

Semester 3

Theory

S.no	Subject name	L	P	M
01	Digital electronics	4	0	100
02	Electrical machines and drives	4	0	100
03	Fluid mechanics and machinery	4	0	100
04	Kinematics of machines	4	0	100
05	Mathematics III	4	0	100

Practical

S.no	Subject name	L	P	M
06	Computer graphics and drafting	4	0	100
07	Electronics laboratory	4	0	100
08	Fluid Mechanics and Machinery lab			

SEMESTER III

Fluid Mechanics and Machinery

4 0 100

1. INTRODUCTION (6)

Units and Dimensions for Fluid Mechanics - Properties of fluids - density, specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws - Capillarity and surface tension.

2. FLUID FLOW CONCEPTS AND BASIC EQUATIONS (6)

Flow characteristics, concepts of system and control volume - Continuity equation - application of control volume to continuity - Energy equation - Euler equation - Bernoulli equation and Momentum equation.

3. FLOW THROUGH CIRCULAR CONDUITS (6)

Laminar flow through circular tubes and Annuli boundary layer concepts - Boundary layer thickness - Hydraulic and energy gradient - Darcy equation on pipe roughness - Friction factor - Moody diagram - Minor losses - Flow through pipes in series and in parallel - Commercial pipes.

4. DIMENSIONAL ANALYSIS (6)

Dimensions and units, the Buckingham II theorem. Discussions on dimensionless parameters - Models and similitude - Application of dimensionless parameters.

5. ROTODYNAMIC MACHINES (6)

Homologous units, specific speed, elementary cascade theory, theory of turbo machines, Euler's equation, Hydraulic efficiency, Velocity components at entry and exit of a rotor - Velocity triangle for single stage radial flow and axial flow machines, Centrifugal pumps, turbines, performance curves for pumps and turbines.

6. POSITIVE DISPLACEMENT MACHINES (6)

Reciprocating pumps, indicator diagram, work saved by air vessels - Rotary pumps, classification, working, performance curves.

7. TUTORIAL (9)

TOTAL HOURS: 45

Text Books:

1. Kumar K.L., " Engineering Fluid Mechanics ", Eurasia Publishing House (P) Ltd., New Delhi, (7th Edition), 1995.
2. Bansal R.K., " Fluid Mechanics and Hydraulic Machines ", (5th Edition), Laxmi Publications (P) Ltd., New Delhi, 1995.
3. Roberson J.A. & Crowe C.T., " Engineering Fluid Mechanics ", M/s Jaico Publishing Co., 1998-99.

References:

1. Streeter V.L. and Wylie E.B., " Fluid Mechanics ", McGraw Hill, 1983.
2. Ramamirtham S., " Fluid Mechanics, Hydraulics and Fluid Machines ", Dhanpat Rai & Sons, Delhi, 1988.

SEMESTER III

Digital Electronics

4 0 100

1.NUMBER SYSTEM AND BASIC LOGIC

(9)

Number systems-Binary, Octal, Hexadecimal, BCD, excess 3, complements conversions and arithmetic. Boolean theorems, Boolean algebra - AND, OR, NOT NAND & NOR operation, sum of product and product of sum forms. Minimization - Karnaugh's map, tabular minimization procedures.

2.COMBINATIONAL CIRCUITS

(9)

Problem formulation and design of combinational circuits, adder/subtractor, Encoder / decoder MUX / DEMUX, comparator, code convertor. Design of combinational circuits. ROM, EPROM, EEPROM, introduction to PAL and PLA and their use in design.

3.SEQUENTIAL CIRCUITS

(9)

Sequential circuits -SR, JK, D, T flip flops, triggering analysis of clocked sequential circuits, ripple counter, synchronous counters. Registers - shift registers, serial to parallel, parallel to serial conversions. Timing signal, RAM, semiconductor memories.

4.ASYNCHRONOUS SEQUENTIAL CIRCUITS

(9)

Stable unstable states, output specifications, cycles and races, Race free assignments, reduction of state and flowtables, hazards, pulse mode sequential circuits.

5.ALGORITHMIC STATE MACHINES

(9)

ASM chart-timing considerations-control implementation-design with multiplexers and PLA.

TOTAL HOURS:45

Text Book :

1. M.Morris Mano, Digital Circuits and Logic Design, PHI, 1994.
2. S.C.Lee, Digital Circuits and Logic Design, PHI, 1989.

References:

1. W.H.Gothmann, Digital Electronics- Introduction Theory and Practice, PHI, 1992.
2. T.L.Floyd, Digital Fundamentals, PHI, 1986

SEMESTER III

Electrical Machines and Drives

4 0 100

1. INTRODUCTION (4)

Types of electrical drives - factors influencing the choice of electrical drives, heating and cooling curves - loading conditions and classes of duty - determination of power rating.

2. ELECTRICAL MOTORS CHARACTERISTICS (6)

Speed - Torque and braking characteristics, DC motors, three phase and single phase induction motors.

3. STARTING METHODS (6)

Types of DC and AC motors starters - typical control circuits for DC series and shunt motors - three phase cage and slip ring induction motors, protective devices for the same.

4. CONVENTIONAL SPEED CONTROLS (6)

Speed control of DC series and shunt motors - armature and field control Ward - Leonard control system - three phase induction motor - voltage, frequency and slip power control.

5. SOLID STATE SPEED CONTROL (8)

(Power Circuit and Qualitative treatment only) Control of DC drives using rectifiers and choppers Control of three phase induction motors using stator voltage control - Voltage/frequency control and slip power recovery schemes, electrical power distribution schemes, substations and earthing (including that of mines).

6. PRACTICAL (15)

Speed control of DC shunt Motor - Load test on DC compound Motor - Load test on DC Series motor - Load test on 3 phase Induction motor - Study of Induction Motor starters.

TOTAL HOURS:45

Text Books:

1. Partab H., " Art and Science of Utilisation of Electrical Energy ", Dhanpat Rai and Sons, Delhi, 1985.

References:

1. Pillai, S.K., " A First Course on Electrical Drives ", Wiley Eastern Ltd., New Delhi, 1982.

SEMESTER III

Mathematics III

4 0 100

1. PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation - Solutions of standard types of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

2. FOURIER SERIES (9)

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity - Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS (9)

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

4. LAPLACE TRANSFORMS (9)

Transforms of simple functions - Basic operational properties - Transforms of derivatives and integrals - Initial and final value theorems - Inverse transforms - Convolution theorem - Periodic functions - Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients and simultaneous equations of first order with constant coefficients.

5. FOURIER TRANSFORMS (9)

Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

TOTAL HOURS:45

Text Books:

1. Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition), John Wiley and Sons, (Asia) Pte Ltd., Singapore, 2000.
2. Grewal, B.S., " Higher Engineering Mathematics " (35th Edition), Khanna Publishers, Delhi 2000.

References:

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " Engineering Mathematics ", Volumes II & III (4th Revised Edition), S. Chand & Co., New Delhi, 2001.
2. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " Advanced Mathematics for Engineering Students ", Volumes II & III (2nd Edition), S. Viswanathan (Printers & Publishers, Pvt. Ltd.) 1992.
3. Venkataraman, M.K. " Engineering Mathematics " Volumes III - A & B, 13th Edition National Publishing Company, Chennai, 1998.
4. Shanmugam, T.N. : <http://www.annauniv.edu/shan/trans.htm>

SEMESTER III

Kinematics of Machines

4 0 100

1. BASICS OF MECHANISMS

(9)

Terminology and Definitions - Degree of Freedom Mobility - Kutzbach criterion - Grashoff's law - Kinematic Inversions of 4-bar chain and slider crank chains - Mechanical Advantage - Transmission angle - Description of common mechanisms - Single, double and offset slider mechanisms - Quick return mechanisms - Snap-action Mechanisms - Linear actuators - Motion Adjustment mechanisms clamping mechanisms - Ratchets and escapements - Indexing Mechanisms - Rocking Mechanisms - Straight line generators - Design of Crank-rocker Mechanisms.

2. KINEMATICS

(9)

Displacement, velocity and acceleration and analysis in simple mechanisms - Graphical Method velocity and acceleration polygons - Instantaneous Centre of Velocity - Angular velocity ratio theorem - Kinematic analysis by Algebraic methods - Complex Algebra methods - Vector Approach, Computer applications in the kinematic analysis of simple mechanisms - Coincident points - Coriolis Acceleration.

3. KINEMATICS OF CAM

(9)

Classifications - Displacement diagrams - parabolic Simple harmonic and Cycloidal motions - Layout of plate cam profiles - Derivatives of Follower motion - High speed cams - circular arc and tangent cams - Standard cam motion - Pressure angle and undercutting.

4. GEARS

(9)

Spur gear Terminology and definitions - Fundamental Law of toothed gearing and involute gearing - Interchangeable gears - gear tooth action - Terminology - Interference and undercutting - Non standard gear teeth - Helical, Bevel, Worm, Rack and Pinion gears (Basics only) - Gear trains - Parallel axis gear trains - Epicyclic gear trains - Differentials - Automotive transmission gear trains.

5. FRICTION

(9)

Surface contacts - Sliding and Rolling friction - Friction angle - Friction in screws with square thread - Friction in V threads - Friction drives - Friction clutches - Belt and rope drives, Friction aspects in Brakes - Friction in the Propulsion and braking of vehicles - tractive resistance.

TOTAL HOURS:45

Text Books:

1. Shigley J.E. and Uicker J.J., " Theory of Machines and Mechanisms ", McGraw Hill, Inc., 1995.

References:

1. Thomas Bevan, " Theory of Machines ", CBS Publishers and Distributors, 1984.
2. Ghosh A. and Mallick A.K., " Thoery of Mechanisms and Machines ", Affiliated East-West Pvt.Ltd., New Delhi, 1988.
3. Rattan S.S., " Theory of Machines ", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998.
4. Rao J.S. and Dukkanpati R.V., " Mechanism and Machine Theory ", Wiley-Eastern Limited., New Delhi, 1992.
5. John Hannah and Stephens R.C., " Mechanics of Machines ", Viva Low-Prices Student Edition, 1999.

SEMESTER III

Fluid Mechanics and Machinery Lab

0 3 100

1.EXPERIMENTS ON FLOW MEASUREMENTS

Venturimeter, Orificemeter, Rotometer

2.EXPERIMENT TO DETERMINE FRICTION FACTOR IN PIPES

3.EXPERIMENTS TO DRAW THE CHARACTERISTIC CURVES OF PUMPS

Centrifugal pump, submersible pump. Reciprocating pump and Gear pump.

4.EXPERIMENTS TO DRAW THE CHARACTERISTIC CURVES OF TURBINES

Pelton Wheel, Francis turbine and Turgo impulse wheel

5.CLASS TESTS

TOTAL HOURS:45

SEMESTER III

Computer Graphics and Drafting

0 3 100

1. GEOMETRY CREATION

Creation of simple geometric bodies using basic primitives (line, arc, circle) and editing the drawing.

2.DRAWING STANDARDS

Dimensioning and text writing - concept of layers (creation and setting) line types and forms.

3.ADVANCED CONCEPTS OF CAD SOFTWARE

Creation of blocks, attributes for standard parts and inserting them in the drawing.

4.DRAFTING

Preparation of 2-D drawings for machine components (bolts, nuts, flange coupling, connecting rod, camprofile) - 3-D modeling - solid, surface, wireframe using standard CAD packages - Assembly of standard parts created using 3-D model - creation of 2-D drawings from 3-D models using CAD packages, different views, sections, isometric view and dimensioning them - Parametric modelling, creating standard machine parts, connecting rod, flange coupling, bearings.

5.PRACTICAL

TOTAL HOURS:45

References:

1. " CAD and Solid Modeling Software Packages Auto CAD and Ideas Manuals of Latest Version ".
2. Asthana R.C.S. and Sinha N.K., " Computer Graphics - for Scientists and Engineers ", New Age International (P) Ltd., New Delhi, 1997.
3. Nagewara Rao P., " Auto Cad 14 for Engineers Drawing made by Easy ", Tata McGraw Hill Publishing Co., Ltd., 1999.