P: 4:0:0** **Exam Hrs:** 03
Lecture Hrs: 52 **SEE Marks:** 50

Unit – 1 FOURIER SERIES : Periodic functions – Euler's formula, Fourier series of even and odd functions. Fourier series of functions of arbitrary period. Half – range expansions. Complex Fourier series. Practical harmonic analysis. **07 Hrs**

Unit – 2 FOURIER TRANSFORMS : Infinite Fourier transforms. Fourier sine and Fourier cosine transforms, properties. Inverse Fourier transforms – Inverse Fourier sine & cosine transforms – problems. **05 Hrs**

Unit – 3 NUMERICAL METHODS: Finite differences**: –** Forward and backward differences. Gregory- Newton forward and backward interpolation formulae. Newton's divided difference formula, Lagrange's interpolation and inverse interpolation formulae – Numerical differentiation using Gregory- Newton forward and backward interpolation formulae (All formulae / rules without proof) - problems. **07Hrs**

Unit – 4 NUMERICAL INTEGRATION : Simpson's $(\frac{1}{3})^{rd}$ rule , Simpson's $(\frac{3}{8})^{th}$ rule and Weddle's rule (All rules without proof) - problems only. **Solutions of algebraic and transcendental equations** :Bisection method, Regula-falsi and Newton–Raphson methods with illustrative examples. **06 Hrs**

Unit – 5 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS(ODE'S) : Numerical solutions of ODE's of first order first degree – Introduction. Taylor's series method. Euler's and modified Euler's method. Runge - Kutta method of IV order – Milne's and Adam-Bashforth predictor & corrector methods (All formulae without proof)

07 Hrs

Unit – 6 DIFFERENCE EQUATIONS AND Z-TRANSFORMS : Difference equations- Basic definitions. Z-transforms–definition, standard Z- transforms, linearity property, damping rule, shifting rules. Initial value theorem and final value theorem. Inverse Z – transforms. Application of Z-transforms to solve difference equations. **07 Hrs**

Unit – 7 PARTIAL DIFFERENTIAL EQUATIONS(PDE's): Formation of PDE's. Solution of non homogeneous PDE by direct integration. Solutions of homogeneous PDE involving derivative with respect to one independent variable only (Both types with given set of conditions). Method of separation of variables(First and second order equations). Solution of the Lagrange's linear PDE's of the type form Pp + Qq = R. **07 Hrs**

Unit – 8 APPLICATIONS OF PDE's: One- dimensional wave and heat equation(No derivation). Various possible solutions of these by the method of separation of variables. D'Alembert's solution of wave equation. Two dimensional Laplace's equation (No derivation)– various possible solutions. Solution of all these equations with specified boundary conditions (Boundary value problems). Illustrative examples from engineering field.

06Hrs

Text Books

1. Higher Engineering Mathematics:- B.S. Grewal, Khanna Publishers, 40th Edition- 2007.2.
Engineering Mathematics:- by N.P.Bali and Manish Goyal, Laxmi Publications, 7th Edn., 2007.

Reference Books

1. Advanced Modern Engineering Mathematics:- Glyn James,Pearson Education, Ltd.,3rd Edition,2007.
2. Advanced Engineering Mathematics: - E. Kreyszig, John Wiley & Sons, 6th Ed.2007.
3. B.V.Ramana : Higher Engineering Mathematics, Tata McGraw Hill, New Delhi. 2nd Edition- 2006.

MATERIAL SCIENCE AND METALLURGY

Sub Code: P08ME 32		**CIE Marks :** 50
Hrs/week: 04	**L:T:P: 4:0:0**	**Exam Hrs:** 03
Lecture Hrs: 52		**SEE Marks:** 50

PART – A
MATERIAL SCIENCE

Unit – 1 STRUCTURE OF CRYSTALLINE SOLIDS : Fundamental concepts of unit cell, space lattice, Bravaias lattice (Simple Sketch of Planes & Directions), Unit cells for cubic structure and HCP, study of stacking of layers of atoms in cubic structures and HCP, Calculation of radius, co-ordination number and atomic packing factors for different cubic structures (Simple Numerical Problems). Crystal imperfections – point, line, surface and volume defects. Atomic diffusion: Diffusion Mechanisms, Fick's laws of diffusion, factors affecting diffusion, Applications of diffusion (Simple Problems). **07 Hrs**

Unit – 2 MECHANICAL PROPERTIES AND BEHAVIOR : Tensile test, properties obtained from tensile test, true stress and true strain(Numerical Problems), plastic deformation - slip and twinning, Hardness of materials - Brinell's, Rockwell's, Vicker's, hardness testing, strain rate effects and impact testing. **06 Hrs**

Unit – 3 FRACTURE: Ductile and brittle fracture, fracture mechanics and its importance, Griffith's criterion of brittle fracture (Simple Problems).

FATIGUE: Fatigue test, S-N curves, factors affecting fatigue life(Simple Problems).

CREEP: The creep curves, creep properties, stress relaxation, Mechanism of creep, creep resistant materials. **06 Hrs**

Unit – 4 ADVANCED MATERIALS: Composite materials – definition, classification, types of matrix materials & reinforcements, Derivation of rules of mixtures for Iso Stress and Iso Strain conditions (Simple Numerical Problems). Production of FRP's : Hand lay up techniques, spray up process, Filament winding process, production of MMC's, diffusion bonding, melt stirring process. Basic steps involved in powdered metallurgy techniques. Advantages and application of composite materials. **06 Hrs**

PART - B
METALLURGY

Unit – 5 SOLIDIFICATION AND PHASE DIAGRAMS: Mechanism of solidification, Homogenous and Heterogeneous nucleation, crystal growth, Phases and Phase diagram, solid solutions, Rules governing formation of solid solutions, Phase diagram- Basic terms, phase rule, cooling curves, construction of Phase diagrams, interpretation of equilibrium diagrams, Types of Phase diagrams, Lever rule, Numerical problems on phase diagrams. **08 Hrs**

Unit – 6 IRON CARBON EQUILIBRIUM DIAGRAM : Phases in the Fe-C system, invariant reactions, critical temperatures, Microstructures of slowly cooled steels, effect of allying elements on the Fe-C diagram, ferrite and austenite stabilizers. The TTT diagram, drawing of TTT diagram, TTT diagram for hypo & hyper eutectoid steels, effect of alloying elements on CCT diagram.

07 Hrs

Unit – 7 HEAT TREATMENT OF STEELS : Annealing and its types, normalizing, Hardening, tempering, martemering, austempering, surface hardening, like case hardening, carburizing, cyaniding, nitriding Induction hardening, hardenabilty, Jominy end-quench test, Age hardening of Al & Cu alloys, effect of alloying elements. **06 Hrs**

Unit – 8 ENGINEERING ALLOYS : Properties, composition and uses of low carbon, mild medium & high carbon steels. Steels designation & AISI –SAE designation. Cast irons, gray CI, white CI, malleable CI, SG iron. Microstructures of cast irons. The light alloys, Al, Mg & Titanium alloys. Copper & its alloys: brasses & bronzes. **06 Hrs**

TEXT BOOKS:

1. **"Materials Science and Engineering – an Introduction"**, Willian D. Callister Jr., Wiley India Pvt.Ltd. 6th Edition, 2006, New Dehli.
2. **"Essentials of Materials For Science and Engineering"**, Donald R. Askeland, Pradeep P.Phule Thomson-Engineering, 2006.

REFERENCE BOOKS:

1. "Foundations of Materials Science and Engineering" – Smith , 3rd Edition McGraw Hill,, 1997
2. "Physical Metallurgy, Principles & Practices", V. Raghavan , PHI 2nd Edition 2006, New Delhi.
3. "Introduction to material science for engineering", 6th edition james F. Shackel ford. Pearson, Prentice Hall, New Jersy, 2006
4. "An Introduction to Metalllurgy" – Alan Cottrell, University Press India, Oriental Longman Pvt. Ltd., 1974.
5. "Elements of Materials Science and Engineering" – H. Van vlack, Addison –Wesley Edn., 1998.
6. "Structure and Properties of Engineering Materials"- Jena and Murthy TMH,2003.

SCHEME FOR END SEMESTER EXAMINATION:

One question to be set from each unit. Students have to answer any FIVE full questions out of EIGHT questions, choosing at least 2 questions from part A and 2 questions from part B.

MECHANICS OF MATERIALS

Sub Code: P08ME 33 | **CIE Marks :** 50
Hrs/week: 04 | **L:T:P: 4:0:0** | **Exam Hrs:** 03
Lecture Hrs: 52 | **SEE Marks:** 50

PART - A

Unit 1: SIMPLE STRESSES AND STRAINS I: Introduction, Stress, types of stresses – tensile, compressive & shear, Strain (tensile, compressive & shear), Mechanical properties of materials, St. Venant's principle, Stress – Strain behaviour (nominal & true) of mild steel (elastic), cast iron (brittle), and non-ferrous materials, proof stress, Working stress & factor of safety, Hooke's law, Modulus of elasticity. Strain energy due to gradually applied load. Longitudinal strain, lateral strain, Poisson's ratio, Principle of super position, Stress-strain analysis of bars of uniform section, Stepped bars, bars with continuously varying section (rectangular and circular), Elongation due to self weight (circular & conical), **08 Hrs**

Unit 2: SIMPLE STRESSES AND STRAINS II: Stress analysis of composite sections, Thermal stresses in uniform and compound bars, Simple shear stress and shear strain, modulus of rigidity, Volumetric strain, expression for volumetric strain, Bulk modulus, relation among elastic constants. **06 Hrs**

Unit 3: COMPOUND STRESSES: Introduction, stresses on inclined planes/sections, Principal planes and stresses, planes of maximum shear stress, – (i) Uniaxial direct loading, (ii) Biaxial direct loading, (iii) General two dimensional system, Mohr's circle diagram. **06 Hrs**

Unit 4: THICK AND THIN CYLINDERS: Introduction, types of cylinders, Stresses in thin cylinders (Hoop's and longitudinal stress), changes in dimensions of cylinder (diameter, length and volume), Thick cylinders subjected to internal and external pressures (Lame's equation), (compound cylinders not included). **05 Hrs**

PART - B

Unit 5: SHEAR FORCE AND BENDING MOMENT DIAGRAMS IN STATICALLY DETERMINATE BEAMS: Introduction, Types of beams, loads and supports, shear forces and bending moments, sign conventions, relationship between load intensity, shear force and bending moments, shear force and bending moment diagrams for different beams subjected to concentrated loads, uniform distributed load (UDL), UVL & couple. **07 Hrs**

Unit 6: BENDING AND SHEAR STRESSES IN BEAMS: Introduction, theory of simple bending, assumptions in simple bending, relationship between bending stresses and radius of curvature, relationship between bending moment and radius of curvature, section modulus, moment carrying capacity/moment of resistance of a section, Bending stresses in beams of uniform section. Shearing stresses in beams, shear stress across rectangular, circular, I and T sections. (composite beams are not included). **07 Hrs**

Unit 7: DEFLECTION OF BEAMS: Introduction, Relation between slope, deflection and radius of curvature, Double integration method for cantilever and simply supported beams for point load, UDL, and Couple, Macaulay's method for simply supported beam with point load, UDL & couple. **07 Hrs**

Unit 8: TORSION OF CIRCULAR SHAFTS AND THEORY OF COLUMNS: Introduction to torsion, pure torsion, assumptions, derivation of torsional equations, polar modulus, torsional rigidity / stiffness of shafts, power transmitted by solid and hollow circular shafts. (Stepped shaft, composite shaft & tapered shaft not included.) Introduction to columns, Euler's theory for axially loaded elastic long columns, derivation of Euler's load for various end conditions, limitations of Euler's theory, Rankine's formula.

06 Hrs

TEXT BOOKS:

1. "Strength of Materials", S.S.Bhavikatti, Vikas publications House – Pvt. Ltd., 2nd Ed., 2006.
2. "Mechanics of Materials" by Dr.B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi. 2002
3. "Strength of Materials" by Dr.R.K.Bansal, Laxmi Publications, New Delhi.

REFERENCE BOOKS:

1. "Strength of Materials", W.A. Nash, Sehaum's Outline Series, Fourth Edition-2007.
2. "Mechanics of materials", Ferdinand P Beer, E Russell Johnston, JR., John T DeWolf adapted by N Shiva Prasad & S Krishnamurthy, Tata McGraw-Hill Publishing Company, New Delhi, Third Edition.
3. "Mechanics of Materials", James M. Gere, Stephen P. Timoshenko, CBS Publishers and Distributors, Delhi.
4. "Strength of Materials", S.S. Rattan, Tata McGraw-Hill Publishing Company, New Delhi.
5. "Strength of Materials", I.B.Prasad, Khanna Publishers, Delhi.

SCHEME FOR END SEMESTER EXAMINATION:

One question to be set from each unit. Students have to answer any FIVE full questions out of EIGHT questions, choosing at least 2 questions from part A and 2 questions from part B.

MANUFACTURING PROCESS – I

Sub Code: P08ME 34 **CIE Marks :** 50
Hrs/week: 04 **L:T:P: 4:0:0** **Exam Hrs:** 03
Lecture Hrs: 52 **SEE Marks:** 50

PART - A

Unit 1: INTRODUCTION: Concept of Manufacturing process, its importance, Classification of Manufacturing processes. Selection of a process for a production. **02 Hrs**

Unit 2: MELTING FURNACES: Classification of furnaces, Constructional features & working principle of Electric Arc Furnace, Cupola furnace**.** **05 Hrs**

Unit 3: CASTING PROCESS: Introduction to Casting process & steps involved, Varieties of components produced by casting process, Advantages & Limitations of casting process, **Patterns**: Definition, functions, Materials used for pattern, various pattern allowances and their importance. Classification of patterns. Binder: Definition, Types of binders used in moulding sand. Additives: need, types of additives used. **08 Hrs**

Unit 4: SAND MOULDING: Types of sand moulds, ingredients of mouldings and Properties, core sands, ingredients properties, Core making, Core baking – Dielectric baking of cores, Principles of Gating : Elements of gating system, types of gates, gating ratio, function of risers, types of risers – open and blind risers. Types of defects in Castings, Causes and remedies. **09 Hrs**

PART – B

Unit 5: SPECIAL MOULDING PROCESS : Study of important Moulding processes, Green sand, Core sand, CO2 moulding sand, Shell mould, Investment casting, permanent mould casting : Gravity die-casting, Pressure die casting, centrifugal casting, Squeeze Casting, Slush casting, Thixocasting and continuous casting processes. **08 Hrs**

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Unit 6: WELDING PROCESS: Arc Welding: Principle, Flux Shielded Metal Arc Welding (FSMAW), Inert Gas Welding (TIG & MIG) Submerged Arc Welding (SAW) and Atomic Hydrogen Welding processes (AHW). **07 Hrs**

Unit 7: SPECIAL TYPE OF WELDING: Resistance welding - principles, Seam welding, Thermit welding, Spot welding and projection welding. Friction welding, Explosive welding, Laser welding & Electron Beam Welding. **07 Hrs**

Unit 8: METALLURGICAL ASPECT IN WELDING: Structure of welds, Formation of different zones during welding, Heat affected zone (HAZ), Parameters affecting HAZ, Shrinkage in welds & Residual stresses. Weldability and Weldability testing, Welding defects – Detection causes & remedy. **06 Hrs**

TEXT BOOKS:

1. "Manufacturing & Technology: Foundry Forming and Welding", P.N.Rao 2nd Ed., Tata McGraw Hill, 2003.
2. "Manufacturing Process-I", Dr.K.Radhakrishna, Sapna Book House, 5th Ed, 2006.

REFERENCE BOOKS:

1. "Manufacturing Technology", Serope Kalpakjain, Steuen.R.Sechmid, Pearson Education Asia, 5th Ed. 2006.
2. "Process and Materials of Manufacturing:, Roy A Lindberg, 4th Ed. Pearson Edu. 2006.
3. Welding Technology by Little

SCHEME FOR END SEMESTER EXAMINATION:

One question to be set from each unit. Students have to answer any FIVE full questions out of EIGHT questions, choosing at least 2 questions from part A and 2 questions from part B.

BASIC THERMODYNAMICS

Sub Code : P08ME 35 | **CIE Marks :** 50
Hrs/week : 04 | **L:T:P: 4:0:0** | **Exam Hrs :** 03
Lecturer Hrs : 52 | **SEE Marks :** 50

PART-A

Unit 1: FUNDAMENTAL CONCEPTS & DEFINITIONS: Definition and scope of thermodynamics. Microscopic and Macroscopic approaches description of matter. Types of thermodynamic systems such as closed system, open system (control volume) and isolated System. Definition of thermodynamic property, intensive property and extensive property with examples. Thermodynamic state, path and process. Definition of thermodynamic equilibrium, quasi-static process, mechanical equilibrium, thermal equilibrium, and chemical equilibrium. Concept of equality of temperature, Zeroth law of thermodynamics, temperature scales, and its measurement, and numerical problems on the design of temperature scales. **06 Hrs**

Unit 2: WORK AND HEAT : Mechanics definition of work, thermodynamic definition of work with examples, its units and sign convention. Different types of thermodynamic process and process equation. Displacement work, expressions for displacement work in different thermodynamic processes. Definition of heat, its units and sign convention. Comparison between work with heat. Numerical problems on work and heat. **06 Hrs**

Unit 3: FIRST LAW OF THERMODYNAMICS: Equivalence of heat and work - Joule's experiment. Statement of the First law of thermodynamics for a closed system under going cyclic process. Energy as a property of the system. Numerical problems on closed system First law for an open System (control volume). Steady flow energy equation and its important applications. Numerical problems on steady flow thermodynamic systems. **07 Hrs**

Unit 4: PURE SUBSTANCES: Definition, Two property Rule, Pressure - Temperature and Temperature –Volume diagrams, triple point and critical points. Sub- cooled liquid, saturated liquid, mixture of saturated liquid and vapour, saturated vapour and superheated vapor, with water as example. Temperature-Enthalpy diagram, change of phase (Latent heat) and Dryness fraction (quality of steam). T-S and H-S diagrams for water and representation of various processes on these diagrams, Steam tables, Mollier chart and its use. Bucket Calorimeter, Separating calorimeter, Throttling calorimeter, combined separating and throttling calorimeter. **07 Hrs**

PART-B

Unit 5: SECOND LAW OF THERMODYNAMICS: Thermal reservoir. source and sink. Devices converting heat to work in a thermodynamic cycle, heat engine, heat pump and refrigerator, their: schematic representation, efficiency and coefficient of performance. Kelvin – Planck and Clausius statement of the Second law of thermodynamics and equivalence of the two Statements of second law. Definition of perpetual motion machines of I and II kind. Reversible and Irreversible processes, factors that make a process irreversible, reversible heat engine-Carnot Cycle and expression for efficiency of Carnot cycle. Simple numerical problems on heat engines and heat pumps. **07 Hrs**

Unit 6: ENTROPY: Clausius Inequality: Statement, proof and application to a reversible cycle. Entropy: Definition, entropy as a property of the system and principle of increase of entropy. Entropy as a quantitative test for irreversibility, isolated system and calculation of entropy changes for different thermodynamic process. Expression for entropy using T dS relations. Simple numerical problems. **06 Hrs**

Unit 7: AVAILABILITY AND IRREVERSIBILITY: Introduction, available and unavailable energy, Maximum work, maximum useful work for a system and a control volume, availability of a system, availability of a closed system, and availability of a steadily flowing stream, second law efficiency. Simple numerical problems. **06 Hrs**

Unit 8 : IDEAL GASES: Characteristic equation for gases, Ideal gas, equation of state, internal energy and enthalpy as functions of temperature only, universal and particular gas constants, specific heats, Evaluation of heat, work, change in internal energy, enthalpy and entropy in various quasi-static processes. Ideal gas mixture, Dalton's law of additive pressures, Amagat's law of additive volumes. **07 Hrs**

TEXT BOOKS

1. Introduction to Classical Thermodynamics by Van and Wylen
2. Engineering Thermodynamics by R K Rajput, Laxmi Publications Pvt Ltd

REFERENCE BOOKS

1. Engineering Thermodynamics by Spalding and Cole, ELBS edition.
2. Engineering Thermodynamics by Prakash and Gupt
3. Thermodynamics – An engineering approach by Yunus A. Cenegal Tata McGraw Hill

COMPUTER AIDED MACHINE DRAWING

Sub Code: P08ME 36 **CIE Marks :** 50
Hrs/week: 06 **L:T:P: 0:0:6** **Exam Hrs:** 03
Lecture Hrs: 52 **SEE Marks:** 50

Unit 1: INTRODUCTION : Review of graphic interface of the software. Review of basic sketching commands and navigational commands. Starting a new drawing sheet. Sheet size. Naming a drawing units, grid and snap. **02 Hrs**

PART – A

Unit 2: SECTIONS OF SOLIDS: Sections of Pyramids, Prisms, Cubes, Tetrahedrons, Cones and Cylinders resting only on their bases (No problems on, axis inclinations, spheres and hollow solids). True shape of sections.

Unit 3: ORTHOGRAPHIC VIEWS: Conversion of pictorial views into orthographic projections of simple machine parts with and without section. (Bureau of Indian standards conventions are to be followed for the drawings), Hidden line conventions, Precedence of lines, study of sectional views **08 Hrs**

Unit 4: THREAD FORMS: Thread terminology, sectional view of threads. ISO Metric (Internal & External), BSW (Internal & External), square and Acme threads, Butress thread, Sellers thread, American Standard thread.

Unit 5: FASTENERS: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly) simple assembly using stud bolts with nut and lock nut.

08 Hrs

PART –B

Unit 6: KEYS & JOINTS: Study of keys: Parallel key, Taper key, feather key, Gibhead key and Woodruff key

Unit 7: RIVETED JOINTS: single and double riveted lap joints, butt joints with single/double cover straps (chain and Zigzag, using snap head rivets).cotter joint (socket and spigot), knuckle joint (pin joint). **08 Hrs**

Unit 8: COUPLINGS AND BEARINGS:

Protected type flanged coupling, pin (bush) type flexible coupling. **08 Hrs**

PART – C

ASSEMBLY DRAWINGS

Unit 9: Assembly drawing of following machine parts (3D parts to be created and assemble and then getting 2D drawing with required views, including part drawing).

1. Screw Jack
2. I.C. Engine Connecting Rod
3. Machine Vice
4. Plummer Block
5. fuel Injector **18 Hrs**

TEXT BOOKS:

1. 'A Primer on Computer Aided Machine Drawing -2007'. Published by VTU, Belgaum.
2. Machine Drawing', N.D. Bhat & V.M.Panchal
3. 'Machine Drawing', N. Siddeshwar, P. Kannaiah, V.V.S. Sastri, published by Tata Mc. GrawHill, 2006

REFERENCE BOOKS.

1. 'Machine Drawing', K.R. Gopala Krishna, Subhash Publication.
2. 'Machine Drawing with Auto CAD', Goutam Pohit & Goutham Ghosh, 1st Indian print Pearson Education, 2005
3. 'Auto CAD 2006, for engineers and designers'. Sham Tickoo. Dream tech 2005

SCHEME FOR END SEMESTER EXAMINATION:

Two question to be set from each Part - A, Part – B, Part – C students has to answer one question each from Part- A and Part – B for 30 marks each and one question from Part –C for 40 marks.

METALLOGRAPHY AND MATERIAL TESTING LABORATORY

Sub Code: P08ME 37 **CIE Marks :** 50
Hrs/week: 03 **L:T:P: 0:0:3** **Exam Hrs:** 03
Lecture Hrs: 42 **SEE Marks:** 50

PART – A

1. Tensile, Compression, Shear and Torsion tests on mild steel specimens using a Universal Testing Machine
2. Bending Test on mild steel, wooden specimens.
3. Preparation of specimen for metallographic examination of different engineering Materials, Identification of microstructures of plain carbon steel, tool steel, grey C.I, SG iron, Brass, Bronze & composites.
4. Heat treatment: Annealing, Normalizing, Hardening and Tempering of Ferrous alloys and study their Rock well's hardness.

PART- B

5. Impact Tests: Izod and Charpy tests on mild steel specimens.
6. Hardness tests: Brinell, Rockwell and Vickers's Hardness tests.
7. To study the wear characteristics of ferrous / non-ferrous / composite materials for some specific parameters (Demonstration only).
8. Non-destructive test experiments (Demonstration only)
   (a). Ultrasonic flaw detection , Magnetic crack detection
   (b). Dye penetration testing to study the defects of Casted and welded specimens
9. Fatigue Test (Demonstration only)
10. Experiment on Wear Study

SCHEME OF EXAMINATION:

One Question from Part -A	:	20 Marks
One Question from Part – B	:	20 Marks
Viva – Voice	:	10 Marks
Total		**50 Marks**

FOUNDRY AND FORGING LABORATORY

Sub Code: P08ME 38 | **CIE Marks :** 50
Hrs/week: 03 | **L:T:P: 0:0:3** | **Exam Hrs:** 03
Lecture Hrs: 42 | **SEE Marks:** 50

PART – A (Minor)

1). TESTING OF MOULDING AND CORE SANDS: Preparation of specimen and conduction of the following tests:

- Compression, Shear and Tensile tests
- Permeability test
- Core hardness and Mould hardness tests
- Grain fineness test
- Clay content test
- Moisture content test

PART – B (Major)

2). FOUNDRY PRACTICE:

a) Use of foundry tools and other equipments.

b) Preparation of moulds (ready to pour) using two boxes, use of solid pattern, split pattern, match plate pattern and cores.

c) Preparation of one casting, Aluminium or cast iron (demonstration only)

3). FORGING MODELS:

a) Use of forging tools and other equipments.

b) Preparing minimum three models involving upsetting, drawing and bending operations, length / volume calculations. (One model to be prepared by using Power Hammer).

SCHEME OF EXAMINATION:

One Question from Part -A	:	10 Marks
One Question from Part – B	:	30 Marks
Viva – Voice	:	10 Marks
Total		**50 Marks**