DESIGN OF MACHINE ELEMENTS - II

Contact Hours/ Week	: 04	Credits :	04
Total Lecture Hours	: 52	CIE Marks :	50
Sub. Code	: ME64	SEE Marks :	100

Module-I

Curved Beams: Comparision of straight and curved beams, loads and stresses in curved beams of standard cross sections in hooks, punching press and C- clamps. Closed rings and links and solution to problems Brakes and clutches, Design of Brakes, Block and Band brakes, internal expanding brakes. Design of cluthes, single plate, Multiplate and cone clutches and solution to problems.

Module-II

SPRINGS : Types of springs and their functions, stresses in helical coil compression and extension springs of circular and non circular cross section wire. Fluctuating loads in springs, Energy stored in springs, leaf springs : stresses in leaf springs, equalized stresses and solution to problems.

Module-III

GEARS: Spur gears: Terminology, stresses in gear tooth, Lewis equation and form factor. Design for strength, Dynamic load and Wear load. Helical gears: Terminology, Formative number of teeth, Design for strength , Dynamic and Wear loads, and solution to problems.

Module-IV

BEVEL gears: Terminology, Formative number of teeth, Design for Strength, Dynamic and Wear loads. Worm Gears: Terminology, design for strength, dynamic and wear loads. Efficiency and heat balancing in worm gears, and solution to problems.

Module-V

LUBRICATION & BEARINGS: Lubricants and their properties, Bearing characteristics Number, Bearing modulus, Heat balancing, Minimum oil film thickness, Journal bearing design.
Antifriction bearings: Ball and Roller bearings, Rating Life, Selection of bearings from SKF and Fag catalogues.

Design Data Handbooks:

1	Design Data Handbook	K. Lingaiah, McGraw Hill 1984, Vol.1 & Vol. 2
2	Design Data Handbook	K. Mahadevan and Balaveera Reddy CBS publication.

TEXT BOOKS

1	Mechanical Engineering Design -Joseph E Shigley and Charles R. Mischke, McGraw Hill International Edition, 6th edition 2003.
2	Design of Machine Elements -V.B. Bhandari, Tata McGraw Hill Publishing Company Ltd. New Delhi, 2nd edition 2007

REFERENCE BOOKS

1	Design of Machine Elements: M.F. Spotts, T.E Shoup, L.E. Hornberger, S.R. Jayaram and C.V. Venkatesh, Pearson Education 2006.
2	Machine Design: Hall, Holowenko and Laughlir(Schaum's outline series adapted by S.K. Somani TATA McGraw Hill Publishing Company Ltd. New Delhi, Special Indian Edition 2008.
3	Design of Machine Elements by Maleev and Hartman.

FINITE ELEMENT METHODS

Contact Hours/ Week	: 04	Credits :	04
Total Lecture Hours	: 52	CIE Marks :	50
Sub. Code	: ME65	SEE Marks :	100

Module-I

Introduction to FEM & basics of theory of elasticity: Need for use of FEM- Advantages and Disadvantages of FEM Matrix algebra – Terminologies relating to matrices, Methods of solution of linear algebraic equations. Eigen values and eigen vectors, Simple numeric Gaussian Quadrature- 1 pt, 2pt and 3pt formula. Definition of stress and strain, stress- strain relation; strain displacement Relations in 2-D and 3-D.

8 hrs

Module-II

One Dimensional FEA: Definitions, displacement method Nodal degrees of freedom, different coordinate systems, Shape functions - Lagrangian polynomial. Formulation of bar. Methods of handling boundary conditions - elimination method - penalty method. Simple numerical. Iso parametric – sub parametric – super parametric elements. Direct stiffness method.

8 hrs

Module-III

Higher order elements, trusses and Beams: Convergence criteria – requirements of convergence (no proof). Higher order bar element, Pascal triangle. Plane trusses, Simple numerical on trusses, Introduction to beams, Formulation and Simple numerical.

8 hrs

Module-IV

Axi-symmetric, two and three elements: Formulation of triangular – quadrilateral elements. Higher order elements in triangular - quadrilateral elements, Method of reducing band-width of stiffness matrix , Axi-symmetric elements and formulation (Tetrahedral and hexahedral elements no Formulation).

8 hrs

Module-V

Dynamic consideration, steady state heat transfer and commercial FE package: Application of Dynamic analysis, formulation, element mass matrices for ID element, computation of eigen value and vector for simple one Dimensional analysis. One-dimensional steady state heat conduction, Structure of a commercial FE packages, Mesh generation, Preprocessor – Solver - Post processor.

8 hrs

TEXT BOOK

1	Introduction to Finite elements in Engineering by Chandrupatla and Belegundu- Pearson education, 2002.

REFERENCE BOOKS

	J.N.Reddy-Finite Element Method Tata Mc Graw Hill edition 2002.
1	Optimization concepts and application in engineering Chandrupatla and Belegundu-

	Pearson education, 2002
2	A First Course in Finite Element methods by Daryl .L.Longman, Thomson Learning 3rd edi., 2001
3	Fundamentals of Finite Element method by Hutton – Mc Graw Hill , 2004.
4	Concepts and application of FEA by Robert Cook et.al –John wiley and sons, 2002.

Metal Forming Processes

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 39	CIE Marks :	50
Sub. Code	: ME621	SEE Marks :	100

Module-I

Metal Forming: Classification, Systamatic approach to metal forming, Classification based on temperature of deformation, Microstructural changes during hot working, Flow curves, Relationship between true strain and engineering strain, Relationship between true stress and engineering stress, Flow stress determination, Different methods for determining flow curve (using tension test, compression test, Plane strain compression, Torsion test), Ideal flow curves, Effect of strain rate on flow curve, Strain rate sensitivity, Effect of temperature on flow stress, Zener-Holloman parameter. 8 hrs

Module -II

Extrusion: Classification, Strain in extrusion, Metal flow in extrusion, Analysis of extrusion pressures, Extrusion pressure based on uniform work of deformation, Detailed analysis of extrusion pressure using slab method, Effect of principal variables on extrusion pressure. 7 hrs

Module-III

Forging: Classification, Slab analysis of forging pressure for upsetting a disc, Forging in plane strain, Forging parameters, Defects in forging.

Rolling: Classification, Forces and geometrical relationships in rolling, Analysis of rolling pressure and rolling load, Effect of front and back tensions on the sheet during rolling, Elastic curve for a rolling mill, Von Karman or Orowan equations, Defects in rolled products. 8 hrs

Module-IV

Drawing: Classification, typical design of drawing die, Analysis of drawing stress, uniform deformation energy method, slab analysis, force analysis, Limit of drawability for steady state wire drawing, Methods of tube drawing. 8 hrs

Module-V

Sheet Metal Forming: Classification, Strain involved in bending, Stretch forming, Deep drawing, Sach's equation, Limiting drawing ratio, Metallurgical factors considered to increase drawability, Re-drawing, Forming limit criteria, Keeler Goodwin diagram, Defects in deep drawing. 8 hrs

TEXT BOOK

1	Mechanical Metallurgy	by G.E.Dieter, Mc Graw Hill Publications (2001).

REFERENCE BOOK

1	Principles of Industrial Metal Working Process, by G.W.Rowe, C B S Publications (2002).
2	Materials and Processes, by E.Paul, Degramo,J.T, Black, Ronald,A.K, Prentice Hall Publications (2002).

Total Quality Management

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 39	CIE Marks :	50
Sub. Code	: ME622	SEE Marks :	100

Module-I

Introduction-World scenario, National issues, Quality education, Effectiveness vs. efficiency, Drivers of Quality.

Principles of TQM-Definition Of Quality, Internal & External Customers, Vision & Mission Statements, Objectives, Goals,, Targets, Action plans, Philosophies of Quality Gurus, Ten Principles of Quality Management.

TQM Philosophy-Evolution of TQM, Defining TQM, Preparing for TQM, Stages in TQM Implementation, TQM models.

Quality Planning-SWOT Analysis ,Strategic planning, Organizational culture. 8 hrs

Module -II

Customer Orientation-Customer Focus, Customer satisfaction model Quality Function Deployment(QFD),Customer Satisfaction Measurement,

Problem Solving Tools-Problem Solving Process, Seven QC Tools, Seven Management tools, case studies. 8 hrs

Module-III

Continuous Improvement Strategies-Deming Wheel, Zero Defect Concept, Benchmarking, Six sigma.

Preventive Techniques-Failure Mode Effect Analysis, Poke Yoke.

Quality Ambience- Five S for Quality Ambience, Time Management. 8 hrs

Module-IV

Leadership-Top Management Commitment, Leadership for TQM, Change Management, Motivational Strategies, Quality Circle Philosophy.

Team Development-Synergy, Team Building, Types of Teams, Characteristics of Successful Teams, Team Members Roles, Effective Team Meetings, Common Team Problems. 8 hrs

Module-V

Quality Certification-ISO 9000 series Certification ISO 9001: 2000 Certification, ISO 14000 Series Certification, Quality auditing, Quality Awards.

TQM Road Map: Measurement of Quality, TQM Road Map, TQM Implementation Strategy, When TQM Fails. 8 hrs

TEXT BOOK

1	.L Suganthi & Anand	"Total Quality Management" PHI-2004.

REFERENCE BOOKS

1	Dale H Besterfield	"Total Quality Management" Pearson Education,3rd Edition.
2	Poornima M Charanthimath	"Total Quality Management" " Pearson Education.
3	N. Logathetis	Total Quality management.

NON-DESTRUCTIVE TESTING

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 40	CIE Marks :	50
Sub. Code	: MEE623	SEE Marks :	100

Module-I

Introduction: Need for Inspection, Types of inspection Techniques, Benefits of Non-destructive examination, selection of NDT methods, Reliability in NDT.
Visual Examination: Defects in Materials, Basic Principles, Defects detected by unaided eye, optical aids used for visual inspection. 7 hrs

Module-II

Liquid Dye Penetrant Inspection (LPI): Introduction, Principles, Characteristics of penetrants, Inspection Procedure, Penetrant testing materials and methods, Applications and Limitations. **Magnetic Particle Inspection (MPI):** Basic definitions and principles, Magnetization methods, Procedure, continuous and residual methods, sensitivities, demagnetization, Magnetic Particles, Applications, Advantages and Limitations. **Eddy Current Testing (ECT):** Introduction and principles, Instrumentation for ECT, Techniques of ECT, sensitivity, Applications and Limitations. 9 hrs

Module-III

Radiography: Introduction, Uses and limitations of radiography, Basic Principles, Electromagnetic Radiation Sources, Production of X-rays, X-ray Spectra, γ-radiation sources, Attenuation of radiation, Effect of radiation in the film, Radiographic imaging, Inspection Techniques (Single wall single image, Double wall penetration, latitude and special) Applications, Viewing and interpretation of radiographs, Radiation hazard, Protection against radiation. 8 hrs

Module-IV

Ultrasonic Testing (UT): Introduction, Nature of sound, Wave velocity & length, Generation of Ultra sound, Characteristics of Ultrasonic Beam, Sound waves at Interfaces, Sound attenuation, display systems, Types of Display, Inspection methods, Defect identification, Immersion testing, sensitivity, surface condition and some applications.

8 hrs

Module-V

Other NDT Methods: Insitu-Metallographic Examination, Accoustic Emission Testing (AET), Leak testing, Neutron radiography, Laser induced ultrasonics, Thermography, Surface texture analysis. 8 hrs

TEXT BOOKS

1	Barry Hull and Veron John "Non-Destructive Testing" ELBS Edition 1989.
2	Metals hand book, V 01-17, 9U1 Edition "Non destructive evaluation & quality control" American society of metals. 2001.
3	Handbooks of American Society for Non destructive testing.2002.

REFERENCE BOOKS

1	Baldev Raj, T. Jayakumar and M. Thavasimuthu – Practical Non Destructive Testing, Narosa Publishers.
2	J. Prasad and C. G. Krishnadas Nair –Non-Destructive test and Evaluation of Materials, Tata Mc Graw Hill, 2008.

MAINTENANCE ENGINEERING

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 39	CIE Marks :	50
Sub. Code	: MEE624	SEE Marks :	100

Module-I

Introduction to Maintenance Systems:

Definition, Scope, Objective, Functions of maintenance department, maintenance system, Break down maintenance system, Preventive maintenance, Predictive maintenance, design out maintenance, corrective maintenance, Planned maintenance, total productive maintenance.

10 Hrs

Module-II

Economics in Maintenance:

Repair and repair cycle, Repair complexity, optimal overhaul / repair / replacement policy, optimal inspection frequency. Numerical problems.

08 Hrs

Module-III

Maintenance of Machinery:

Causes of machine failure, performance evaluation, complete overhauling of Machines tools.

Maintenance planning and scheduling:

Maintenance planning, Maintenance scheduling, Maintenance job analysis, spare parts control.

12 Hrs

Module-IV

Industrial Safety:

Economic importance of accidents, Types of safety organizations, Analysis of accident records, accident investigations, Analysis of accidents, Safety standards for Mechanical equipment. Electrical equipment and systems. Chemical hazards, material handling, exhaust systems, welding, Plant housekeeping-building, Aisles, passages, floors, tool cribs, washrooms, canteens.

10 Hrs

Module-V

Computers in maintenance:

Features and benefits of Computer aided maintenance. Application of computers to maintenance work.

Industrial Pollution Control:

Dust control- Fibre collectors, mechanical dust collectors, wet type collectors, Electro static precipitators, Noise pollution Control- Noise measurement and control. Industrial vibration and its control.

12 Hrs

TEXT BOOK

1	Maintenance Engineering and Management by R.C.Mishra and K.Pathak, Prentice Hall of India, 2002.
2	Maintenance and Safety Engineering by C.M.Ramesha, 2002.

REFERENCE BOOK

1	Industrial Maintenance by H.P.Garg, 2003.
2	Maintenance Engineering Hand book by Lindrey Higgins, Mc Graw Hill, 6th edition, 2003

GAS DYNAMICS

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 40	CIE Marks :	50
Sub. Code	: ME631	SEE Marks :	100

Module-I

The Energy Equation

Energy equation for a non-flow process, flow process, The adiabatic energy equation, Stagnation velocity of sound, Stagnation Pressure, Stagnation density, Stagnation state, Various regions of flow, Reference velocities, Bernoulli equation, Effect of Mach number on compressibility. 7 hrs

Module-II

Isentropic Flow with Variable Area

Comparison of isentropic and adiabatic processes, Mach number variation, Stagnation and Critical States, Area ratio as function of Mach number, Impulse function, Mass flow rate, Flow through nozzles, Flow through diffusers

Flow in constant Area Ducts with Friction

The Fanno Curves, Variation of flow properties, Variation of flow Mach number with duct length, Isothermal flow with friction. 9 hrs

Module-III

Gas-turbine types

Introduction, gas turbine engine and its components, classification according to application, cycle, and fuel, combined steam and gas turbine power plants, some advantages of gas turbine.

Design of Nozzles

Introduction, construction, critical pressure ratios, losses, divergence and position angles, wet and super saturated steam, shock waves in nozzles, discharge coefficients, and nozzle calculations. 8 hrs

Module-IV

Gas dynamics

Compressibility effect, steady 1D compressible flow, perfect gas flow in a duct, isentropic flow with friction, normal and oblique shock waves, isentropic 2D, supersonic expansion and compression.

8 hrs

Module-V

Combustion Systems

Operational requirements, Types of combustion system, some important factors affecting combustion, The combustion process, Combustion chamber performance. Gas Turbine emissions.

8 hrs

TEXT BOOKS:

1	Gas Dyamics by S.M Yahya
2	Gas Turbine Theory by HIH Saravana muttoo, GFC Rogers,H Cohen 5th Edition, Pearson Education.

REFERENCE BOOKS:

1	J.F.Lee Theory and design of steam and gas turbine MGH, 1954
2	Cohen and Rogers, Gas Turbine Theory Langmans, London, 1965.

ADVANCED FOUNDRY TECHNOLOGY

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 40	CIE Marks :	50
Sub. Code	: ME632	SEE Marks :	100

Module-I

Design of Castings: Casting Design Considerations, Steps involved in designing a new casting, Classification foundry Metals and alloys, Foundry Characteristics of Cast Iron, Steel, Aluminium and Copper and its alloys, Introduction to Melting furnaces (Induction and Resistance) 8 hrs

Module-II

Patterns and Cores: Introduction to patterns and cores, Pattern making, Pattern requirements, Pattern Materials, Machines and tools for pattern making, Various Pattern allowances, Pattern construction and Pattern layout, Types of pattern, Cores, Purpose of core, steps in making core, Different types of cores and Core Prints. 8 hrs

Module-III

Solidifcation: Nucleation, homogeneous and heterogeneous nucleation, Growth, fundamental aspects of growth, dendritic growth, Significance and Practical control of cast grain structure, grain size, shape and orientation, Grain refinement and modification, concept of progressive and directional solidification, Solidification time and Chvorinov,s equation. 8 hrs

Module-IV

Risering and Gating of castings: Reason for Risering, Requirements of a riser, Riser size and directional solidification, Riser location and Directional solidification. Methods used in Practice for controlling Solidification like Insulation, Internal chills and chaplets, External chills, Padding, Riser shape size and contact area, Location of risers, Gating system, Types of gates. 8 hrs

Module-V

Defects in castings and Mechanization of Foundry : Defects in castings, Inspection and testing of castings, Modernization and mechanization in foundries, Need for modernization, Areas of mechanization. 8 hrs

TEXT BOOKS

1	Foundry Engineering by H. F. Taylor, M. C. Flemings and John Wulf, Chapman and Hall Limited.
2	Foundry Technology, by O.P. Khanna- Dhanpat Rai Publications,

REFERENCE BOOKS

1	ASME Hand book, Metal Casting, 2002.
2	Richard W. Heine, Principles of metal casting, Tata Mc Graw Hill, 1996.
3	P. C. Mukharjee, Metal casting Technology, 2002.
4	B. Chalmers, Principles of solidification, Mc Graw Hill, 2001.
5	Taylor et. Al, Foundry Engineering, Wiley Eastern, 1993.
6	Foundry Engineering, Peter Beley, Buttersworth Publications.

PROJECT MANAGEMENT

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 40	CIE Marks :	50
Sub. Code	: MEE633	SEE Marks :	100

UNIT 1

1. **CONCEPTS OF PROJECT MANAGEMENT:**
Concepts of a Project, Categories of projects, Phases of project life cycle, Roles and responsibilities of project manager, tools and techniques for project management.

ESTABLISHING THE PROJECT: SCOPE, TIME, COST & PERFORMANCE GOALS:
Feasibility Report, Financing Arrangements, phased planning, Project planning steps; Objectives and goals of the project, finalisation of project implementation schedule, preparation of cost estimates, Evaluation of the project profitability.

10 Hrs

UNIT 2

2. **ORGANISING HUMAN RESOURCES AND CONTRACTING:**
Delegation, project manager's authority, project organisation,accountability in project execution, contracts,3R's of contracting, tendering and selection of contractor, team building.

04 Hrs

UNIT 3

3. **PROJECT SCHEDULING,TOOLS & TECHNIQUES OF PROJECT MANAGEMENT:**
Project implementation scheduling, effective time management, different scheduling techniques, resource allocation methods, Bar (GAMTT) chart, bar chart for combined activities, logic diagrams and networks, Project evaluation and review Techniques (PERT).

15Hrs

UNIT 4

4. **PROJECT DIRECTION, CO-ORDINATION AND CONTROL:**
Project direction, communication in a project, project co-ordination, project control scope/progress control, performance control, schedule control, Cost control.

05Hrs

UNIT 5

5 PROJECT MANAGEMENT PERFORMANCE:
Performance indicators, Performance improvement-Do-it-Yourself trap, the CM & DM companies for better project management, Project management environment

05Hrs

SUGGESTED TEXT:

1. Project Management a System approach to Planning Scheduling & Controlling, Harold Kerzner, CBS Publishers and Distributors.
2. Project planning, Scheduling & control, James p, Lewis, Meo Publishing company.
3. Chadhury S, Project Execution Plan; plan for project Execution interaction.

REFERENCES:

1. Project Management - Beningston Lawrence - McGraw Hill -1970.
2. A Management Guide to PERT and CPM, WEIST & LEVY, Eastern Economy of PHI.
3. PERT & CPM -L.S. Srinath, Affiliated East West Press Pvt. Ltd.

THEORY OF IC ENGINES

Contact Hours/ Week	: 03	Credits :	03
Total Lecture Hours	: 40	CIE Marks :	50
Sub. Code	: ME634	SEE Marks :	100

Module-I

Introduction to IC Engines:

Heat Engines, Development of IC engines, Modern IC engines, Classification of IC engines, Engine Structure and its components, Engine Nomenclature, Working, Application of IC engines, Thermodynamic analysis of IC engines Problems.

6 Hrs

Working of IC engines:

Actual working of 4-stroke Petrol, Diesel, and Gas engines and valve timing diagrams, Actual working of 2-stroke petrol, Diesel, and Gas engines and the corresponding port timing diagram, comparison of SI and CI engines, Engine power and efficiencies. Problems.

8 Hrs

Module -II

Fuel-Air Cycles and their Analysis:

Introduction to Fuel-air cycles, Factors affecting Air-standard cycles, Comparison of Air-standard and Fuel-Air cycles, Effect of operating variables on cycle analysis, Gas tables and its use in cycle analysis, Use of combustion charts in cycle analysis, Difference between Actual cycle and Fuel-Air cycle, Actual and Fuel-Air cycles for SI and CI engines. Problems.

12 Hrs

Module-III

Combustion in SI and CI Engines :

Stages of Combustion, Delay period or Ignition lag and factors affecting the lag, Flame propagation and factors affecting it, Abnormal combustion and knocking in SI engines, factors affecting knock, its effect, and control, Knock measurement, its rating and Anti knock agents, Detonation, factors affecting, and controlling of detonation in CI engines, Rating of CI engine fuels, Comparison of knocking in SI and CI engines, Combustion chambers for SI and CI engines 12 Hrs

Module-IV

Non-Conventional IC Engines :

Dual and multi fuel engines, stratified charged engines, Adiabatic engines, Variable compression ratio engines, Free piston engines, Stirling engines, Wankel rotary engines.

6 Hrs

Future Fuels for IC Engines:

Alcohol, Hydrogen, Biogas, Producer gas, LPG and CNG, Coal gas, Vegetable oils, Ammonia, Pros and cons of Alternative fuels.

6 Hrs

Air-Pollution from IC Engines :

Emissions of SI and CI engines, Effects of pollution, Pollution measurement, Emission controls, Noise pollution and its control, Green House effect. 6 Hrs

TEXT BOOK

1	A Course in Internal Combustion Engines by Domkundwar & Domkundwar, Dhanpat Rai & Co. (P) Ltd.

REFERENCE BOOKS

1	A Course in Internal Combustion Engines, by Mathur and Sharma, Dhanpat Rai & Co. (P) Ltd.
2	Thermal Engineering by R.K.Rajput, Laxmi Publications.
3	IC Engines by Edward F. Obert, Harper International edition, 1973
4	Internal Combustion Engines by Colin R. Ferguson, C. John Wiley & Sons, 1986.

ENERGY LABORATORY

Lab Hours/ Week	: 03	Credits :	1.5
Sub. Code	: MEL61	CIE Marks :	50
		SEE Marks :	50

PART – A

1. Determination of Flash point and Fire point of lubricating oil using Abel Pensky and Martin (closed) / Cleavland (Open Cup) Apparatus.
2. Determination of Calorific value of solid, liquid and gaseous fuels.
3. Determination of Viscosity of a lubricating oil using Redwoods, Saybolts and Torsion Viscometers.
4. Valve Timing/port opening diagram of an I.C. engine (4 stroke/2 stroke).
5. Use of planimeter

21 Hours

PART - B

1. Performance Tests on I.C. Engines, Calculations of IP, BP, Thermal efficiencies, SFC, FP, heat balance sheet for
(a) Four stroke Diesel Engine
(b) Four stroke Petrol Engine
(c) Multi Cylinder Diesel/Petrol Engine, (Morse test)
(d) Two stroke Petrol Engine
(e) Variable Compression Ratio I.C. Engine.

21 Hours

Scheme for Examination:

One Question from Part A - 15 Marks (05 Writeup+10)
One Question from Part B - 25 Marks (05 Writeup+20)
Viva-Voce - 10 Marks

Total 50 Marks

COMPUTER AIDED MODELING AND ANALYSIS LABORATORY

Lab Hours/ Week	: 03	Credits :	1.5
Sub. Code	: MEL62	CIE Marks :	50
		SEE Marks :	50

Part - A

Study of a FEA package and modeling stress analysis of

a) Bars of constant cross section area, tapered cross section area and stepped bar

6 Hours

b) Trusses – (Minimum 2 exercises)

3 Hours

c) Beams – Simply supported, cantilever, beams with UDL, beams with varying load etc (Minimum 6 exercises)

12 Hours

Part - B

a) Stress analysis of a rectangular plate with a circular hole

3 Hours

b) Thermal Analysis – 2D problem with conduction and convection boundary conditions(Minimum 2 exercises)

6 Hours

c) Fluid flow Analysis – Potential distribution in the 2 – D bodies

3 Hours

d) Dynamic Analysis

1) Fixed – fixed beam for natural frequency determination

2) Bar subjected to forcing function

3) Fixed – fixed beam subjected to forcing function

9 Hours

REFERENCE BOOK

1	**A first course in the Finite element method** by Daryl L Logan, Thomason, Third Edition
2	**Fundaments of FEM** by Hutton – McGraw Hill, 2004.
3	**Finite Element Analysis** by George R. Buchanan, Schaum Series.

SCHEME OF EXAMINATION

One question from Part-A : 20Marks (05 Write up +15)

One question Part-B : 20Marks (05 Write up +15)

Viva : 10 marks

Total : 50 Marks