

**Short Syllabi of the Courses for B. Tech. Degree in
Mechanical Engineering**
(2004 Admission onwards)

FIRST & SECOND SEMESTERS : Common for all branches

THIRD SEMESTER

MA201T: Mathematics III

3-1-0-0-3

Probability distributions, Random variables, mean and variance of probability distributions, Chebyshev's theorem, joint distributions, Sampling distributions and inference concerning means, sampling distribution of the variance, tests of hypothesis, Inference concerning variance, test for goodness of fit, regression analysis, analysis of variance, completely randomized designs.

Text Book:

1. Johnson R.A, Miller & Freund's Probability and Statistics for Engineers, 5th Edn., Prentice Hall Ltd., 1995

EE216T: Electrical Measurements and Machines

3-0-0-0-3

Measurement of power, Basics of rotating machinery, principle of operation, e.m.f and torque equation, d.c. Machines, principles of operation, generators and motors, Transformers, Alternators, synchronous machines, single phase and special machines. Working of AC and DC Servomotors and Principles of Position, Velocity and Force servo control Systems- Applications in CNC Machine Tool drives and Robots.

Text Book:

1. Hughes, K., Electrical Technology, E.L.B.S., 1996
2. Nagrath, I.J., and Kothari, D.P., Electrical Machines, Tata McGraw Hill Ltd., New Delhi, 1997.

ME211T: Mechanics of Fluids

3-1-0-0-3

Characteristics and properties of fluids; Fluid static's and kinematics; Energy equations for different types of fluid flow; Flow measuring devices; concepts of basic potential flows; Flow past immersed bodies; Boundary layer equations and its solutions

Text Books:

1. White, F.M., Fluid mechanics, McGraw Hill

References:

1. Finnemore & Franzini, Fluid mechanics with engineering applications, Mc Graw Hill.
2. Som, S.K. & Biswas, G, Fluid mechanics & Fluid machines, Tata Mc Graw Hill.

ME212T: Elements of Solid Mechanics

3-1-0-0-3

General concepts of stress and strain - stress and strain tensors; Bending stresses in beams - axial shear and bending moments by integration and singularity functions; Torsion in

circular elastic and inelastic bars; Different methods of assessment of deflection of beams; transformation of stress and strains, compound stresses; Theory of columns.

Text Books:

1. Popov, E.P., Engineering Mechanics of Solids, Prentice hall of India, New Delhi 1996.

References:

1. Timosenko, S.P. & Young, D.H., Elements of Strength of Materials, Mc Graw Hill International student edn.
2. Irving, H. Shames, Introduction to Solid Mechanics, Prentice hall of India, 2nd edn.
3. Crandall, S.H., Dahl, N.C. & Lardner, T.J., Introductions to Mechanics of Solids, McGraw Hill.

PM213T: Materials Science and Metallurgy

3-0-0-0-3

Introduction and overview of engineering materials, Atomic Structure and Bonding, Structure of Crystalline Solids, Imperfections/Defects in Solids, Diffusion in Solids, Mechanical Responses of Metals, Dislocations and Strengthening Mechanisms, Plastic deformation, Failure Mechanisms of Materials, Phases and Phase Diagrams, Phase Transformations, Metallic alloys, Structure and Properties of Ceramics, Structure and Properties of Polymers and Composites, Materials Selection and Design Principles.

Text Book:

1. Smith, Science of Engineering materials, Prentice-Hall
2. Callister W.D. , Materials Science and Engineering, John Wiley

References:

1. Avner S.H., Introduction to Physical Metallurgy, McGraw Hill
2. Van Vlack L.H., 'Elements of Material Science and Engineering', John Wiley
3. Shackelford J.F., Material Science for Engineers
4. Reed Hill, Physical Metallurgy Principles, Affiliated East West Press

ME214D: Machine Drawing

0-0-3-0-2

Orthographic projections of machine elements; Welded joints, Screwed fasteners, Pipe joints, couplings, Pulleys , Gears, Journal and roller bearings; Assembly drawings of Engine parts, Parts of lathe, Valves, Jigs and fixtures; Concepts of limits, fits and tolerances; Working drawings of simple machine elements; Introduction to CAD.

Text Books:

1. Bhatt, N.D. & Panchal, V.M., Machine drawing, Charotar publishing.

References:

1. Narayana, K.L., Kannaiah, P. & Reddy, K.V., Machine drawing, Wiley Eastern.
2. John, K. C. & Varghese, P.I., Machine drawing, VIP Publishing.
3. Gill, P.S., A text book of Machine drawing, kalson publishing.
4. Narayana, V. L. & Mathur, M.I., Machine drawing, Jain brothers.
5. Sidheswar, N. Kannaiah, P. & Sastry, V.V.S., Machine drawing, Tata Mc Graw Hill.
6. Pippenger, J. & Hicks, T., Industrial Hydraulics, Mc Graw Hill.

EE215L: Electrical Measurements and Machines Lab

0-0-0-3-1

List of experiments:

1. a) Linear and Non-linear Characteristics - Determination of V-I characteristics of a linear resistor and an incandescent lamp.

- b) Methods of measuring high and low resistance-Voltmeter/Ammeter method.
2. Measurement of Power in Single phase AC circuit- determination of impedance, admittance, power factor and real/reactive/apparent power drawn in RLC series circuits (using 3Ammeter, 3 Voltmeter and 1Wattmeter method)
3. a) Measurement of Energy using single-phase energy meter and verification by power /time measurements.
b) Measurement of power in 3 phase circuits using two-wattmeter method.
4. Determination of the efficiency and regulation of single-phase transformer by direct loading.
5. Determination of efficiency and regulation at various loads conditions of a single-phase transformer by open circuit and short circuit tests.
6. a) Study of Starters for 3 phase Induction motors
b) Determination of performance characteristics of Squirrel Cage induction motor by conducting load test.
7. Determination of performance characteristics of a Slip ring induction motor by conducting load test.
8. Determination of Open circuit characteristic and load characteristics of a dc shunt generator.
9. Determination of performance characteristics of a dc shunt motor by conducting load test.
10. Determination of performance characteristics of a dc series motor by conducting load test.
11. Determination of Open circuit characteristic of a 3-phase alternator.
12. Testing of Single phase motor

CE294L: Strength of Materials Laboratory

0-0-0-3-1

Study of extensometer and strain gauges, Simple tension test, double shear test, Rockwell, Brinnel and Vickers hardness tests, Izod and Charpy impact tests, Strength of open coiled and closed coil springs, bending, torsion, compression and fatigue tests.

FOURTH SEMESTER

MA202T: Mathematics IV

3-1-0-0-3

Power series solution of differential equations, Legendre equation, Bessels equation, Sturm-Liouville problem, Eigen functions, Partial differential equations – Methods of solving PDE, Ethic, Parabolic and hyperbolic equations, typical examples and their solution, complex analysis, analytic functions and their applications, conformal mapping, Evaluation of real integrals, residue theorem, Laurents series, Taylor series and Maclariuns-series.

Text Book:

1. Kreyzig. E , Advanced Engineering Mathematics, 8th Ed., John Wiley & Sons, 2000.

References:

1. Wylie, C.R. & Barret L.C, Advanced Engineering Mathematics, 6th Ed., McGraw Hill, New York, 1995.

ME251T: Thermodynamics

3-1-0-0-3

Introduction to thermodynamic systems; P,V,T relationships of pure substances; Zeroth law of thermodynamics and temperature measurements; First law of thermodynamics - concepts of heat and work; Second law of thermodynamics - concept of entropy, calculation of entropy changes, availability, thermodynamic property relationship, mixture of gases.

References:

1. Zemansky, M.W., Thermodynamics, Mc Graw Hill
2. Nag, P.K., Engineering Thermodynamics, Tata Mc Graw Hill
3. Cengel, Y.A. & Boles, M.A., Thermodynamics-An Engineering Approach, McGraw Hill.
4. Jones, I.B. & Dugan R.E., Engineering Thermodynamics, Prentice Hall.
5. Y.V.C. Rao, An Introduction to Thermodynamics, Prentice Hall.
6. Rogowsky, Elements of Internal Combustion Engines, Tata Mc Graw Hill.
7. Gill, Smith & Ziurys, Fundamentals of Internal Combustion Engines, Oxford & IBH.
8. Maleev, Internal Combustion Engine Theory & Design, Mc Graw Hill.
9. Judge, Modern Petrol Engines, Chapman & Hall.
10. Mathur & Mehta, Thermodynamics & Heat Power Engineering, Vol I&II.

ME252T: Mechanics of Machinery

3-1-0-0-3

Introduction to kinematics and mechanisms - displacement and velocity analysis - acceleration analysis; Concepts of path-curvature theory; Design of cams; Design of gears, gear trains; Kinematic synthesis; Graphical synthesis for motion, function generator; Techniques for analytical synthesis.

Text Books:

1. Arthur, G. Erdman & George, N. Sandor, Mechanism Design: Analysis & Synthesis, Vol 1 Prentice Hall of India, 1988.
2. Arthur, G. Erdman & George, N. Sandor, Mechanism Design: Analysis & Synthesis, Vol 2, Prentice Hall of India, 1988.
3. Hamilton, H., Mable & Charles, F. Reinholtz, Mechanisms & Dynamics of machinery, 4th edn. 1987, John Wiley & sons.

References:

1. Amitabha Ghosh & Ashok Kumar Mallik, Theory of Mechanisms & Machines, Affiliated East West Press.
2. Shigley, J.E. & Vicker, J.J., Theory of Machines & Mechanisms, Mc Graw-Hill.
3. George, T., Martin: Kinematics & Dynamics of Machines, Mc Graw-Hill.

ME253T: Advanced Mechanics of Solids

3-1-0-0-3

Concepts of stress and strain at a point; Equations of elasticity, boundary conditions, special problems in bending; Problems of plane stress, strain and axy-symmetrics; rotating discs; Introduction to energy technique; 3-D approach to torsion in non- circular sections; Torsion in thin walled open and closed sections; Introduction to theory of plasticity- stress, strain relationships.

Text Books:

1. Srinath, L.S., Advanced Mechanics of Solids, 1980, Tata McGraw-Hill, New Delhi.

References:

1. Den Hartog., Advanced Strength of Materials, Mc Graw –Hill, New York.
2. Timoshenko & Goodler, Theory of Elasticity, Mc Graw Hill, New York.
3. Durelli, Philips & Psao, Introduction to the Theoretical & Experimental Analysis of Stress & Strain, Mc Graw Hill, New York.
4. Fred, B. Seely & Smith, Advanced Mechanics of Materials, John Wiley & Sons, New York.
5. Johnson, W. & Muller, P. B., Engineering Plasticity.

PM254T: Manufacturing Science

3-1-0-0-3

Foundry - pattern, mould and core making; melting practice; solidification of pure metals and alloys; Casting processes - different types; Riser and gating designs; Casting defects and their inspection; Yield criteria of metals; Isotropic and kinematic hardening; Metal forming operations and their analysis - classification of metal joining - different welding techniques; Welding metallurgy, testing of welded joints; Brazing and soldering.

Text Books:

1. Amithabha Ghosh & Asok kumar mallik, Manufacturing Science, Affiliated East West Press Ltd.
2. Richard Heine & Philip Rosenthal Principles of Metal Casting, Tata McGraw Hill.
3. Richard, A.Little, Welding and Welding Technology, Tata McGraw Hill.

References:

1. Serope Kalpakjian, Manufacturing Engineering & Technology, Addison Wesley Pub. Co.
2. Oscar Hoffman & George Sachs, Introduction to Theory of Plasticity for Engineers, McGraw Hill.
3. Flemings, M.C., Solidification Processes, Mc Graw Hill.
4. American Welding Society, Welding Hand Book.
5. Lawrence, E. Doyle., Manufacturing Processes & Materials for Engineers, Prentice Hall of India Ltd.
6. Taylor Howard & Merton et.al., Foundary engineering, John Wiley & Sons Inc.
7. Metals Hand Book- Vol 5., Welding Institute of Metals. USA.

PM255T: Metrology and Instrumentation

3-1-0-0-3

Basis concepts of measurement experiment planning, calibration, models of measurement systems; Statistical concepts in measurements; Uncertainty analysis; Data acquisition

systems; Interferometers, Different types of transducers; Optical instruments, limits and fits, surface finish measurements, screw threads and gear measurements, co-ordinate measuring machines; Techniques of temperature measurements, pressure measurements, strain measurements, force and torque measurements.

Text Books:

1. Figliola Richard, S. & Beasley Donald E., Theory & Design for Mechanical Measurements, 3rd edn., John Wiley & Sons Inc,
2. American Society of Tool & Manufacturing Engineers, Hand Book of Industrial Metrology, Prentice Hall of India Pvt Ltd.

References:

1. Ernest, O. Doebelin, Measurement Systems, Mc Graw Hill Co., 4th edn.
2. Thomas, G. Bechwith, Lewis Buck, N & Roy, D. Marangoni., Mechanical Measurements, NAROSA.
3. Collett, C.V. & Hope, A.D., Engineering Measurements, 2nd edn , ELBS/Longman.
4. Antony, D.M., Engineering Metrology, Pergamon Press.
5. Holman, m J.P., Experimental Methods for Engineers, Mc Graw Hill Co.
6. John, A. Bosch., Coordinate Measuring Machines & Systems, Marcel Dekker, Inc.
7. Groover Mikell, P., Automation, production systems & Computer Integrated Manufacturing, Pearson Education Asia.

ME256L: Fluid Mechanics and Fluid Machinery Lab

0-0-0-3-1

Study of plumbing tools and pipe fittings - Measurement of Metacentric height and radius of gyration of floating bodies - Measurement of Viscosity of fluids- Study of discharge measuring instruments - Measurement of pressure and velocity - Calibration of venturimeter- Orifice meter - Notches and weirs - Nozzle meters & Rota meters - pipe friction- Minor losses in pipes - Verification of Bernoulli's theorem - Demonstration of laminar and turbulent flow in pipes - Critical velocity - Forces on curved and plane surfaces- Evaluation of the performance of turbines - Main and operating characteristics - Muschel's curves Performance of pumping and other machinery line centrifugal pumps - Reciprocating pumps- Gear pumps - Hydraulic ram and torque converter.

PM257L: Production Engineering Lab I

0-0-0-3-1

Classifications of machine tools and machining processes - Specification of machine tool, power source, Centre lathe - general features, parts and functions - Machining on Centre lathe- Cutting tools - Materials, types; Grinding, Cutting variables - Selection of speeds, feeds and depth of cut - Use of cutting fluids - Methods of holding work - Lathe operations - straight, taper and eccentric turning, thread cutting, drilling, boring, profile turning, knurling - Tolerance and surface finish.

FIFTH SEMESTER

ME301T: Principles of Management

3-1-0-0-3

Introduction to management – characteristics – systems approach – task responsibilities and skill required – mission – models in decision making – process of management – planning – organizing – directing – controlling – overview of operations management – human resources management – marketing management – financial management.

Text Books:

1. Koontz & Weihrich, Management, 9th edn., McGraw Hill, 1999.

References:

1. Stoner et-al, Management, 6th edn., Prentice Hall, 1999.
2. Mazda, Engineering Management, Addison Westey, 1999.
3. Certo S., Modern Management, 8th edn., Prentice Hall, 2003.

ME311T: Heat & Mass Transfer

3-1-0-0-3

Heat transfer - conduction heat transfer - general heat conduction equations in Cartesian, cylindrical and spherical coordinates - applications like extended surface heat transfer and critical insulation thickness - unsteady state heat conduction in one dimension - lumped heat capacity system - Introduction to Heat Exchangers- LMTD, correction factors, heat exchanger effectiveness and number of transfer units-Convective heat transfer - laminar and turbulent forced convection heat transfer from flat plates - internal flow and heat transfer - empirical relations in forced convection and free convection - condensation and boiling Radiation heat transfer – Laws of radiation- radiation exchange between surfaces - radiation shields - electrical network analogy-Mass transfer - Fick's law of diffusion - diffusion in liquids - multi-component systems and their governing equations.

Text Book:

1. Holman, J. P., Heat Transfer, McGrawHill International Students Edition.

References:

1. Incropera, F. P. and De Witt D. P., Fundamental of Heat and Mass Transfer, John Wiley
2. Kreith, F., Heat Transfer, International Text Book Company.
3. Gebhart, B., Heat Transfer, MacGraw Hill.

ZZ301Z: Environmental Studies

3-0-0-0-3

Unit 1: The Multidisciplinary nature of environmental studies. Unit 2: Natural Resources, Renewable and non-renewable resources: Natural resources and associated problems, Unit3: Eco Systems, Unit 4: Bio diversity and its conservation, Unit5: Environmental Pollution, Unit 6: Social Issues and the Environment, Unit 7: human population and the environment, Unit 8. Field Work.

PM313T: Machining Science & Machine Tools

3-1-0-0-3

Mechanics of machining, orthogonal and oblique cutting, tool wear and tool life, machinability, economics of machining, tool geometry and nomenclature, grinding wheels, basic concepts of machine tools, kinematics, machine tool drives, machine tool dynamics, gear manufacture, hydraulic control of machine tools, testing of machine tools, unconventional machining processes and mechanics, design of jigs and fixtures.

References:

1. A. Ghosh & A. K. Mallik, Manufacturing Science, Affiliated East West Press.

2. B. L. Juneja & G. S. Skekhon, Fundamentals of Metal Cutting & machine Tools, Wiley Eastern.
3. A. Bhattacharyya, Principles of Machine Tools, New Central Agency.
4. A. Bhattacharyya, Metal Cutting: Theory & Practice, Central book publishers.
5. M. C. Shaw, Metal Cutting Principles, CBS Publishers.
6. HMT, Production Technology – Tata Mc Graw Hill.
7. N. K. Mehta, Machine Tool Design & Numerical Control, Tata McGraw Hill.
8. Geoffrey Boothroyd & W. A. Knight, Fundamentals of Machining & Machine Tools, Marcel Dekkel.
9. ASTME., Fundamentals of Tool Design, Prentice-Hall of India.
10. Chapman, Workshop Technology, Vol. 1, Vol. 2, Vol. 3.
11. Khaimovitch, Hydraulic control of Machine Tools, Pergamon press.
12. Anthony Esposito, Fluid Power with Applications, McGraw Gill Book Company.
13. Ernst; Oil Hydraulics Power, Industrial Applications, McGraw Hill Book Company.
14. Kempster, M. H. A., An Introduction to Jig & Tool Design, ELBS.
15. Donaldson, Lecain & Goold; Tool design, Tata McGraw Hill.

PM357L: Metrology & Instrumentation Lab

0-0-0-3-1

Study and use of various measuring instruments and gauges, Measurement System Analysis, Measurement of thread parameters, Tools angles, Gear parameters, etc. Calibration experiments with pressure gauge, load cell, thermocouple, stroboscope, LVDT, etc. and uncertainty analysis. Limits and fits, Surface finish measurements, Evaluation of straightness and other form measurements, Measurements with Coordinate Measuring Machines.

PM358L: Production Engg. Lab II

0-0-0-3-1

Introduction: Limits and Fits, Horizontal and Vertical milling machine – Spindle drives and feed motion - Milling cutters – indexing head – Simple, compound and differential indexing, shaping machine - cutting motion, slotting machine, Grinding machine – Surface, cylindrical and centreless grinding – Tool and cutter grinder, unconventional machining, NC/CNC machine.

Exercises:

Shaping and slotting Exercises -Flat and bevel surfaces, grooves, Slots, guide ways, key ways etc.

Exercises in horizontal and -surface, slot, key way and gear milling-Vertical milling machine

Turning Exercises-Limits and Fits

Grinding Exercises

Non – traditional Machining

NC/CNC Machining.

References:

1. HMT, Production Technology, Tata McGraw Hill.
2. ASTME, Tool Engineer's Handbook.
3. Chapman W. A. J., Workshop technology part 2 & 3, ELBS.
4. Rao P. N., Manufacturing Technology, Tata McGraw Hill.
5. Groover & Zimmer, CAD/CAM, Prentice Hall.
6. Metha N. K., Machine Tool Design – Tata McGraw Hill.

Electives

ME321T: Design for Manufacturability

3-1-0-0-3

Introduction, concurrent Engineering, Management Framework, Justification of DFM. Quality Tools in DFM, Computer Aided Technology, Creative Thinking, General Product Design-Design for Assembly, Machining, Forming. - Design for Forging, Casting, Coating, Heat Treatment, Fastening, Welding, Materials.

Text Book:

1. Chitale, A.K. & Gupta, R.C., Product Design & Manufacturing, Prentice Hall of India Pvt. Ltd., 1997.

References:

1. Dieter, George Elwood, Engineering Design – A Materials & Processing approach, McGraw Hill International.
2. Bakerjian, Ramon, Ed., Design for Manufacturability, 1992, Tool & Manufacturing Engineers Handbook, Society of Manufacturing Engineers, Michigan.

ME322T: Unconventional Energy Systems

3-1-0-0-3

Energy outlook, Solar Energy Systems, Biomass Utilization, Wind Energy Calculations and Usage, Mini and Microhydel plants, Scope and Economics of Unconventional Energy Systems, Introduction to Integrated Energy Systems.

References:

1. S. P. Sukhatne, Solar Energy – Principle of Thermal Collection & Storage, 2nd edn, Tata McGraw Hill.
2. H. P. Garg, Advances in Solar Energy Technology, D. Reid Publishing House, 1997.
3. G. N. Tiwari & S. Suneja, Solar Thermal Energy Systems, Narora Publishing House, '97.
4. A. N. Mathur & N. S. Rathore, Biogas Production, Management & Utilization, Himansu Publication, 1992.
5. K. C. Khandelwal & S. S. Mandi, Practical Hand Book of Biogas Technology, 1990.
6. L. L. Freris, Wind Energy Conversion System, Prentice Hall, 1990.

ME323T: Fluid Machinery

3-1-0-0-3

Integral form of continuity, momentum and energy equations – Flow of fluids over flat and curved surfaces – Dimensional analysis – Rayleigh's method and Buckingham II Theorems- Principles of modelling and similitude as applied to Turbo machines- Euler's turbine equation – Analysis of turbines – constructional features of Pelton, Francis and Kaplan turbines- Rotodynamic pumps – Vortex motion – Free and Forced Vortex- Constructional features of centrifugal pumps – Principle of working – Analysis- Pump characteristics – Pump selection – Model studies.-Positive displacement pumps – Reciprocating pumps – working principle, Analysis, pump characteristics. Gear pump, vane pump, accumulator, hydraulic ram.

References

1. Shepherd D. G., Principles of Turbo machinery, Macmillan.
2. Jagdish Lal, Hydraulic Machines, Metropolitan.
3. Stepanof A. J., Centrifugal & Axial Flow Pumps, John Wiley.
4. Streetu, Fluid Mechanics.

ME324T: Introduction to Finite Element Methods**3-1-0-0-3**

Linear Vector Spaces, Variational Methods of approximation – FEM analysis of one-dimensional – two-dimensional problems. Applications to heat transfer, Elasticity and fluid mechanics problems. FEM analysis of Eigen value non-linear problems.

Text Books:

1. Reddy, J. N., An Introduction to the Finite Element Method, McGraw Hill, International Edition.
2. Reddy, J. N., Applied Functional Analysis & Variational Methods in Engineering, McGraw Hill, International Edition.

References:

1. Huebner, K. H., The Finite Element Method for Engineers, John Wiley.
2. Zenkiewicz, O., The Finite Element Method, McGraw Gill International Edition.

ME326T: Marketing Concepts**3-1-0-0-3**

Marketing defined – scope and concepts – analysing opportunities and market planning – consumer and business markets – segmentation – product life cycle – advertising – sales promotion-marketing communication – changing practices.

Text Books:

1. Kotler, P., Marketing Management, 10th edn., Prentice Hall India Ltd, New Delhi, 2000.

References:

1. Ramaswamy, V.S. & Namkumari, S., Marketing Management, Macmillan India Ltd, New Delhi, 1997.
2. Keegan, Global Marketing Management, Pearson Education India, New Delhi, 2002.
3. Saxena, Marketing Management, 2nd edn., Tata McGraw Hill, '02.

ME 327T: Management Information Systems**3-1-0-0-3**

Concept of data and information - economies of information – building blocks of information systems – General system design – System analysis – charting tools – coding considerations – Forms design – File storage consideration – Sorting and searching techniques – verification, audit – Security features.

References:

1. Burch & Gruditski, Information Systems – Theory & Practice, 5th edn., John Wiley Sons, New York, 1989.
2. Hawryszkiewicz, I. T., Introduction to Systems Analysis & Design, Prentice Hall of India, '89.
3. Ian sommerville, Software Engineering, 6th edn., Pearson Education Asia, 2001.
4. Lucas, Henry C., Analysis, Design, & Implementation of Information Systems, 4th edn., McGraw Hill, New York, 1992.
5. O' Brien J. A., Management Information Systems, 4th edn., Tata McGraw Hill, '99.

SIXTH SEMESTER

ME312T: Dynamics of Machinery

3-1-0-0-3

Kinematics and Kinetics of rigid body – Euler equations of motion – Euler angles gyroscope - Introduction to Lagrangian dynamics – work and energy principle of virtual work – D'Alembert's principle – generalised coordinates – Lagrange's equation of motion – Introduction to calculus of variations – Hamilton's principle – force analysis – balancing – introduction to vibration.

Text Books:

1. L. Shames I. H., Engineering Mechanics, Prentice Hall of India.
2. Meirovitch L., Elements of Vibration Analysis, McGraw Hill.
3. Geenwood P. T., Classical Dynamics, Prentice Hall of India.
4. Hollowenko, Dynamics of Machinery, McGraw Hill.

References:

1. Beer F. P. & Johnston E. R. Jr., Vector Mechanics for Engineers – Dynamics, McGraw Hill.
2. Meirovitch L., Methods of Analytical Dynamics, McGraw Hill.
3. Shigley J. E. & Uicker J. J. Jr., Theory of Machines & Mechanisms, McGraw Hill.
4. Forray M. J., Variational Calculus in Science & Engineering, McGraw Hill.

ME352T: Gas Dynamics

3-1-0-0-3

Basic equations of fluid flow, Use of integral and differential formulation, Derivation of Navier Stokes equations, Equations for compressible, one-dimensional duct flows, one dimensional isentropic flows, Flow with normal and oblique shocks, Fanno flows, Rayleigh flows, generalized one dimensional flow, analysis of diffusers.

References:

1. Rathakrishnan. E., Gas dynamics, Prentice Hall India, New Delhi, 1995.
2. Shapiro., A.H., Dynamics & Thermodynamics of Compressible fluid flow, Ronald Press.
3. Zuckrow. M. J. & Hoffman, D. H., Gas Dynamics, Mc Graw Hill, New York.

ME353T: Thermal Engineering I

3-1-0-0-3

Gaspower cycles including Miller & Stirling cycles, part throttle & super charged cycles-Engine systems including MPFI and stratified charge engines-Thermo chemistry & alternate fuels-Normal & Abnormal combustion in IC Engines - Octane & Cetane Numbers-Engine Performance-Engine emissions & control - catalytic converter & EGR-Gas turbine cycles including jet-propulsion cycles - combustion chambers -centrifugal & axial flow compressors.

Text Books:

1. Yunus A. Cengel & Michael A. Boles, Thermodynamics – an engineering approach, Tata McGraw Hill Publishing Company.
2. Willard W. Pulkrabek, Engineering Fundamentals of Internal combustion Engines (University of Wisconsin) Prentice Hall of India Pvt.Ltd., New Delhi
3. H. Cohen & GFC Rogers Longmans, Gas Turbines Theory, Green & Co.Ltd., London.
4. L. Mathur & R. P. Sharma, Internal combustion Engines, Dhanpat Rai Publications (P) Ltd., Madras.

ME361T: Fundamentals of Control System Engineering**3-1-0-0-3**

Mathematical Modeling of Dynamic Systems – Time Invariant Differential Equations using Laplace Transform – Mathematical Modeling of Simple Mechanical Systems – State – space approach to modeling dynamic systems – Mathematical modeling of Electrical Systems – Linearization of Nonlinear Systems – Transient – Response Analysis of First-Order and Second – Order Systems – Transient-Response Analysis of Higher Order Systems – Solution of the State Equation – frequency – domain analysis of dynamic systems – Vibrations in Rotating Mechanical Systems – Vibration isolation – Dynamic Vibration Absorbers – Free Vibrations in Multi-Degrees-of-Freedom – Transient – Response Analysis – Transient – Response Specifications – Improving Transient – Response and Steady – State Characteristics – Stability Analysis – Root-Locus Analysis – Root-Locus Plots with MATLAB –Turning Rules for PID Controllers – frequency – domain analysis and design of control systems – Bode Diagram Representation of the Frequency Response – Plotting Bode diagrams with MATLAB – Nyquist plots and the Nyquist Stability Criterion – Drawing Nyquist Plots with MATLAB – Design of Control Systems in the Frequency Domain – Example Problems.

Text Book:

1. Ogata, K., System Dynamics, 4th edn., Pearson Education Inc., 2004.

References

1. Ogata, K., Modern Control Engineering, 4th edn., Prentice-Hall of India, 2002.
2. Benjamin C. Kuo, Automatic Control Systems, EEE, 7th edn., 1995.
3. Chen C. T., Linear System Theory & Design, 3rd edn., Oxford University Press, 1999.
4. Franklin, G. F., J. D. Powell, & A. Emami-Naeini., Feedback Control of Dynamic Systems, 4th edn., Prentice Hall, 2002.
5. Dorf R. C., & R. H. Bishop., Modern Control Systems, 9th edn., Prentice-Hall, 2001.
6. John J. D. Azzo & Constantine H. Houpis., Linear Control System Analysis & Design, McGraw Hill, 4th edn., 1995.
7. Francis H. Raven, Automatic Control Engineering, McGraw Hill, 5th edn., 1995.
8. D. K. Anand, Introduction to Control Systems, Pergamon Press Inc., 1974.

ME362T: CAD/CAM**3-1-0-0-3**

Introduction to computer graphics, 2D and 3D transformations, CAD/CAM hardware and software, CAD/CAM data exchange and integration, CNC machine tools, constructional features, drives and controls, CNC manual part programming and computer assisted programming, computer integrated manufacturing systems, computer aided inspection, group technology, flexible manufacturing systems, industrial robotics and machine vision, rapid prototyping, design for manufacturability, process planning and concurrent engineering, learn production and agile manufacturing.

References

1. David F. Rogers & J H Adams, Mathematical Elements of Computer Graphics, McGraw Hill International.
2. David F. Rogers, Procedural Elements for Computer Graphics, McGraw Hill International.
3. Ibrahim Zeid, CAD/CAM Theory & Practice, Tata McGraw Hill publishing company.
4. Yoram Koren, Computer Control of Manufacturing Systems, Mc Graw Hill Book Company.

5. Mikell P. Groover, Automation, Production Systems, & Computer Integrated Manufacturing, Pearson Education.
6. Mehta, N.K., Machine Tool Design & Numerical Control, Tata McGraw Hill.
7. Bolton, W., Mechatronics, Electronic Control Systems in Mechanical Engineering, Addison Wesley Longman Limited.
8. Fu, K.S. Gonzalez, R.C. & Lee, C.S.G., Robotics Control, Sensing, Vision & Intelligence, McGraw Hill International.
9. HMT Limited, Mechatronics, Tata Mc Graw Hill Publishing Company Limited.

ME381L: Thermal Engineering Laboratory

0-0-0-3-1

Constant Speed Characteristics of Petrol and Diesel engines- Determination of Friction Power at any given speed and load by Willian's Line, Morse Test, Retardation Test and Motoring Test.-Variable Speed Characteristics of Petrol and Diesel engines- Heat Balance in constant speed and variable speed conditions- Determination of Valve-timing Diagrams of high speed and low speed engines- Determination of the Higher and Lower Calorific Values of solid, liquid and gaseous fuels- Determination of Flash Point, Fire Point, Viscosity & Pour Point of different lubricants- Constant Speed characteristics of blowers and compressors (reciprocating and rotary).

ME398P: Mini Project/ Industrial Training

0-0-0-3-1

Students may undertake short research projects under the direction of members of the faculty, normally 3 hrs/week. A written, detailed report describing the project and results is required. Students are expected to undertake fabrication work of new experimental set up/devices or develop software packages for the various laboratories in the department.

Students may opt to undertake with help from the Department of Training and Placement, Internship in the field of Mechanical Engineering by undergoing in-plant training of at least one-month duration in reputed industries/research centers in the country. The industrial training is expected to be undertaken during the semester recess. The student writes a final report on this training and makes an oral presentation before an evaluation committee.

Electives

ME371T: Fluid Power Control

3-1-0-0-3

Introduction to oil hydraulics and pneumatics, ISO Symbols and standards, ideal pump and motor analysis. Practical pump and motor analysis. Performance curves and parameters. Direction, pressure and flow control valves, flow forces and lateral forces on spool valves, Flapper valve Analysis and Design, Electro hydraulic servo valves, Bypass Regulated and Stroke Regulated Hydraulic Power Supplies, Direction, flow and pressure control valves in pneumatic systems, Examples of typical circuits using Displacement – Time and Travel-Step diagrams. Will-dependent control, Travel-dependent control and Time-dependent control, Combined Control, Program Control, Sequence Control, Electro-pneumatic control and air-hydraulic control.

References:

1. Blackburn, J. F., G. Reethof, & J. L. Shearer., Fluid Power Control, New York, Technology Press of M. I. T. & Wiley, 1960.
2. Anthony Esposito, Fluid Power with applications, 5th edn., Pearson Education 2000.

3. Ernst, W., Oil Hydraulic Power & its Industrial Applications, 2nd edn., New York: McGraw Hill, 1960.
4. Lewis, E. E., & H. Stern, Design of Hydraulic Control Systems, New York, McGraw Hill, 1962.
5. Morse, A. C., Electro hydraulic Servomechanism, McGraw Hill, New York, 1962
6. Pippenger, J.J., and R.M. Koff, Fluid Power Control systems, New York: McGraw Hill, 1959.
7. Fitch, Jr., E.C., Fluid Power Control Systems, McGraw Hill, New York, 1966.
8. Khaimovitch., Hydraulic & pneumatic control of machine tools
9. John Watton., Fluid Power Systems: modeling, simulation & micro computer control, Prentice Hall International, 1989.
10. Herbert E. Merritt., Hydraulic control systems, John Wiley & Sons Inc., 1967.
11. Thoma, Jean U., Hydrostatic Power Transmission, Trade & Technical Press, Surrey, England, 1964.
12. Ian Mencal., Hydraulic operation & control of Machine tools – Ronald Press.
13. Hasebrink J.P., & Kobler R., Fundamentals of Pneumatics /electropneumatics, FESTO Didactic publication No. 7301, Esslingen Germany, 1979.
14. Werner deppert & Kurt Stoll., Pneumatic Control-An introduction to the principles, Vogel-Verlag English ed., 1985, Germany.
15. Blaine W. Andersen., The analysis & Design of Pneumatic Systems, John Wiley & Sons, Inc., 1967.
16. Sterwart., Hydraulic & Pneumatic power for production-Industrial Press.

PM374T: Quality Engineering and Management

3-1-0-0-3

(Prerequisite: Basic Probability and Statistics)

Quality Improvement in the Modern Business Environment, Modeling process quality, inferences about process Quality- Methods and philosophy of Statistical Process Control, Control Charts for Variables, Control Chart for Attributes, process and Measurement System Capability Analysis- Factorial and Fractional Factorial Experiments for Process Design and Improvement, Process optimization with Designed Experiments- Acceptance sampling, Reliability concepts and estimation.

Text Book:

1. Montgomery, douglas C., Introduction to Statistical Quality Control – fourth edition, John Wiley & Sons Inc., NewDelhi, 2001.

References:

1. Besterfield, Dale H., Besterfield, Carol, Besterfield - Michna, Glen H., Besterfield – Scare, Mary., Total Quality Management – third edition, Pearson Education, New Delhi, 2003,
2. Wadsworth, Harrison M., Stephens, Kenneth S., Godfrey, Blanton A., Modern Methods for Quality Control & Improvement – Second Edition, John Wiley & Sons Inc., New Delhi, 2002.
3. Lawson, John & Erjavec, John, Modern Statistics for Engineering & Quality Improvement, Thomson Duxburg, Indian EPZ edition, 2000.

PM375T: Work System Design

3-1-0-0-3

Definition and scope of work design and measurement-Work Design and Methods Study - Principles of motion economy; Work Measurement, Establishment and maintenance of time standards, Allowances and Performance rating; Precision time measurement,, Pre-determined fundamental motion time standards, Work sampling; Work Study in Office.

Ergonomics: Nature of man-machine systems and characteristics; Information input and processing – sources and pathways of stimuli - Human information processing; Visual displays – Quantitative and qualitative displays, General guidelines in design of visual displays; Auditory and tactual displays; Speech communication; Bases of human motor activity, Human control of systems, Compatibility, Influence of display factors and control factors on system control.

Text Books:

1. Barnes, R. M., Motion & Time Study: Design & Measurement of Work, John Wiley & Sons, NY, 7e, 1980.
2. Mark S. Sanders & Ernest J. McCormick, Human Factors in Engineering and Design, Tata, McGraw-Hill, 1976.

References:

1. Marvine E., Ph.D. Mundel, Ph.D. Danner, David L. Anner, Motion and Time Study, Prentice Hall.
2. Murrell K.F.H. & Schnauber, H., Ergonomics, Econ, Munich, 1986.
3. Gavriel Salvendy, Handbook of Human Factors & Ergonomics, Interscience, 1997.

PM376T: Technology Management

3-1-0-0-3

Introduction to technology management – concepts – technological changes – approaches – technology cycle – technology acquisition – technology transfer, absorption, diffusion intellectual property rights.

Text Book :

1. Hawthorn E.P., The management of Technology, McGraw Hill, 2000.

References:

1. Babcock D.L., Managing Engineering Technology, Prentice Hall '98.
2. Burgelman et.al., Strategic Management of Technology and Innovation, Tata McGraw Hill, 2001.
3. Cleland & Bursic., Strategic Technology Management, A Macom Publishers, Newyork, 1999.
4. Betz. F., Managing Technology – Competing through new ventures, innovation and corporate research, Prentice Hall, 1998.

ME377T: Theory of Metal Forming

3-1-0-0-3

Review of the theory of stress and strain - yield criteria - stress space representation - plasticity - true stress strain curves - empirical relations for work hardening materials - behavior of anisotropic materials - plastic stress strain relations - the elastic-plastic problem of bending - torsion - and other simple problems - theory of metal forming operations like drawing extrusion - rolling and forging - slip line field theory - bound theorems.

References:

1. Hoffman and Sachs, Introduction to the Theory of Plasticity for Engineers, McGraw Hill Book Co, New York, 1987.
2. Chakravarty J., Theory of Plasticity, van Nostrand Reinhold Co., London, 1975.

SEVENTH SEMESTER

PM351T: Operations Research

3-1-0-0-3

Methodology of operations research – Linear programming model formulation – Graphical solution - Theory of simplex method – Two-phase method – Charne’s Method – Duality – Primal-dual relationships – Formulation and solution of transportation problem and assignment problem – Games theory – Two-person zero-sum games – Graphical method and linear programming method – Dynamic programming problems with a finite number of consecutive decisions – Queueing theory – Steady state solution of single server model (Poisson input and exponential service times).

Text Books:

1. Hadley, G., Linear Programming, Addison Wesley/Narosa, Narosa, Narosa publishing House, 1987.
2. Taha, H. A., Operations Research : An introduction, Sixth Edition, Prentice Hall of India Private Limited, New Delhi, 1997.

References:

1. Hillier, F.S.& Liberman, G.J., Introduction to Operations Research, Seventh Edition, McGraw Hill International Edition, 2001.
2. Ravindran A., Philips,D & Solberg, J.J., Operations Research: Principles and Practice, Second Edition, John Wiley & Sons Inc. 1989.
3. Murthy, K.G., Linear & Combinational Programming, John Wiley & Sons, 1976.

ME401D: Machine Design

4-0-0-0-4

Steps in design process; selection of materials; design for static , impact and fatigue loading; threaded fasteners; design of welded joints, springs, clutches & brakes and belt & chain drives; design of shafts and keys; design of spur, helical, bevel and worm gears; lubrication and bearing design; selection of rolling contact bearings.

Text Book:

1. Joseph Edward Shigley Mechanical Engineering Design – McGraw Hill Book Co.

References:

1. Siegel, Maleev & Hartman., Mechanical Design of Machines – International Book Company
2. R.M. Phelan., Fundamentals of Mechanical Design – Tata McGraw Hill Publishing Co.Ltd
3. V.L. Doughties & A.V. Vallance., Design of Machine elements –McGraw Hill Book Co.
4. R.C. Juvinall & K.M. Marshek., Fundamentals of Machine Component design (Second Edition) – John wiley & sons

Data Handbooks (allowed for reference during examinations also):

1. Prof.B.R. Narayana Iyengar & Dr. K. Lingaigh., Machine Design Data Handbook,Vol.I & II
2. P.S.G. Tech., Machine Design Data Hand Book.

ME441L: Heat Transfer Laboratory

0-0-0-3-1

Introduction to fundamentals of heat transfer – condensation and boiling, heat exchangers and experimental techniques in thermal sciences.

References:

1. Holman J.P., Heat Transfer, McGraw Hill.
2. Beckwith & Buck, Mechanical Measurements, McGraw Hill.

PM442L: CAD/CAM Lab**0-0-0-3-1**

Introduction to Computer Graphics – Viewing transformations, Curves and Surfaces generation – Familiarity with Boolean operations – Sweep, Revolve, Loft, Extrude, Filleting, Chamfer, Splines etc. Windowing, View Point, Clipping, Scaling and Rotation Transformations using commercial solid modeling packages. Introduction to FEM-Mesh generation, Linear and Non Linear analysis-Static Dynamic analysis, Post Processing, Exercises on Heat Conduction, fluid flow and Elasticity may be given using commercial FEM packages, Synthesis and Design of Mechanisms-Animations, Exercises on various mechanisms like four bar linkages and its variations, cam and follower, Two and Four Stroke engines, Design for manufacturability- use of commercial software packages, Exercises in Process Control using PLC-PID control strategy, CNC Part Programming fundamentals-Manual Part Programming and Computer Aided Part Programming. Exercises on CNC Lathe and Machining Center/Milling machines., Rapid Prototyping, Hands on training on industrial robots-manual and programmed path planning, Demonstration of the capability of Coordinate Measuring Machine using sample component e.g.: Engine Block – Concepts of Reverse Engineering and Rapid Prototyping.

References:

1. Rogers, D.F. & Adams, J.A., Mathematical Elements for Computer Graphics, McGraw Hill, 2nd Edition, 1990.
2. Rogers David F., Procedural Elements for computer Graphics, McGraw Hill, 1985.
3. Cook, Robert Davis et al., Concepts & Applications of Finite Element Analysis, John Wiley & Sons, 1989.
4. Koren, Yoram, Computer Control of manufacturing System, McGraw Hill, 1983.
5. Kundra, Rao & Tewari, Numerical Control & Computer Aided Manufacturing, Tata McGraw Hill.
6. Ramamurthy, V., Computer Aided Mechanical Design, Tata McGraw Hill.
7. Fu, K.S., Gonzalez R.C. & Lee C.S.G., Robotics: Control, Sensing, vision & Intelligence, McGraw Hill, 1987.
8. Koren, Yoram, Robotics for Engineers, McGraw Hill, 1985.
9. John A Bosch, Coordinate measuring Machines &Systems, Marcel Decker Inc., New York, 1995.

ME444P: Project**0-0-0-3-3**

Students are required to enroll in this course to complete the degree requirements. The project work commenced in VII Semester shall be continued in VIII Semester, normally 3 hours/week. At the end of seventh semester, a mid term evaluation will be conducted by a project evaluation committee.

Electives**ME421T: Mechanical Behaviour & Testing of Materials****3-1-0-0-3**

Crystal imperfection – Plastic deformation by slip and twinning – Shear strength of materials – Dislocation theory – Yield point phenomena – Strain hardening – Annealing of cold worked metal – Theory of brittle fracture – Ductile fracture, fatigue – Creep – Fracture at elevated temperatures – The tension test – Instability – Measurement of ductility – Effect of strain rate – Hardness tests – Flow of metal –Torsion test – Torsion stress for large plastic strains – Torsion failure.

Text Book:

1. Dieter, G.M., Mechanical Metallurgy, McGraw Hill Inc, 2001.

References:

1. Hertzberg R.W., Deformation and fraction Mechanics, John Wiley and Sons.
2. Mc Clinock and Ali Argon S., Mechanical behavior of materials.
3. Reed Hill and Robert E., Physical Metallurgy Principles, East West Press.

ME422T: Computational Methods in Fluid Flow and Heat Transfer 3-1-0-0-3

Classifications of Partial Differential Equations (PDE) Discretization methods of Partial Differential Equations and Physical domain.-Finite Difference formulations of Partial differential equations and boundary conditions.-Grid generation methods – Adaptive grids. Marching techniques – Explicit-implicit – crank-Nicholson – ADI – ADE Methods-Consistency, stability and convergence for marching problems – stability analysis-Finite difference schemes used for model equations: Heat equation, Laplace's equation, First order wave equation and Berger's equation-Finite volume methods for diffusion and convection – diffusion problems-Calculation of the flow field using stream function – vorticity approach, staggered grid-Pressure – velocity coupling – SIMPLE, SIMPLER, QUICK algorithms.

References:

1. D. A. Anderson, J. C. Tennehill & R. H. Pletecher, Computational Fluid Mechanics & Heat Transfer, Hemisphere, 1984.
2. S. V. Patankar, Numerical Heat Transfer & Fluid Flow, Hemisphere, 1980.
3. K. Muraleedhar and T. Sundararajan, Computational Fluid Flow & Heat Transfer, Narosa, 1995.
4. H. K. Versteeg & W. Malalasekera, An introduction to computational fluid Dynamics: The Finite Volume Method, Adison Wesley-Longman, 1995.
5. P. J. Roache, Computational Fluid Dynamics, 2edn, Hermosa, 1982.
6. R. W. Hornbeck, Numerical Marching Techniques for Fluid Flows with Heat Transfer NASA, SP-297, 1973.
7. Hoffmann Klaus. A., Computational Fluid Dynamics for Engineers – Volume I, Engineering Education System, Wiehita.

ME423T: Automobile Engineering**3-1-0-0-3**

Constructional details of engines – various components – cooling systems – lubricating systems – fuel system – ignition system – transmission systems – braking systems – steering mechanism – chassis and suspension – starting mechanism – electrical equipments – trouble shooting – modern trends in automobiles – pollution and control.

References:

1. Joseph Heitner, Automotive mechanics.
2. Newton & Steeds, Automotive mechanics.
3. William Crouse, Automotive engines.
4. A. W. Judge, Motor manual (four volumes).
5. William Crouse, Automotive fuel, lubricating & cooling systems.
6. William Crouse, Automotive chassis & body.
7. William Crouse, Automotive electrical equipments.
8. Crouse & Anglin, Automotive mechanics.

ME424T: Industrial Tribology**3-1-0-0-3**

Navier-Stroke's equation; Reynolds equations; Idealized hydrodynamic bearings; finite bearings; Hydrodynamic instability; Externally pressurized and gas lubricated bearings;

surface topography; theories of friction; Wear of materials; Measurement of friction and wear.

References:

1. B.C. Majumdar, Introduction to Tribology, A.H. Wheeler, Bangalore.
2. Pinkus & Sternlicht, Theory of hydrodynamic lubrication, John Wiley & Son, New York.
3. D. F. Moore, Principle & Application of Tribology, Pergamon Press, New York.
4. E. Rabinowicz, Friction & Wear of Metals, John Wiley & Sons, New York.
5. K. L. Johnson, Contact Mechanics, Cambridge University Press.
6. T. R. Thomas, Rough Surfaces, Longman Inc.

PM425T: Supply Chain Management

3-1-0-0-3

Evolution of Supply Chain Management (SCM) from logistics management - Decision phases in a supply chain - Achieving strategic fit - Supply chain drivers and obstacles - Information technology and SCM - Enterprise resource planning systems and SCM - Role of purchasing in SCM - Sources of supply - Outsourcing and Make or Buy decisions - General procurement procedures - Managing inventories in a supply chain - Inventory models with constraints - Managing uncertainty in a supply chain using safety inventory - Determining appropriate level of safety inventory - Transportation in a supply chain - Design options for a transportation network - Routing and scheduling in transportation - Facility decisions - Models for facility location and capacity allocation.

Text Books:

1. Chopra, S. & Meindl, P., Supply Chain Management, Pearson Education, Inc., 2001.
2. Doebler, D.W. & Burt, D.N., Purchasing & Supply Management: Text & Cases, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, a. 1996.
3. Tersine, R.J., Principles of Inventory & Materials Management, Fourth Edition, Prentice-Hall Inc., New Jersey, 1994.

References:

1. Christopher, M., Logistics & Supply Chain Management, IInd Edition, Financial Times Professional Ltd, '98.
2. Narasimhan, S.L., McLeavy, D.W. & Billington, P.J., Production Planning & Inventory Control, Second Edition, Prentice Hall of India Private Limited, 1995.
3. Raghuram, G. & Rangaraj, N., Logistics & Supply Chain Management: Cases & Concepts, Macmillan India Limited, New Delhi, 2000.
4. Arnold, J.R.T. & Chapman, S.N., Introduction to Materials Management, Fourth Edition, Prentice-Hall Inc., 1998.

PM426T: Cost Analysis & Control

3-1-0-0-3

Cost analysis – need – classification – elements of cost overheads – depreciation – cvp analysis – costing systems – absorption costing, variable costing – standard costing and variance analysis.

Text Book:

1. Khan M.Y. & P.K. Jain, Management Accounting, 3rd edn., Tata McGraw Hill, 2002.

References:

1. Duccan Williamson, Cost & Management accounting, Printice Hall of India, 1999.
2. Hilton et.al., Cost Management, 2nd edn., Tata McGraw Hill, 02.

3. Khan M.Y. & Jain P.K., Cost Management, TMH outline series, 2nd edition , 2000.

ME427T: Aerodynamics

3-1-0-0-3

Potential theory, conformal transformation, Blassius theorem, Kutta theorem, Jowkowski transformation, Aerofoil, thin aerofoil theory, finite wing theory.

References:

1. Kuethe & Chow, Foundations of aerodynamics- Wiley 1976.
2. Katz & Plotkin, Low speed aerodynamics-Mc Graw Hill 1990.
3. Milne Thomson. L. M., Theoretical hydrodynamics, Mc Millen, 1958.
4. John D. Anderson Jr., Fundamentals of Aerodynamics, Mc Graw Hill.
5. E.L.Houghton & A.E.Brock, Aerodynamics for Engineering Students, Edward Arnold (Publishers) Ltd.

ME429T: Heating Ventilation & Air Conditioning

3-1-0-0-3

Principles of refrigeration – vapour compression refrigeration system – components – air refrigeration – absorption refrigeration – psychrometry – psychrometric processes – air conditioning systems-human comfort-cooling load calculations-duct design-air distribution systems-heating systems-heat pump-air conditioning equipments and control systems.

References:

1. Stoecker, Refrigeration & Air conditioning.
2. Dossat, Refrigeration & Air conditioning.
3. Jordan & Priester, Refrigeration & Air conditioning.
4. Arora, Refrigeration & Air conditioning.
5. Noman Harris, Modern Air conditioning Practice.
6. Stoecker, Principles of Air conditioning.
7. Laub, Heating & air conditioning of buildings.
8. Kell & Marting, Air conditioning & Heating of buildings.
9. Carrier's Handbook for Design of Unit Air Conditioners.

ME430T: Computer Graphics

3-1-0-0-3

Aim: Give an introduction and overall idea about computer graphics- Procedural elements of computer graphics- overview of graphics devices, Line and circle drawing algorithms, hidden line removal algorithms, etc. - Mathematical elements of Computer Graphics – Viewing - transformations, Mathematical modeling of curves and surfaces.

Text Books:

1. David F. Rogers & J H Adams, Mathematical Elements of Computer Graphics, 2nd edn., McGraw Hill International Editions 1990.
2. David F Rogers, Procedural Elements for Computer Graphics, McGraw Hill International Editions, 1995.

References:

1. Donald Hearn & M Pauline Baker, Computer Graphics; Second edition, Prentice Hall of India Private Limited, 1995.
2. Foley, Van Dam Feiner & Hughes, Computer Graphics Principles & Practice, Second Edition, Addison-wesley Publishing Co. 1997.
3. Michael E Mortenson, Geometric Modeling, John Wiley & sons, 1985.

PM432T: Organisation Behavior**3-1-0-0-3**

Organisation behavior – development – individual behavior values – attitudes – emotions – perceptions – abilities group process – team – communications – conflict – work design and technology – organization culture – change – stress management.

Text Book:

1. Robbins, Organizational Behavior, 9/e, Pearson Education, 2002.

References:

1. Greenberg & Baron, Behavior in Organizations, 7/e, Pearson Education, 2002.
2. Machane & Vonglinow, Organizational Behavior, 2/e, TMH, 2003.
3. Hersey, Balaschard & Johnson, Management of organizational Behavior, 8/e, Pearson Education, 2002.

PM433T: Consumer Behavior**3-1-0-0-3**

Consumer – diversity in market place – market segmentation – ethics in marketing – consumer as individuals – consumer as decision makers – consumers in the social and cultural settings.

Text Book:

1. Schiffman & Kanuk, Consumer Behavior, 7/e, Pearson Education, 2000.

References:

1. Solomon, Consumer Behavior, 5/e, Pearson Education, 2001.
2. Solomon, Consumer Behavior, 5/e, Pearson Education, 2000.
3. Peter & Olson, Consumer Behavior & Marketing Strategy, 6/e, TMH, 2001.
4. Arnould, Linda & Zinkhan, Consumers, TMH, (2001).

EIGHTH SEMESTER

ME451T: Thermal Engineering–II

3-1-0-0-3

Properties of steam and steam–air mixtures – steam tables, mollier chart and psychrometric chart– solution of problems with the above charts including those on evaporative cooling and wet cooling towers- Vapour & Combined Power Cycles and Co-generation- Steam generators – Combustion equipments including Fluidized-bed Combustion chambers-Steam nozzles, turbines and condensers, Power Plant Economics and environmental aspects of thermal power systems.

References:

1. Yunus A. Cengel & Michael A. Boles, Thermodynamics an engineering approach.
2. El Wakil, Power Plant Engineering, McGraw Hill Publishing Company.
3. Vopat & Scotski, Power Station Engineering & Economy (Tata-Mc Graw Hill).
4. Rajput, Thermal Engineering.

ME352T: Operations Management

3-1-0-0-3

Decision Making – strategic and tactical decisions – Single stage decision making – Multi stage decision making – Project Management – Organisational structure –Network construction – CPM and Pert networks –Inventory control –Selective Inventory control – Independent demand systems: Deterministic models –Introduction to independent demand systems: probabilistic models-Manufacturing Planning and Controls (MPC)-Material Requirement planning (MRP) – Technical issues –Production activity control – Forecasting methods-Facilities Planning –Product design-Process design-Scrap and Equipment Estimation –Facility Design –Flow, space and activity relationship.

Text Books:

1. Chase, Aquilano & Jacobs, Production & Operations Management, Eighth Edition, Tata McGraw Hill Edition
2. Richard, J. Tersine, Principles of inventory & Materials Management, Fourth Edition, Prentice Hall Internationa
3. Vollmann, Berry & Whybark, Manufacturing Planning & Control Systems, Fourth Edition, Irwin McGraw Hill.
4. Tomkins, White, Bozer, Frazelle, Tanchoco & Trevino, Facility Planning, Second Edition, John Wiley & Sons.

SH341T: Industrial Economics

3-1-0-0-3

The scope of Industrial Economics and its History. Industrial efficiency: Concepts and Measurement. Meaning of the concept. The Determinants of efficiency levels. Some efficiency conditions in the theory of production, Efficiency and decision making process. The organizational forms and Alternative motives of the firm. Types of organisational forms. Business Motives.

The Theory of Demand. The elasticity concept. Demand for the Products of Individual firms in an Industry. Demand forecasting. The cost theory and optimum size of the firm. The theory of cost and production. The efficiency and size of the firm.

Some concepts - standard forms of Market structure - The concept of workable competition. The conceptual frame work of the study of Industrial Economics. Market strategies and innovation. The process of innovation, concepts and Relationships, Measurement of innovation activities - The Theory of technological innovation.

Diffusion of New Technology.

The need for finance - types of Finance - sources of finance - contribution of various sources finance in Indian situation. Choice of Funding: Internal VB External sources. An evaluation of Indian Industrial policy. The ways and means of Government regulation of Industry. Labour productivity - concept of labour productivity and its measurement the determinants of labour productivity.

References:

1. R.R. Barthwal, Industrial Economics, John Wiley.
2. W. Stewart, Industrial Economics: An applied approach (Macmillan)
3. Rogar Clark, Industrial Economics, Blackwall- Oxford.
4. Bhagawati and P. Desai, India: Planning for Industrialization.
5. Sharad S. Martha, Regulation and development: India's experience.
6. Bagchi, A. and N. Banerjee, Changing structure of industrial finance in India. (K.P. Bahi and Co.)
7. P.J. Devons et.al., An introduction to Industrial Economics. (Allen and Wlwin.)

ME443S: Seminar

0-0-0-3-1

Each student shall prepare a technical paper and make a 20 – 30 minute oral presentation on a current research topic relevant to mechanical engineering to the rest of the class, after scrutiny and approval of the faculty- in charge of seminar. The oral presentation and a final technical report (in the format of an ASME journal paper of not less than 12 pages) are evaluated by faculty members in charge of seminar. Appropriate weights may be given for communications skills (both verbal and written) as well as for capacity to impress the audience and ability to handle question & answer (Q&A) sessions.

ME461P: Project

0-0-0-6-5

Students are required to enroll in this course to complete the degree requirements. The project work commenced in VII Semester shall be continued in VIII Semester, normally 3 hours/week. At the end of the semester, a thesis written in an acceptable style describing an original research project, and a successful oral defense of the thesis topic before a project evaluation committee are required.

Electives

ME471T: Powder Metallurgy

3-1-0-0-3

Powder Metallurgy Process, Secondary operations, Powder production techniques; Powder properties and their characteristics, Particle size distribution, Types of distribution function, sieve analysis, Microscopy, Sedimentation analysis; Specific surface and other technological properties; Powder conditioning; compaction, Pressing equipments and tooling; Powder Injection Moulding, extrusion and rolling, Hot compaction, Hot Iso-static Pressing (HIP), equipments, tooling and applications; Explosive compaction; slip casting: sintering, single component, Sintering diagrams and sintering anomalies, Multi-component sintering-solid phase and liquid phase, infiltration and reaction sintering; Sintering atmospheres and equipments; Production routes in practice; Products of PM.

Text Book:

1. F. Thummler and R. Oberacker, An introduction to Powder Metallurgy, The Institute of Materials, The University Press, Cambridge Great Britain. ISBN 0-901716-26-X.

References:

1. ASM Handbook: Powder Metal Technologies and Applications (ASM Handbook, Vol. 7) by ASM.

ME472T: Refrigeration & Air – Conditioning Systems**3-1-0-0-3**

Principles of refrigeration – Methods of Refrigeration – Carnot refrigeration cycle – air-cycle refrigeration system – steam jet refrigeration-Vapour compression refrigeration system – theoretical and practical cycles – simple and multi-pressure systems – thermodynamic analysis-Vapour absorption systems – properties of refrigerants – System components – Compressors – Condensers, Expansion devices, Evaporators-Psychrometric properties and processes, air conditioning systems – summer, winter, year-round air conditioning systems, central and unitary systems-Human comfort and comfort chart – cooling load and heating load calculation – Duct design – Design of air conditioning systems.

Text Books:

1. Stoeckor, Refrigeration & Air Conditioning, Tata McGraw Hill.
2. Norman Harris, Modern Air Conditioning Practice, McGraw Hill.

References:

1. Dossat, Refrigeration & Air conditioning
2. Jordan & Priester, Refrigeration & Air conditioning, Prentice Hall
3. Arora, Refrigeration & Air Conditioning, Tata McGraw Hill

PM474T: Manufacturing Planning and Control**3-1-0-0-3**

Evolution of manufacturing planning and control system – Continuous improvement – Just-in-time principles – Forecasting –Time series analysis – error measurement – Aggregate planning – Quantitative methods – Master production scheduling (MPS) – MPS technique – Final assembly schedule – Material requirement planning (MRP) – Lot sizing – Buffering concept – pull production systems – Mixed model production schedule – Shop – floor control – Capacity planning and control techniques – Advanced concepts in scheduling.

Text Books:

1. Vollmann, Berry & Whybark, Manufacturing Planning & Control Systems, fourth Edition, Irwin McGraw Hill.
2. John M. Nicholas, Competitive Manufacturing Management: Continuous Improvement, Lean production & Customer – Focussed Quality, Tata McGraw Hill publishing Company Limited.

References:

1. Narasimhan, S. I., McLeavy, D. W., and Billington, P. J., Production planning and Inventory Control, Second Edition, 2000, Prentice-Hall of India.
2. Tersine, R. J., Production and Operations Management: Concepts, Structure, and Analysis, Second Edition, 1985, North-Holland.
3. Monks, J. G., Operations Management: Theory and Problems, Third Edition, 1987, McGraw Hill, International Edition.
4. Panneerselvam, R., Production and Operations Management, 2001, Prentice-Hall of India, New Delhi.

PM475T: Accounting & Finance for Engineers**3-1-0-0-3**

Finance – scope – objectives – time value of money – financial accounting – financial statement analysis – sources of finance – working capital – financial planning – capital budgeting.

Text Books:

1. Khan M.Y. and Jain P.K, Financial Management, 3rd edn., Tata McGraw Hill 2003.
2. Jawahar Lal, Financial Accounting, 2nd edn., Wheeler publishing 2000.

References: -

1. I.M. Pandey, Financial Management, 8th edn., Vikas publishing house 2003.
2. Prasanna Chandra, Financial Management, 4th edn., Tata McGraw Hill 2003.

ME478T: Introduction to Robotics**3-1-0-0-3**

Manipulator Kinematics: Introduction to robotics, classification of robots, workspace analysis, Convention for affixing frames to links-DH Representation, Derivation of Direct kinematic equations for various types of robots.

Inverse Manipulator Kinematics: Solvability, algebraic vs. geometric, Pipers solution when three axes intersect, Examples of inverse manipulator kinematics, repeatability and accuracy.

Jacobians: Velocities and static forces: Linear and rotational velocity of rigid bodies, velocity propagation from link to link, jacobians, singularities, static forces in manipulators, jacobians in force domain, Cartesian transformation of velocities and static forces.

Trajectory Generation: General consideration in path description and generation, joint space schemes, collision free path planning, Robot programming.

Sensing and vision - range sensors, proximity sensors, touch sensors, force and torque sensors - Low level and high-level vision. Robot intelligence and task planning.

References:

1. K S Fu R C Gonzales, C S G Lee: Robotics Control, Sensing, Vision and intelligence, McGraw Hill 1987.
2. John J Craig, Introduction to Robotics, Mechanics and control, second edition Addison - Wesley, 1999.
3. Mark W Spong & M Vidyasagar, Robot Dynamics and Control, John Wiley & Sons, 1989.
4. R P Paul: Robot Manipulators Mathematics Programming, Control, The computer control of robotic manipulators, The MIT Press 1979.
5. Robert J Schilling: Fundamentals of Robotics, Analysis and Control. Prentice Hall of India 1996.
6. Gonzalez/Woods, Digital Image Processing, Addison Wesley, 1993.

PM479T: Discrete Event System Simulation**3-1-0-0-3**

Introduction to system concept, modelling and simulation - Monte carlo simulation - Examples of single server queueing systems and inventory systems - Concepts in discrete event system simulation - Event scheduling/time advance algorithm - Random number generation - Random variate generation - Input modelling for simulation - Verification and validation of simulation models - Output analysis for a single model - Simulation modelling and analysis of manufacturing systems – Introduction to simulation software for manufacturing applications.

Text Book:

1. Banks, J., Carson, J.S. & Nelson, B.L., Discrete-Event System Simulation, Second Edition, Prentice Hall of India Private Ltd, '96.

References:

1. Deo, N., System Simulation with Digital Computer, Prentice Hall of India Private Limited, 1996.
2. Gordon, G., System Simulation, Prentice Hall of India Private Limited, 1996.

3. Kelton, W.D., Sadowski, R.P & Sadowski, D.A., Simulation with ARENA, CB/McGraw-Hill International Edition, 2000.
4. Law, A.W. & Kelton, W.D., Simulation Modeling and Analysis, Third Edition, McGraw-Hill International Edition, 2000.

ME481T: Human Resource Management

3-0-0-0-3

Personnel functions – Job analysis – Evaluation – Salary, wages and incentives administration, Dimensions of Human behaviour – measurement – Theories of motion – Group behaviour – labour laws – Industrial conflict resolution, work organization – Process of organizational change.

References:

1. Fred Luthans, “Organizational Behaviour”, McGraw Hill International Student Edition.
2. Dwivedi, R.S., “Manpower Management – An Integrated Approach to Personnel Management and Labour Relations”, PHI, 1984.
3. Yoder D., and Staodohar P. D., “Personnel Management and Industrial Relations”, PHI 1986.
4. Monappa A., and Saiyadain M. S., “Personnel Management”, TMH, 1988.
5. Kapoor N. D., “Introduction to Commercial and Industrial Law”, Sultan Chand & Sons, New Delhi, 1986.