B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
COMPUTER AIDED DESIGN
ME-361

L	T	P	Cr		
3	1	-	4	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Introduction: Introduction to CAD/CAM, Historical Development, Industrial look at CAD/CAM, Introduction to CIM Basic of Geometric & Solid modeling, Coordinate systems, Explict, Implict, Intrinsic and parametric equation

Part families, Part classification and coding, product flow analysis, Introduction to Group Technology (GT)

UNIT II

Transformations: Transformation of points & line, Introduction to 2-D rotation, Translation Reflection, Scaling, Shearing and combined transformation, Homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations.

Projections: Orthographic, parallel, axonometric and perspective projections

UNIT III

Curves: Algebraic and geometric forms, tangent & twist vectors, conics, cubic splines, Bezier curves and B-spline curves sixteen point form, four Curve form, Plane surface, ruled surface

Surfaces: Surface of revolution, tabulated cylinder Bi-cubic surface, Beizer surface, B-spline surface, Solid models and representation scheme B-rep & CSG, sweep representation

UNIT IV

Numerically controlled systems: Introduction, NC, CNC, DNC, Elements of NC systems, Open loop & Closed loop, Co-ordinate system, Conventional machine axis, XYZ zero setting.

Part programming: NC manual part programming, G & M codes, Exercise for manual part program for simple parts, Computer assisted part programming.

Tooling for CNC machine ,Automatic tool changer ,Sensors for feedback system ,APT Geometry for point line , Introduction to AGV

Text and Reference Books:

1. CAD/CAM by M.P. Groover, PHI
2. CAD/CAM Theory and Practice, Ibrahim Zeid
3. Computer Aided Manufacturing, P.N. Rao.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
REFRIGERATION AND AIR CONDITIONING
ME-362

L	T	P	Cr		
3	1	-	4	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Refrigeration

Basics of refrigeration: Basics of heat pump & refrigerator, Carnot's refrigeration and heat pump, Units of refrigeration, COP of refrigeration and heat pump, Carnot's COP, ICE refrigeration, evaporative refrigeration.
Refrigerants: Nomenclature of refrigerants, desirable properties of refrigerants.
Air refrigeration: Basic principles of operation of air refrigeration system, Bell-Coleman air refrigerator, advantages of using air-refrigeration in aircrafts, disadvantages of air refrigeration in comparison to other cold producing methods, simple air refrigeration in air craft, simple evaporative type air refrigeration in aircraft, necessity of cooling the aircraft.

UNIT II

Vapor Compression refrigeration systems: Simple Vapor Compression Refrigeration System, different compression processes (wet compression, dry or dry and saturated compression, superheated compression), Limitations of vapour compression refrigeration system if used on reverse Carnot cycle, representation of theoretical and actual cycle on T-S and P-H charts, effects of operating conditions on the performance of the system, advantages of vapour compression system over air refrigeration system.
Vapor Absorption refrigeration systems: Basic absorption system, COP and Maximum COP of the absorption system, actual NH_3- H_2O absorption system, functions of various components, Li-Br absorption system, selection of refrigerant and absorbent pair in vapour absorption system, Electrolux refrigerator, Comparison of Vapour and Absorption refrigeration systems,

Air conditioning

UNIT III

Psychrometry: Difference in refrigeration and air conditioning, Psychometric properties of moist air (wet bulb, dry bulb, dew point temperature, relative and specific humidity of moist air, temperature of adiabatic saturation), empirical relation to calculate p_v in moist air.
Psychometric chart, construction and use, mixing of two air streams, sensible heating and cooling, latent heating and cooling, humidification and dehumidification, cooling with dehumidification, cooling with adiabatic humidification, heating and humidification, by-pass factor of coil, sensible heat factor, ADP of cooing coil, Air washer.
Air conditioning: Classification, Factors affecting air conditioning systems, comfort air-conditioning system, winter air conditioning system, summer air-conditioning system, unitary air-conditioning system, central air conditioning system, Split AC, Window AC, Room sensible heat factor, Grand sensible heat factor, effective room sensible heat factor.

UNIT IV

Cooling load estimation: Inside design conditions, comfort conditions, components of cooling loads, internal heat gains from (occupancy, lighting, appliances, product and processes), system heat gain (supply air duct, A.C. fan, return air duct), external heat gain (heat gain through building, solar heat gains through outside walls and roofs), solar temperature, solar heat gain through glass areas, heat gain due to ventilation and infiltration.
Advanced refrigeration and air conditioning systems:
Cryogenics: Introduction to cryogenics, Cascade Refrigeration System, Applications
Steam Jet Refrigeration Systems: Introduction, Working Principle, Advantages, Disadvantages, Applications
Textbooks:

1. Refrigeration and air conditioning – C. P. Arora,
2. Refrigeration and air conditioning – R. K. Rajput

Reference books:

1. Refrigeration and air conditioning – P. L. Ballaney
2. Refrigeration and air conditioning – Domkundwar

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
MECHANICAL VIBRATION
ME-363

L	T	P	Cr		
3	1	-	4	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Introduction: Vibration Terminology**,** Kinematics of simple vibrating motion Simple harmonic motions, Representation of harmonic motion. Degree of freedom, Types of Vibration, Addition of Simple Harmonic Motions, phenomenon of Beats, Work done by a Harmonic Force (Problems)

Undamped free vibrations of single degree of freedom: Undamped free vibration, Equations of motions, general solution of free vibration, Torsional vibrations, Springs in Series & Parallel, Energy Methods (Problems)

UNIT II

Damped free vibrations of single degree of freedom: Damped free vibration, Types of Damping, Free Vibration with Viscous Damping,, Logarithmic Decrement, Coulomb Damping (Problems)

Forced vibrations: Forced Vibration with constant harmonic excitation, Forced vibration with rotating and reciprocating mass, Vibration isolation and Transmissibility, Vibration measuring instruments. (Problems)

Two Degree of Freedom System: Two Degree of Freedom System, Principle modes, Torsional System, Vibration absorbers.

UNIT III

Multi Degree of Freedom System:- Equation of Motion, Influence coefficients, Coordinate coupling, Eigen Values and Eigen Vectors, Orthogonality, Torsional Vibration of Multi-Rotor System.. (Problems)

Geometric method, Stability of equilibrium points, Method of harmonic balance.

Numerical Methods: Rayleigh's method, Dunkerley's equation, Stodola's Method, Rayleigh-Ritz's method, Method of Matrix iteration, Holzer's method… (Problems)

UNIT IV

Continuous systems: Transverse vibration of strings, Longitudinal vibrations of bars, Lateral vibration of beams, Torsional vibration of circular shafts, Whirling of shafts.

Transient vibrations: Introduction, Method of Laplace vibration and response to an impulsive output, response to step-input, response to a pulse-input, and phase plane method.

REFERENCE AND TEXT BOOKS: -

1. Mechanical vibration - By G.K. Grover, Nemchand Chand and Sons
2. Mechanical vibration - By V.P. Singh
3. Mechanical Vibration – By Thomson, Prentice Hall
4. Mechanical Vibration - By Den Hartog, Mc Graw Hill
5. Introductory course to mechanical vibrations – By Rao and Gupta, Wiley Eastern

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
OPERATION RESEARCH
ME-364

L	T	P	Cr		
3	1	-	4	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Introduction and History of Operation Research: Development of operations Research, characteristics and scope of operations Research, operations Research in Management, Models in operations Research, Model Formulation, Types of mathematical models, Limitations of operations Research.

Linear Programming Methods: L.P. models, simplex method, Algebra of simplex method. (Minimization and Minimization problems), The big M method, Post optimality analysis, essence of duality theory, Application of sensitivity analysis.

UNIT II

Transportation and Assignment Models: Introduction to model, matrix terminology, Formulation and solution of Transportation model (least cost method, Vogel's Approximation method), Least time transportation problem, Assignment problems.

Network Problems: Introduction to net work logic, Numbering of events (Fulkersen Rule), PERT calculations - Forward path, back-ward path. Slack, probability, comparison with PERT, Critical path, Floats. Project cost, crashing the network, updating (PERT and CPM).

UNIT III

Simulation in OR: Introduction, applications of simulation, advantages and limitations of simulation technique, generation of random numbers, Time-flow mechanism, simulation languages.

Decision making: Steps in decision theory approach, Decision Machinery environment, Decision machining under certainty and uncertainty, Decision machining under condition of risk, Decision trees, Minimum enchained criteria, Advantages and limitations of decision tree solutions, post optimality

Argument models: Definition of arguments models, comparison with transport model, Mathematical representation of assignment model, Formulation and solution of argument models, variation of the argument model, Alternate optimal solutions

UNIT IV

Queuing Theory: Introduction, Applications of queuing Theory, Waiting time and idle time costs, single channel queuing theory and multi channel queuing theory with Poisson. Arrivals and exponential services, Numerical on single channel and multi channel queuing theory.

Game theories and techniques: Theory of games, competitive games, Rules and Terminology in game Theory, Rules for game theory- saddle point, dominance, mixed strategy (2 x2 games) , mixed strategy (2 x n games or m x 2 games), mixed strategy (3 x3 games), two person zero sum games, n-person zero sum games.

Text Books:

Operations Research- By P.K. Gupta and D.S. Hira

Reference books:

1. Introduction to operation research - By Hillier and Lieberman, McGraw-Hill
2. Linear Programming - By N.P. Loomba

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
MACHINE DESIGN-II
ME-365

L	T	P	W		
4	2	-	6	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	4 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT-I

Gears:
Classification of Gears, Law of Gearing, Standard System of gear teeth, Various Failure modes, Interference, Minimum number of Teeth, Form of teeth, Material for gears.
Spur gears: Spur gear terminology, Force Analysis, Beam Strength of gear Tooth, Dynamic Tooth Load & Wear Strength, Spur gear Construction & Design for Shaft.
Helical gears: Helical gear terminology, Force Analysis, Virtual number of Teeth, Beam Strength & Wear Strength.
Bevel Gears: Bevel gear terminology, Force Analysis, Beam strength & Wear Strength.
Worm & Worm Wheels: terminology of Worm & worm Wheels, Force Analysis, Beam Strength, Wear strength, Design of Worm gearing.

UNIT-II

Belt, Rope &chain: Design/Selection of V-Belts & Pulleys, Wire ropes, Chains & Sprockets.
Clutches: Positive Clutches, Friction Clutches; single & multiple plate clutches; Centrifugal Clutches; Cone Clutches.
Brakes: Block & Shoe Brakes, Band Brakes, Differential Band Brakes, Internal Expending Shoe Brakes.

UNIT-III

Design of Springs:
Helical Springs: Various terms Used; Stress; Surge; Energy Stored; Fatigue loading; Calculations of Stiffness in Series & parallel.
Helical Torsion Springs, Flat spiral springs.
Leaf Spring: Construction; Nipping; Calculation of Length; Materials used.
Bearings: Hydrodynamic lubricated Bearings, Selection of Ball Bearings, Selection of roller Bearings, Selection of Taper roller Bearings.

UNIT-IV

Flywheels: Construction & Design, Coefficient of Fluctuation of Speed, Fluctuation of Energy, Energy stored in Flywheels, Stresses in Rim & Arms.
I.C Engine: Design of Cylinders, Pistons, Connecting rods and Crank Shafts.
Crane Hook: Type of Crane Hooks & its Design.

Text Book:

1. Design of Machine Elements by Bhandari
2. A Text Book of Machine design by R.S Khurmi & J.K Gupta

Reference Book:

1. Machine Design by Sharma & Aggarwal
2. PSG Design Data Book.
3. Machine Design an integrated Approach by Robert Norton, Prentice Hall
4. Fundamental of Machine Component Design by R.C juvinnal,Johan Wiley& Sons

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
REFRIGERATION AND AIR CONDITIONING LAB
ME-36P1

L	T	P	Cr		
-	-	2	1	**On Semester Evaluation**	120
				End Semester Evaluation	80
				Maximum Time	2 hrs

LIST OF EXPERIMENTS

1. To Study basic vapor compression Refrigeration Cycle.
2. To find COP of water cooler.
3. To study the water cooler.
4. To study and perform experiment on vapor absorption apparatus.
5. To find the performance parameter of cooling tower.
6. To study various components in room air conditioner.
7. To find performance of a refrigeration test rig system by using different expansion devices.
8. To study different control devices of a refrigeration system.
9. To study various compressor.
10. To find the performance parameters of Ice Plant.

Note: Out of the above list, eight experiments are to be essentially performed.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
COMPUTER AIDED DESIGN LAB
ME-36P2

L	T	P	Cr		
-	-	2	1	**On Semester Evaluation**	120
				End Semester Evaluation	80

List of Experiments:-

1. Practice on sketcher module in wildfire ProE -2.
2. Practice on part module in wildfire ProE -2.
3. Make a Right handed helical spring by using helical sweep command in wildfire ProE -2.
4. Make a tyre by using toroidal bend command in wildfire ProE -2.
5. Practice on surface module in wildfire ProE -2.
6. Make a water bottle by using surface modeling in wildfire ProE -2.
7. Make a assembly drawing by using wildfire ProE -2.
8. Introduction to Part Programming.
9. Practice on CNC Lathe Trainer for different lathe operations.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
MECHANICAL VIBERATION LAB
ME-36P3

L	T	P	Cr		
-	-	2	1	**On Semester Evaluation**	120
				End Semester Evaluation	80
				Maximum Time	2 hrs

LIST OF EXPERIMENTS

1. To study undamped free vibrations of equivalent spring mass system and determine the natural frequency of vibrations
2. To study the free vibration of system for different damper settings. Draw decay curve and determine the log decrement and damping factor. Find also the natural frequency
3. To study the torsional vibration of a single rotor shaft system and to determine the natural frequency.
4. To determine the radius of gyration of given bar using bifilar suspension.
5. To verify the dunker ley's rule
6. To study the pressure distribution of a journal bearing using a journal bearing apparatus.
7. To determine the radius of gyration of a compound pendulum.
8. To determine the radius of gyration of disc using trifilar suspension.
9. To determine the two frequencies of torsional spring type double pendulum & compare them with theoretical values.

Note: Out of the above list, eight experiments are to be performed essentially.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
GENERAL PROFICIENCY AND FITNESS
ME-366

L	**T**	**P**	**Cr**
-	-	-	1

At the end of each year students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the HOD/principal/Director of the College. A specimen performa indicating the weightage to each component/activity is given below :-

Name : _____ College Roll No. _____
Roll No._____ _____
Branch _____ Year of Admission _____._____

I. Academic Performance (30 marks)
Marks obtained in the Semester

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I
II
III
IV
V
VI
VII

II. Extra Curricular Activities (30 Marks)
(a) Indoor Games _____ _____
_____ _____
(b) Outdoor Games _____
_____

© Essay Competition
Scientific _____
Technical _____
Exhibitions _____
Debate _____

(d) Fine Arts
Drama _____
Dance _____
Music _____
Painting _____

(e) Activities
Hobby Club _____
N.S.S. _____
H ostel Mgt _____
Any other _____

III. Educational tours/visits/Membership of Professional Societies (10 marks)
1. _____
2. _____
3. _____
4. _____
5. _____

IV. Contribution in NSS Social Welfare Floor Relief/draught relief/Adult Literacy mission/Literacy Mission/Blood Donation/Any other Social Service
(10 Marks)
1. _____
2. _____

3. _____
4. _____
5. _____
6. _____

V. Briefly evaluate your academic & other performance & achievements in the Institution (10Marks)

_____
_____
_____
_____

VI. Performance in Viva voce before the committee (10 Marks)

_____
_____
_____

*Marks obtained I( )+II( )+III( )+IV( )+V( )+VI( ) =**Total Marks :

Member Member Member Member

ELECTIVES

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
TRIBOLOGY
ME-36E1

L	T	P	Cr		
3	0	0	3	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Introduction: Introduction to trobological systems and their characteristic features, Analysis and assessment of surface, topography, deterministic and stochastic tribo-models for asperity contacts, techniques of surface examination, technological properties of surfaces.

UNIT II

Wear: Introduction, mechanism of wear, types of wear, quantitative laws of wear, measurement of wear, wears resistance materials.

Friction: Theories of friction, causes of friction, measurement of friction.

UNIT III

Lubrication: Introduction, dry friction, boundary lubrication, hydrodynamic, hydrostatic and elasto-hydrodynamic lubrication, functions of lubricants, types and properties, lubricant additives, properties and testing of lubricants.

Contact systems: Principles, application to rolling contact bearings, cams, Gears.

UNIT IV

Bearings: Geometry and pressure equation of journal bearing, hydrostatic bearings, thrust bearings, porous bearings and hydrodynamic gas bearings. Journal bearings with specialized applications. General requirements and different types of bearing materials.

Suggested Reading

1. Tribology in Industry- By Sushil Kumar Srivastava
2. Introduction to Tribology of Bearings- By B.C. Majumdar , A.H.Wheeler
3. Principles of Tribology – By J. Halling, Macmillan
4. Mechanics and Chemistry in Lubrication- By Dorinson and Ludema , Elsevier
5. Friction and wear of Materials- By E. Robinowicz, Johan Wiley
6. Principles of Lubrication-By A. Cameron, Longmans

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
PRODUCT PLANNING & CONROL
ME-36E2

L	T	P	Cr		
3	0	0	3	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

General: Product design objectives, concept, terminology, principle requirements of a good product design, product types and design considerations for engineering, product life cycle, product specification and range, safety, liability and warranty aspects, patents and copy rights.

UNIT II

Designing For Specific Requirements: Design features and requirements with regard to manufacturing and assembly, safety, ergonomics, energy conservation, storage, transportation and maintenance, quality and reliability as a factor in product design, quality v/s cost, packaging design, role of national and international standards. Visual Design: Objectives, form, function, material and process, relationship, product graphics.

UNIT III

Product Detailing: Need and objectives, considerations affecting detailing decisions.
Product Development: Concept and objectives, information sources, role of innovation in product development and competitiveness, part approval process, advance product quality planning, design failure mode and effect analysis, use of computers in product design & development, introduction to reverse engineering and rapid prototype development.

UNIT IV

Laboratory: Case Study (Report) of an Existing Product/Product Range.
Value engineering: Concept, advantage and applications. Value & types of values, Analysis of function, Value Control.
Modern approaches to product design: Concurrent Engineering (CE), Benefits of CE, Quality function deployment (QFD), Implementation of QFD in production.

Suggested Reading

1. An Introduction to Design Engineering- M.A Parameswaran, Narosa Publishing house, New Delhi.
2. Product Design & Development- Karl T Ulrich, Tata McGraw Hill Education Private Limited, New Delhi.
3. Product Design & Manufacturing – A.K Chitale & R.C Gupta, Prentice Hall of India Private Limited, New Delhi.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
NON DESTRUCTIVE TESTING
ME-36E3

L	T	P	Cr		
				On Semester Evaluation	100
3	0	0	3	End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT-I

Introduction to Non-destructive Testing, Comparison of destructive and non-destructive testing. Introduction to Discontinuities associated with manufacturing processes.

Visual Inspection: Equipment used for visual inspection-Magnifying Glass, Microscope, Borescope, endoscopes, Video Image scope. Visual Weld testing. Documentation and analysis of visual testing.

Liquid Penetrant Testing: Basics of penetrant testing, Pre-cleaning methods, Equipment, Procedures, Characteristics of penetrants & developers, fluorescent penetrant testing, Evaluation, hazards, Precautions, advantages, limitations and applications.

UNIT-II

Ultrasonic Inspection: Properties of Sound Waves, Generation of Ultrasonic waves, Types of Probes, Test Methods, Test Equipment, Couplants and Coupling Techniques, Instrumentation, Test Variables, Inspection procedures, applications, advantages and limitations. Thickness measurement using ultrasonic waves.

UNIT-III

Radiography:, X-rays and Gamma-radiography: principle, equipment & methodology - Type of Industrial Radiation sources and their characteristics, Radiation Detectors, Radiation Protection, Film Radiography, Film Processing, Inspection Techniques and Procedures, Radiograph Interpretation, Radiography Image Quality Indicators, Methods of Viewing Radiographs, Application and limitations. Procedures for welds radiography.

UNIT-IV

Magnetic Particle Testing: Principle of Magnetic Particle Testing, Magnetic Particle Testing Equipment-Magnetic Particle Testing Procedures, Method of De-Magnetization, Evaluation of Indications, applications, advantages and limitations.

Eddy Current Testing- Principle, eddy current equipment, Types of Probes, procedure, Factors Affecting Eddy Current Response-Material, Conductivity, Permeability, Frequency. Applications, limitations, advantages, disadvantages

Text Books:

1. Welding Technology by R.S.Parmar
2. Non-Destructive Testing by P. Halmshaw
3. Practical Non-destructive Testing by Baldev Raj, T. Jayakumd, M.. Thavasamutha
4. Non-destructive Testing of welds Baldev Raj, C.V. Subrananuum, and T.Jayakumar

Reference Book:

1. American Metals Society, "Non-Destructive Examination and Quality Control", Metals Hand Book, Vol.17, 9th Ed, Metals Park, OH, 1989.
2. Bray, Done and Stanley, Roderick, "Nondestructive Evaluation: A Tool in Design, Manufacturing and Service. Revised", CRC Pres New York, Edition 1997.

B. TECH. 6TH SEMESTER (MECHANICAL ENGINEERING)
PROJECT MANAGEMENT
ME-32E4

L	T	P	Cr		
3	0	-	3	**On Semester Evaluation**	100
				End Semester Evaluation	100
				Maximum Time	3 hrs

Note: -

1. **There will be NINE questions in the question-paper. All questions carry equal marks.**
2. **First question covers the whole syllabus. It is objective/ short answer type (at least ten questions). Two questions will be taken from each of the four units.**
3. **Attempt five questions in all. FIRST question is compulsory. Attempt ONE question from each of the other four Units**

UNIT I

Introduction: Project Management: An Overview, Types and Characteristics of Projects, Project life cycle, Identification of investment opportunities, Screening and Selection, Procedures for Implementation, Project Direction, Coordination & Control,

UNIT II

Market and Demand Analysis: Market Survey, Demand Forecasting Methods-Technical Analysis – Manufacturing Process, Materials-Product Mix, Plant Location-Project Charts and Layouts.
Financial Analysis: Cash Flows for Project Appraisal, Investment Evaluation using Capital Budgeting Techniques, Net Present Value, Profitability Index: Internal Rate of Return, Pay Back Period, and Accounting Rate of Return

UNIT III

Organization Systems For Project Implementation: Work Breakdown, Coordination and Control, Project Management Softwares, Organizing Human Resource and Contracting; Organizing Systems and Project Management Performance.

UNIT IV

Development of Project Network: Time estimation, Determination of critical Path (CPM), Event slacks and floats, choice of a schedule in view of resource constraints. Program Evaluation Review Technique (PERT) Examples, illustrations & case studies.

TEXT BOOKS:

1. Prasanna Chandra, "Projects – Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill,4th Ed, 1997
2. A. K. Singh, "Project Management", Laxmi Publication

REFERENCE BOOKS:

1. Mike Field and Laurie Keller, "Project Management", Thompson Business press,
2. Gido and Clements, "Successful project management", 2nd edition; Thompson south-western
3. John M Nicholas, "Project Management for business and technology", Pearson Education Asia
4. Bhavesh M Patel, "Project Management – Strategic Financial planning, Evaluation and control", Vikas publishing house
5. S.Choudry "Project Management", ", Tata McGraw Hill,27th edition

NUMERICAL METHODS & LINEAR PROGRAMMING
(Open elective)
MATH-OE1

L	T	P	Cr	
3	1	0	4	

On Semester Evaluation : 100 Marks
End Semester Evaluation : 100 Marks

Time: 3 hrs

Note: 1. There are nine questions in a set of question paper. All questions will carry equal marks.
2. The students are required to attempt five questions in all selecting at least one from each unit and First question is compulsory.

UNIT-I

Numerical Solution of Algebraic & Transcendental equations: Bisection Method, Regula-Falsi Method, Secant Method, Fixed –Point iteration Method , Newton-Raphson Method and their convergence , Condition of convergence of Newton-Raphson Method.
Solution of Simultaneous Equations: Crout'sTriangularisation Method, Jacobi's Iteration Method, Gauss Seidal Iteration Method, Gauss elimination Method and Gauss Jordan Method

UNIT-II

Finite Differences: Newton forward difference formula (without proof), Newton backward difference formula (without proof), Numerical Differentiation, Numerical Integration, Newton cote's quadrature formula, Trapezodial rule, Simpson 1/3rd rule, Simpson 3/8 rule.

UNIT - III

Numerical Solution of Differential Equations: Picard's Method, Taylor Series Method, Euler's Method, Modified Euler Method, Runge-Kutte Method, Predictor Corrector meyhod, Method of least squares.

UNIT-IV

Linear Programming: Formulation of Linear Programming problems, standard and canonical form of a Linear Programming Problem, Basic solution, Degeneracy, Non-degeneracy, Solution of Linear Programming Problem using Graphical Method, Simplex Method and Dual-Simplex method, Basic Duality Principle.

Text Books:

1. Higher Engineering Mathematics : B. S. Grewal, Khanna Publishers.
2. Ramana, B.V., "Higher Engineering Mathematics" Tata McGraw-Hill.
3. Numerical Methods for Scientific & Engineering Computation : M.K. , Jain, R.K. Jain, S.R.K. Iyengar, New Age Publications
4. Advanced Engineering Mathematics: E. Kreyzig, John Wiley and Sons.
5. Mathur A. B., Jaggi V. P., "Advanced Engineering Mathematics", Khanna Publishers.
6. Babu Ram, "Engineering Mathematics", Pearson Education

Reference Books:

1. Mitin, V. V., Polis, M. P. and Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
2. Numerical Mathematical Analysis: James B. Scarborough, Oxford and IBH Publishing Co. Pvt. Ltd.
3. Jain, R. K. and Iyengar, S. R. K. "Advanced Engineering Mathematics", Narosa Publication, 2003 (2nd Ed.)
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