

SEMESTER 3

12E301 LINEAR ALGEBRA AND NUMERICAL ANALYSIS

3 0 2 4

VECTOR SPACE: General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space, Eigen values and Eigen vectors, diagonalization. (12+8)

ERRORS: Computer arithmetic and errors. (2+2)

SYSTEM OF LINEAR EQUATIONS: Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria. (4+3)

EIGEN VALUES AND EIGEN VECTORS: Power method, QR method. (3+2)

NONLINEAR EQUATIONS: False position method, Newton's method, convergence criteria, Bairstow's method, Graeffe's root squaring method. (4+3)

INTERPOLATION: Lagrange's polynomial, divided differences, interpolation for evenly spaced data. (5+3)

DIFFERENTIATION AND INTEGRATION: Numerical differentiation evenly spaced and unevenly spaced data, numerical integration, Newton-Cotes formulae, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gaussian quadratures. (5+3)

ORDINARY DIFFERENTIAL EQUATIONS: Numerical methods for initial value problem, Taylor-series, Euler and Modified Euler method, Runge-Kutta methods, Multi step methods - Milne method, Adams Moulton Method, solution of second order boundary value problem by finite difference method. (10+6)

Total L: 45+ P: 30=75

TEXT BOOKS:

1. Howard Anton and Chirs Rorres "Elementary Linear Algebra Applications Version", Wiley India, New Delhi, 2010.
2. Curtis F Gerald and Patrick O Wheatly, "Applied Numerical Analysis", Pearson Education, New Delhi, 2011.

REFERENCES:

1. David Clay, "Linear Algebra and its Applications", Addison-Wesley, Boston, 2009.
2. Gareth Williams "Linear Algebra with Applications", Narosa Publishing House, New Delhi, 2009
3. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers with Software and Programming Applications", Tata McGraw-Hill, New Delhi, 2007
4. Rizwan Butt "Introduction to Numerical Analysis Using Matlab", Infinity Science Press, Hingham, 2008.

PRACTICALS :

Exercises using MATLAB

12E302 APPLIED MECHANICS

3 1 0 3.5

STATICS OF PARTICLES: Forces – systems of forces - concurrent forces in plane - resultant - problems involving the equilibrium of a particle - free body diagram. (6+2)

STATICS OF RIGID BODIES IN TWO DIMENSIONS: Rigid bodies - two dimensional structure - moment of force about an axis - moment of a couple - equivalent systems of coplanar forces - rigid body in equilibrium - problems involving equilibrium of rigid body - types of supports - reactions of beams and frames. (6+2)

ANALYSIS OF TRUSSES & CABLES: Roof trusses - Method of joints - Method of sections. Cables - Cable having supports at different levels – calculation of sag - length of cable and tension. (6+2)

CENTROID AND MOMENT OF INERTIA: Centroids of areas, composite areas, determination of moment of inertia of plane figures, polar moment of inertia - radius of gyration. (5+1)

AXIAL STRESSES AND STRAINS: Stress and strain due to axial force - elastic limit - Hooke's law – elastic constants -factor of safety - stepped bars - uniformly varying sections - stresses in composite bar due to axial force. (6+2)

SHEAR FORCE & BENDING MOMENT DIAGRAMS: Bending moment and shear force diagrams in simply supported, overhanging and cantilevers subjected to concentrated loads and UDL. (6+2)

FLEXURAL STRESSES: Theory of simple bending and assumptions - flexure equation - section modulus - normal stresses due to flexure. (5+2)

TORSION: Concept of torsion and torsional shear stress – torsion formula - design of circular shaft – Power transmitted by a shaft (5+2)

Total = L: 45; T:15 = 60

TEXT BOOKS:

1. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics - Statics and Dynamics", Vikas Publishing House, New Delhi, 2011.
2. Beer F P and Johnson E R, "Mechanics of Materials", Tata McGraw-Hill, New Delhi, 2010.

REFERENCES:

1. Beer F P and Johnson E R, "Vector Mechanics for Engineers, Statics & Dynamics", Tata McGraw-Hill, New Delhi, 2011.
2. Bhavikatti S S, "A Text book of Engineering Mechanics", New Age International, New Delhi, 2012.
3. Hibbeler R C, "Mechanics of Materials", Pearson Education, New Delhi, 2005.
4. Punmia B C and Jain A K, "Strength of Materials and Theory of Structures" - Vol.1, Laxmi Publications, New Delhi, 2006.
5. Hearn E J, "Mechanics of Materials", Vol. I, Pergamon Press, Oxford, 1977.

12E303 DIGITAL ELECTRONICS**3 1 0 3.5**

NUMBER SYSTEMS AND BOOLEAN ALGEBRA: Review of Number Systems – Number representation : Signed, Unsigned, Fixed point, Floating point. Computer codes – BCD, Gray code, Excess 3 code, Error detection and correction codes, Parity, Hamming codes. Boolean algebra – Basic Postulates and theorems, Switching functions, Canonical forms, Logic gates. (5+2)

DIGITAL LOGIC FAMILIES: Characteristics of digital ICs – Voltage and current ratings, Noise margin, Propagation delay, Power dissipation. TTL logic family – Inverter - Totem pole, Open collector and tri-state outputs, Wired output operations, LS, ALS and Fast sub families - nMOS Inverter, CMOS logic Inverter. High speed CMOS (74HC, 74HCT, 74AHC, 74AHCT logic sub-families) and ECL logic families – Comparison of performance of various logic families. Interfacing TTL and CMOS devices. (7+2)

COMBINATIONAL LOGIC DESIGN: Standard representation of logic functions – Incompletely specified functions, Simplification of logic functions through K-maps and Quine-McClusky method, Implementation using logic gates. Decoders, Encoders, Multiplexers and Demultiplexers. Implementation of Combinational circuits using Multiplexers and Demultiplexers., Arithmetic circuits: Binary / BCD adders and subtractors, Magnitude comparator (8+3)

INTRODUCTION TO SEQUENTIAL CIRCUITS: General model of sequential circuits – Latch, Flip-Flops, Level triggering, Edge triggering, Master-slave configuration. Binary counters, Shift register, Ring counter, Johnson counter, Timing diagram. (6+2)

DESIGN OF SEQUENTIAL CIRCUIT: Mealy/Moore models – Concept of state, State diagram, State table - Minimal flip-flop / one-hot realization. Design of synchronous sequential circuits – Up-down / Modulus counters, Sequence detector. Introduction to Asynchronous Sequential Circuits. (6+2)

PROGRAMMABLE LOGIC DEVICES: Semicustom design. Introduction to PLDs – ROM, PAL, PLA, FPLA, FPLS. Architecture of PLDs – PAL 22V10 - Implementation of digital functions. (6+2)

INTRODUCTION TO VHDL : Digital design process flow – Entities and Architecture – Concurrent statements – sequential statements – Behavioral, Dataflow, and Structural modeling – simple VHDL codes. (7+2)

Total = L :45 + T :15 = 60**TEXT BOOKS:**

1. Tocci R J, Widmer N and Moss G, "Digital Systems: Principles and Applications", Prentice Hall of India, New Delhi, 2010.
2. Donald Givone, "Digital Principles and Design", Tata McGraw-Hill, New Delhi, 2003.

REFERENCES:

1. Nelson V P, Nagle H T, Carroll B D, and Irwin J D, "Digital Logic Circuit Analysis and Design", Prentice Hall International, New Jersey, 1996.
2. Leach D, Malvino A and Goutam Saha, "Digital Principles and Applications", Tata McGraw-Hill, New Delhi, 2011
3. Anand Kumar A, "Switching Theory and Logic Design", Prentice Hall of India, New Delhi, 2009.

12E304 NETWORK THEORY**3 1 0 3.5**

THREE PHASE CIRCUITS: Phase sequence – Star and Delta connection – phase and line quantities - Phasor diagram - Balanced and unbalanced loads – Analysis – 3-phase power measurement – Two wattmeter method - power factor calculation - Reactive power measurements (7+4)

MAGNETICALLY COUPLED CIRCUITS: Self and Mutual inductance – Co-efficient of coupling - Dot convention - Analysis of coupled circuits – Ideal two winding and auto transformers – single-tuned and double-tuned circuits. (8+3)

NETWORK TRANSIENTS: Transient concepts – complex frequency - Transient response of simple RL, RC, and RLC series and parallel circuits for step, sinusoidal and impulse signals. (8+2)

TWO PORT NETWORK: Two port network parameters – Interconnection of two port networks: series , parallel, and cascade – T-Equivalent and π -Equivalent networks – Network functions - driving point and transfer impedance /admittance - poles and zeros of network function. (8+2)

FILTERS AND ATTENUATORS: Low pass, High pass, Band pass, Band stop filters – Attenuators – T and π Type. (6+2)

NETWORK SYNTHESIS: Realisability concept – Hurwitz property - Positive real function - Properties - Synthesis of RL, RC and LC driving point impedance and admittance functions using Foster and Cauer forms. (8+2)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Charles K Alexander and Mathew N O Sadiku, "Fundamentals of Electric Circuits", Tata McGraw-Hill, New Delhi, 2009.
2. Sudhakar A, and Shyamamohan S Palli, "Circuits & Networks – Analysis and Synthesis", Tata McGraw-Hill, New Delhi, 2010.

REFERENCES:

1. Smarajit Ghosh, "Network Theory- Analysis and Synthesis" Prentice Hall of India, New Delhi, 2008.
2. Navhi M, and Edminister J A, "Theory and Problems of Electric Circuits", Tata McGraw-Hill, New Delhi, 2011.
3. Gopal G B, Prem R C and Duresh C K, "Engineering Network Analysis and Filter Design", Umesh Publications, New Delhi, 2003.

12E305 ELECTRONIC CIRCUITS

3 1 0 3.5

POWER SUPPLIES: Rectifiers – Half-wave and Full-wave rectifiers, Average and RMS value, Ripple factor, Regulation, Rectification efficiency, Transformer Utility Factor. Filters – Capacitor, Inductor, L-type and Π -type, Ripple Factor and Regulation. Need for voltage regulators – Series and Shunt regulators, Comparison, Current limiting and protection circuits. (9+3)

WAVE SHAPING: Response of High pass and Low pass RC circuit for sinusoidal, step, pulse, square, ramp and exponential inputs. Linear wave shaping–Integrator, Differentiator. Non-linear wave shaping–Clipping and clamping circuits, clamping circuit theorem and applications, Introduction to pulse transformers and applications. (8+3)

VOLTAGE AMPLIFIERS: RC-coupled amplifiers - Analysis at low, medium and high frequencies. BIFET amplifiers. DC amplifiers – Problems in DC Amplifiers, BJT Differential amplifier - Differential and Common mode gain, CMRR, MOS Differential amplifier. Cascode and Darlington Amplifiers. (9+3)

POWER AMPLIFIERS AND FEEDBACK AMPLIFIERS: Power amplifiers– Classification, Class A/B/C, Single ended and Push-pull Configuration, Power dissipation, output power and Conversion efficiency, Complementary symmetry power amplifiers, Class AB operation. Basic concepts of feedback amplifiers – Effect of negative feedback on input and output resistances, gain, gain stability, distortion and bandwidth. Voltage and current feedback circuits. (10+3)

OSCILLATORS AND MULTIVIBRATORS: Oscillators – Barkhausen criteria, RC and LC oscillators using BJT – RC phase shift, Wien bridge oscillators, Hartley and Colpitt's oscillators. Frequency stability of oscillators. Crystal oscillators. Non-sinusoidal oscillators – Multivibrators – Bistable, Monostable, Astable multivibrators and Schmitt Trigger using BJT. (9+3)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Millman J and Halkias C, SatyaBrata JIT, "Electronic Devices & Circuits", Tata McGraw-Hill, New Delhi, 2010.
2. Boylestead L R and Nashelsky L, "Electronic Devices and Circuit Theory", Pearson Education, New Delhi, 2009.

REFERENCES:

1. David A Bell, "Electronic Devices and Circuits", Oxford University Press, New Delhi, 2009.
2. Adel Sedra, Kenneth.C Smith, "Microelectronics Circuits", Oxford University Press, New Delhi, 2010.
3. Thomas L Floyd, "Electronic Devices", Prentice Hall of India, New Delhi, 2011.
4. Millman J and Taub H, Mothiki S Prakash Rao, "Pulse, Digital and Switching Waveforms", Tata McGraw-Hill, New Delhi, 2011.

12E306 ELECTROMAGNETIC FIELDS

3 0 0 3

INTRODUCTION: Review of 3D Co-ordinate Systems – Gradient, Divergence, and Curl Operations - Divergence theorem - Stokes' theorem -Line, Surface and Volume integrals. (5)

ELECTROSTATIC FIELDS: Coulomb's law – Electric field intensity - Electric flux density - Gauss's law and its Applications - Absolute potential – Potential difference - Potential Gradient - - Determination of electric field and potential due to point , line, surface and volume charge distributions – Electric Dipole - Energy density in electrostatic field. (9)

ELECTRIC FIELDS IN MATERIAL SPACE: Properties of conductors and dielectrics - convection and conduction currents - polarization in dielectrics - dielectric constant and strength - continuity equation and relaxation time- Boundary conditions involving conductors, dielectric, and free space. (6)

ELECTROSTATIC BOUNDARY-VALUE PROBLEMS: Poisson's and Laplace's equations - Uniqueness theorem- Solution of Laplace's equation of single variable only- Resistance and Capacitance determination - Method of images. (5)

MAGNETOSTATIC FIELDS: Biot Savart's law - Ampere's circuital law and its applications – Magnetic flux density, Scalar and Vector magnetic potentials - Maxwell's equations for static EM fields. (5)

MAGNETIC FORCE: Forces due to magnetic fields - Force and Torque on a closed circuit - Magnetic Materials- Boundary conditions at the interface of two different magnetic materials. (5)

INDUCTANCE: Inductance of Solenoid, Toroid, Coaxial cable and Transmission line - Energy density in magnetic field - Lifting force of a magnet. (5)

TIME VARYING FIELD: Faraday's Law – Transformer and Motional emfs- Displacement Current- Maxwell's Equations in final form- EM wave - Poynting theorem. (5)

Total 45

TEXT BOOKS:

1. Mathew N O Sadiku, "Elements of Electromagnetics", Oxford University Press, New Delhi, 2010.
2. William H Hayt Jr., John A Buck, 'Engineering Electromagnetics', Tata McGraw-Hill, New Delhi, 2011.

REFERENCES:

1. Joseph A Edminister, 'Theory and Problems of Electromagnetics', Schaum's Outline Series, Tata McGraw-Hill, New Delhi, 2006.
2. Gangadhar K A, "Field Theory", Khanna Publishers, New Delhi, 2009.

12E310 ELECTRONIC CIRCUITS & DIGITAL ELECTRONICS LABORATORY

0 0 3 1.5

1. Study of Half-wave and Full-wave rectifiers with and without capacitor filter
2. Design and Implementation of Series Voltage Regulator
3. Design and Implementation of RC coupled amplifier
4. Design and Implementation of Class B Push-Pull amplifier
5. Design and Implementation of RC Phase Shift Oscillators
6. Study of Basic Digital ICs and Implementation of Adder and Subtractor circuits
7. Design and Implementation of Code converters
8. Design and Implementation of Counters and Shift registers
9. Study of Multiplexer and Demultiplexer
10. Design and Implementation of Synchronous sequential circuit

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

12E311 ELECTRIC NETWORKS LABORATORY

0 0 3 1.5

1. Verification of line and phase voltage/current relationship for star and delta connected loads
2. Three phase power measurement by two wattmeter method (Balanced and unbalanced load)
3. Measurement of self and mutual inductance of a coil
4. Study of series and parallel connection of magnetically coupled coils
5. Analysis of magnetically coupled circuit using PSPICE
6. Response of low pass and high pass RC circuit for pulse and square input signals
7. Transient analysis of RLC series and parallel circuit using PSPICE
8. Determination of Z and Y parameters of two-port networks
9. Frequency response of low pass and high pass filters
10. Design of symmetrical T-type and π -type attenuator

REFERENCES:

1. Sudhakar A, and Shyamohan S Palli, "Circuits & Networks – Analysis and Synthesis", Tata McGraw-Hill, New Delhi, 2010.
2. Laboratory Manual, Prepared by EEE Department, 2012

SEMESTER 4

12E401 PROBABILITY, STATISTICS AND RANDOM PROCESSES

3 1 0 3.5

PROBABILITY: Introduction, axioms of probability, conditional probability, independence, Baye's formula (4+1)

RANDOM VARIABLES: Discrete random variables – Probability mass function, cumulative distribution function, expectations, variances and moments of discrete random variables, Bernoulli and Binomial random variables, Poisson random variables, Geometric random variables. (6+2)

Continuous random variables - Probability density functions, expectations and variances of continuous random variables, uniform, normal and exponential random variables. (6+2)

MULTIPLE RANDOM VARIABLES: Joint distribution of two random variables, joint probability mass function, joint probability density function, independence of discrete and continuous random variables, correlation. (4+1)

SUM OF RANDOM VARIABLES: Expectations of sums, pdf of the sum of two random variables, moment generating function, sums of independent Gaussian random variables, central limit theorem, laws of large numbers (5+2)

STATISTICAL INFERENCE: Estimation of a random variable, linear estimation of X given Y, MAP and ML estimation (5+2)

STOCHASTIC PROCESSES: Definition, types of stochastic processes – Poisson processes, The Brownian motion process, expected value and correlation, stationary processes, wide sense stationary processes (8+3)

RANDOM SIGNAL PROCESSING: Linear filtering of a random process, power spectral density, cross correlations, Gaussian processes (7+2)

Total L: 45+T: 15=60

TEXT BOOKS:

1. Roy D.Yates and David J Goodman, "Probability and Stochastic Processes – A friendly Introduction for Electrical and Computer Engineers", John Wiley & Sons, New Delhi, 2005
2. Athanasios Papoulis and Unnikrishna Pillai S, "Probability, Random Variables and Stochastic Processes", Tata McGraw-Hill, New Delhi, 2009.

REFERENCES:

1. Sheldon M. Ross, "Stochastic Processes", Wiley India, New Delhi, 2008.
2. Medhi J, "Stochastic Processes", New Age International Publishers, New Delhi, 2008.
3. Saeed Ghahramani, "Fundamentals of Probability with Stochastic Processes", Prentice Hall, New Jersey, 2005.
4. Trivedi K.S, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", Prentice Hall of India, New Delhi, 2009.

12E402 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

3 1 0 3.5

OPERATIONAL AMPLIFIER CHARACTERISTICS: Functional Block Diagram – Symbol, Characteristics of an ideal operational amplifier, transfer characteristics, Circuit schematic of $\mu A 741$, Open loop gain, CMRR - input bias and offset currents, input and output offset voltages, offset compensation techniques. Frequency response, characteristics – stability, limitations, frequency compensation, slew-rate. Transfer characteristics. (8+2)

LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS: Inverting and Non-inverting amplifiers – Voltage follower, Summing amplifier, Differential amplifier, Instrumentation amplifier. Integrator and Differentiator – Practical considerations. Voltage to Current and Current to Voltage converters, Phase changers. Sinusoidal oscillators. Active filters – Design of low pass, high pass, wide band pass and Band stop Butterworth filters, Narrow band pass and notch filters. (9+3)

NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS: Comparator – Regenerative comparator, Zero-crossing detector, Window detector, Sample and hold circuit, Precision diode, Half and Full wave rectifiers, Active peak detector, Clipper and Clamper, Logarithmic, Exponential amplifiers and Multiplier, Square, and Triangular waveform generators. (8+2)

SINGLE POWER SUPPLY OPERATIONAL AMPLIFIERS: Need for single power supply operational amplifiers – LM324, AC Inverting and Non-Inverting amplifiers. Norton Amplifiers – Various configurations. (3+1)

IC VOLTAGE REGULATORS: Block diagram of 723 general purpose voltage regulator – Circuit configurations, Current limiting schemes, Output current boosting, Fixed and adjustable three terminal regulators, Switching regulators. (6+2)

SPECIAL FUNCTION ICs: 555 Timer Functional block diagram and description – Monostable and Astable operation, Applications, 566 Voltage Controlled Oscillator, Analog Multiplier, Comparator ICs. PLL Functional Block diagram – Principle of operation, Building blocks of PLL, Characteristics, Derivations of expressions for Lock and Capture ranges, Applications: Frequency synthesis, AM and FM detection, FSK demodulator, Motor speed control. (7+3)

A-D and D-A CONVERTERS: DAC/ADC performance characteristics – Digital to Analog Converters: Binary weighted and R-2R Ladder types – Analog to digital converters: Continuous, Counter ramp, Successive approximation, Single slope, Dual slope and Flash Type. (4+2)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Adel Sedra, Kenneth.C Smith, "Microelectronic Circuits", Oxford University Press, New Delhi, 2010.
2. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", New Age International, New Delhi, 2010

REFERENCES:

1. Gayakwad A R, "OP-Amps and Linear Integrated circuits", Prentice Hall India, New Delhi, 2010
2. Coughlin F R, and Driscoll F F, "Operational Amplifiers and Linear Integrated Circuits", Prentice Hall of India, New Delhi, 2010
3. Michael Jacob J, "Applications and Design with Analog Integrated Circuits", Prentice Hall of India, New Delhi, 2010.
4. David A Bell, "Operational Amplifiers and Linear ICs", Oxford University Press, New Delhi, 2011.

12E403 MEASUREMENTS AND INSTRUMENTATION

3 0 0 3

STANDARDS AND INDICATING INSTRUMENTS: SI units – units for charge, voltage, current, power, energy, flux. Standards – brief Introduction. D'Arsonval Galvanometer. Moving iron: attraction and repulsion type instruments, errors. Moving coil instruments – Permanent magnet moving coil instruments, Dynamometer type moving coil Instruments, Torque equations and errors. Extension of ranges, use of shunts and Instrument Transformers. (11)

MEASUREMENT OF POWER AND ENERGY: Dynamometer type wattmeter – Torque expression, Errors. Energy meters, Calibration of energy meters. Measurement of power using Instrument Transformers. Maximum demand indicator, Power factor meter. (8)

MEASUREMENT OF R-L-C: Resistance measurement – Kelvin double bridge, Wheatstone bridge, substitution method, Loss of charge method, Guard Wire method. Measurement of inductance and capacitance – Maxwell, Anderson, and Schering bridge. Measurement of Earth resistance. (8)

MEASUREMENT OF NON-ELECTRICAL QUANTITIES: Transducers – Classifications, Principle of operation of Resistance potentiometer, Strain Gauge, Inductive and capacitive transducers, LVDT, Piezo-electric transducers. Encoders. Hall effect sensors, and photo sensors and its applications. Measurement of Pressure – High Pressure and low pressure measurement. Measurement of Temperature - Resistance thermometers, thermistors and thermocouples. (12)

ELECTRONIC LABORATORY INSTRUMENTS: Electronic voltmeter – Digital voltmeter of ramp and integrating types. Digital Multimeter, Spectrum Analyser, Harmonic Distortion Analyser, Function Generator, Dual channel Oscilloscope, Digital storage Oscilloscope. (6)

Total 45

TEXT BOOK:

1. Sawhney A K, "A Course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai & Sons, New Delhi, 2011.
2. Doebelin E O and Dhanesh N Manik, "Measurement Systems", McGraw-Hill, New Delhi, 2012.

REFERENCES:

1. David A. Bell, "Electronic Instrumentation and Measurements", Oxford University Press, New Delhi, 2012.
2. Rangan C S, Sharma G R, Mani V S, 'Instrumentation Devices and Systems', Tata McGraw-Hill, New Delhi, 2004

12E404 DC MACHINES AND TRANSFORMERS

3 1 0 3.5

DC GENERATORS: Laws of magnetic circuit – Principle of operation, Constructional details, Armature Windings, EMF equation, Methods of Excitation, Separate, shunt, series and compound excitations. (6+2)

No load characteristics – Armature reaction, Commutation, Interpoles, Compensating windings, Load characteristics of various types of DC Generators. (6+2)

DC MOTORS: Principle of operation – Torque equation, Electrical and Mechanical characteristics of DC shunt, series and compound motors. Starters – Speed control – Armature and field control – Braking. (6+2)

Losses and efficiency – Swinburne's test – Separation of losses, Hopkinson's test. (6+2)

TRANSFORMERS: Principle of operation – Constructional features, Classification of Transformers, EMF equation, Transformation ratio, Transformer on no-load and load, Phasor diagrams. (6+2)

Equivalent circuit - Voltage regulation, Regulation curve, Losses, Efficiency, All day efficiency (2+2)

Phasing out, polarity and voltage ratio tests – Open circuit and short circuit tests, Sumpner's test. Separation of losses – Parallel operation. Overview of OLTC Concepts. (6+2)

Auto-Transformer – Principle of operation – Saving of copper – Phasor diagram – Equivalent circuit – Three phase Transformer connections – Instrument Transformers. (7+1)

Total = L: 45 + T : 15 = 60

TEXT BOOKS:

1. Murugesh Kumar K, "Electrical Machines Vol. I", Vikas Publishing House, New Delhi, 2010.
2. A.E.Fitzgerald, Charles Kingsley. Jr., and Stephen D. Umans, "Electric Machinery", Tata McGraw-Hill, New Delhi, 2011.

REFERENCES:

1. Kothari D. P. and Nagrath I. J., "Electrical Machines", Tata McGraw-Hill, New Delhi, 2006.
2. Bhattacharya S.K., "Electrical Machines", Tata McGraw-Hill, New Delhi, 2011.
3. Ashfaq Husain, "Electric Machines", Dhanpat Rai & Co., New Delhi, 2011
4. Bandyopadhyay M.N., "Electrical Machines – Theory and Practice", Prentice Hall India, New Delhi, 2009.

12E405 MICROPROCESSORS AND MICROCONTROLLERS

3 1 2 4.5

ARCHITECTURE OF 8085 MICROPROCESSOR: Functional Block Diagram – Registers, ALU, Bus systems – Timing and control signals. (4+0)

PROGRAMMING OF 8085: Instruction formats – Addressing modes – Instruction set – Need for Assembly language – Development of Assembly language programs – Machine cycles and Timing diagrams (7+3)

MEMORY INTERFACING: Interface requirements – Address space partitioning – Buffering of Buses – Timing constraints – Memory control signals – Read and write cycles –Typical EPROM and RAM Interfacing. (5+3)

I/O INTERFACING: Memory mapped I/O scheme – I/O mapped I/O scheme – Input and Output cycles – Simple I/O ports – Programmable Peripheral Interface (8255). Data transfer schemes – Interfacing simple keyboards and LED displays. (6+2)

INTERRUPTS AND DMA: Interrupt feature – Need for interrupts - Characteristics of Interrupts – Types of Interrupts – Interrupt structure – Methods of servicing interrupts - Development of Interrupt service subroutines – Multiple interrupt requests and their handling – Need for Direct Memory Access – Devices for handling DMA – DMA Controller features. (6)

APPLICATIONS: Multiplexed seven-segment LED Display systems – Stepper motor control – Measurement of frequency, phase angle and power factor – Interfacing ADC0801 A/D Converter – DAC 0800 D/A Converter – Waveform generation. (5+2)

INTEL 8051 MICROCONTROLLER: Architecture – Memory Organisation – Addressing modes – Instruction set – Boolean processing – Simple programs. (6+2)

8051 PERIPHERALS: Interrupt structure – Timer, Serial ports and Power control : Features and Modes – Interfacing – Overview of 8051 Instruction set – Boolean processing – Simple programs – Typical Applications. (6+3)

Total = L : 45 + T : 15+P:30= 90

TEXT BOOKS:

1. Ramesh S Gaonkar, "Microprocessor Architecture: Programming and Applications with the 8085", Penram International Publishing , Prentice Hall of India, New Delhi, 2011.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D Mckinlay "The 8051 Microcontroller and Embedded Systems", Pearson Education India, New Delhi, 2011.

REFERENCES:

1. Aditya P Mathur, "Introduction to Microprocessors", Tata Mc Graw-Hill Education, New Delhi, 2009.
2. Kenneth L Short, "Microprocessors and Programmed Logic, Pearson Education, New Delhi, 2004.
3. Kenneth J Ayala, : "The 8051 Microcontroller", Cengage Learning, New Delhi, 2004

PRACTICALS:

Exercises involving

- Assembly Language Programming
- Interfacing concepts in 8085
- Peripheral Programming in 8051

12E406 ENVIRONMENTAL SCIENCE AND ENGINEERING

3 0 0 3

INTRODUCTION: What is Environmental Science – Introduction to Environmental Engineering – Environmental Systems Overview – Environment (Protection) Act , 1986 – Environmental Ethics **MATERIALS AND ENERGY BALANCES:** Introduction – Unifying Theories – Materials Balances – Energy Balances – Environmental Impact Assessment – Environmental Management Standard ISO 14000 (8)

SUSTAINABLE ENERGY, MINERAL AND SOIL RESOURCES: Energy Resources – Mineral Resources – Soil Resources – Parameters of Soil Sustainability – Soil Conservation **ECOSYSTEMS:** Human Influences on Ecosystems – Energy and Mass Flow – Nutrient Cycles – Population Dynamics – Biodiversity – Values and Benefits of Biodiversity – Threat to Biodiversity – Conservation of Biodiversity (8)

WATER QUALITY ENGINEERING: The Nature of Water Quality Problems: Rivers and Streams, Lakes and Reservoirs, Ground Water, and Oceans and Estuaries – Water (Prevention and Control of Pollution) Act, 1974 – Engineered Water Quality Systems – Physical Treatment Method: Sedimentation – Chemical and Physicochemical Treatment Method: Disinfection – Biological Waste Water Treatment: Activated Sludge (6)

AIR QUALITY ENGINEERING: Nature of Air Pollution Problems: Criteria Pollutants, Hazardous Air Pollutants, Acid Deposition, Petrochemical Smog, Indoor Air Quality and Global Change – Air (Prevention and Control of Pollution) Act, 1981 - Air Pollutant Emissions and Controls: Characterising .Emissions, Pollutant Generation by Combustion and Motor Vehicle Emissions – Treatment Technology: Particle Control Device (6)

NOISE POLLUTION: Introduction – Sound Power and Intensity –Relative Scale of Sound Pressure Levels – Characterisation of Noise - . Effects of Noise on People, Effects on Performance, Noise Control: Source-Path-Receiver Concept: Control of Noise Source by Design, Noise Control in Transmission Path, Control of Noise Source by Redress, Protect the Receiver (6)

GLOBAL ATMOSPHERIC CHANGE: The Atmosphere of Earth – Global Temperature: Orbital Variations and Sunspots, A Simple Global Temperature Model - The Greenhouse Effect – Global Energy Balance – Carbon Credit (4)

ELECTRONIC WASTE MANAGEMENT: Introduction - producer responsibility legislation – the Waste Electrical and Electronic Equipment (WEEE) directive – the RoHS directive – WEEE health and safety implications – **MATERIALS USED IN MANUFACTURING ELECTRICAL AND ELECTRONIC PRODUCTS:** Where do RoHS Proscribed Materials Occur - Soldering and the Move to Lead-free Assembly – Printed Circuit Board Materials – Materials Composition of WEEE: Mobile Phones – Television – Washing Machines. (7)

Total 45

TEXT BOOKS:

1. Mackenzie L. Davis, and David A. Cornwell, "Introduction to Environmental Engineering", Tata McGraw Hill, New Delhi, 2010
2. William W. Nazarodd and Lisa Alvarez-Cohen, "Environmental Engineering Science", Wiley-India, New Delhi, 2010
3. Gilbert M Masters, "Introduction to Environmental Engineering and Science", Prentice Hall of India, New Delhi, 2004.
4. R. E. Hester and R. M. Harrison, "Electronic Waste Management", Royal Society of Chemistry, London, 2009.

REFERENCE:

1. Mallick M. R., "Environment Laws", Professional Book Publishers, New Delhi, 2012

12E410 LINEAR ICs AND MEASUREMENTS LABORATORY

0 0 3 1.5

1. Characteristics and Applications of Op Amp (CMRR, Slew rate, Adder, Subtractor, Zero crossing detector, Differentiator, and Integrator)
2. Waveform Generation using OpAmp (Square, Triangular, and Sinusoidal)
3. Performance characteristics of Voltage Regulator ICs
4. Study of 555 Timer and 566 VCO
5. Design and Implementation of Active Filters
6. Measurement of Impedance using AC bridges
7. Extension and Calibration of instrument ranges
8. Calibration of Energy meter using Phantom loading method.
9. Wheatstone bridge and Kelvin's Double Bridge.
10. Measurement of Earth Resistance

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

12E411 DC MACHINES & TRANSFORMERS LABORATORY

0 0 3 1.5

1. Load Characteristics of DC Shunt and Compound Generator.
2. Load Characteristics of DC Shunt and Compound Motor.
3. Load Test on DC series motor.
4. Hopkinson's Test.
5. Electrical Braking of DC Shunt motor.
6. Load Test on 1-Phase Transformer.
7. Open circuit and Short circuit Tests on 1- Phase transformer.
8. Sumpner's Test on a 1- Phase Transformer.
9. Separation of Losses in a 1- phase Transformer.
10. Phase relation and polarity test of transformers.

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

SEMESTER 5

12E501 COMPUTER ARCHITECTURE

3 0 0 3

REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS: Register transfer language – Register, bus and memory transfers – Arithmetic, logic and shift micro-operations – control functions. (5)

BASIC COMPUTER ORGANISATION: Instruction codes – Instructions – Timing and Control – Instruction Cycle : Fetch and Decode , Execution – Typical register and memory reference instructions – Input / Output operations and Interrupt – Design stages. (8)

CENTRAL PROCESSOR ORGANISATION: General register organization – Stack organisation – Instruction formats – Addressing modes – Data transfer and manipulation – Program control – Hard-wired and Micro-programmed Control Implementation – Data path structures – CISC characteristics, RISC Characteristics – RISC pipeline. (9)

ARITHMETIC PROCESSING: Introduction – Binary operations: Addition, Subtraction, Multiplication and Division algorithms – Algorithms for Floating point Arithmetic operations – Algorithms for BCD Arithmetic operations. (9)

MEMORY AND INPUT/OUTPUT ORGANISATION: Basic concepts – Memory Hierarchy – Main memory – Auxiliary memory – Associative memory - Cache Memory – Virtual memory concepts – Input /Output interface – Modes of data transfer: Programmed I/O and Interrupt driven data transfer – Direct Memory Access – Asynchronous Data transfer – I/O processor. (9)

INTRODUCTION TO PARALLEL PROCESSING: Parallelism in uniprocessor systems – Flynn's classification: SISD, SIMD, MISD, MIMD schemes – Principles of Pipelining - Shared memory, Distributed memory – Typical Applications. (5)

Total 45

TEXTBOOK:

1. Morris Mano M, "Computer System Architecture", Pearson Education, New Delhi, 2007.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", McGraw-Hill International, New York, 2010.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture : Designing for Performance", Pearson Education, New Delhi, 2012.
2. Hwang K, and Briggs F A, "Computer Architecture and Parallel Processing", Tata McGraw-Hill, New Delhi, 2012.

12E502 DATA STRUCTURES AND ALGORITHMS

3 1 2 4.5

INTRODUCTION TO DATASTRUCTURES: Data types - Primitive data structures - Linear and non-linear data structures - Data structure operations - Data structures in C language. (2+0)

INTRODUCTION TO ALGORITHMS: Algorithms - Analysis of Algorithms –best case, average case, and worst case complexities – Big O notation – Pseudo code for algorithms – Simple algorithms and their analysis. (3+0)

INTRODUCTION TO OBJECT-ORIENTATION & C++: Characteristics of Object-oriented Programming – Encapsulation – Inheritance – Polymorphism – Aggregation – Implementation using C++. (6+4)

ARRAY & STACK: Arrays – storage structure for 1-D and 2-D arrays. Sparse matrix -Stacks - Array implementation of stacks - stack operations - Applications - Conversion of infix expressions to polish notation - Parenthesis checking - Array implementation of strings - Operation on strings. (5+2)

QUEUES: Array implementation - Queue operations -Types - Dequeues - Priority queues. (3+1)

LINKED LIST: Operation of linear list - Linked list – Linked Implementation of stacks and queues - Circular list – Doubly-linked list - List with header node – Use of malloc () function in C. (6+2)

TREES: Definitions - Binary trees - Operations on binary trees - Storage representation – Threaded binary tree - Application of trees - Manipulation of arithmetic expression - Huffman's algorithm. (6+2)

SORTING: Exchange Sorting: Bubble sort, quick sort –Selection sorting: Straight selection sort, Binary tree sort, Heap sort - Insertion sorting: Simple insertion sort, Shell sort, Address calculation sort – Merge sort – Radix sort. (7+2)

SEARCHING: Linear search - Binary search – Tree searching: Binary search tree, Insertion & Deletion of an element, Efficiency – Hashing - Introduction to Multiway search trees. (7+2)

Total = L :45 + T :15 + P: 30 = 90

TEXTBOOKS :

1. Yedidayah Langsam, Moshe J. Augenstein and Aaron M.Tanenbaum, "Data Structures using C and C++", Pearson Education, New Delhi, 2009.
2. Ellis Horowitz Sartaj Sahni Ellis Horowitz, Sartaj Sahni and Susan Anderson - Freed, "Fundamentals of Data structures in C", Silicon Press, New Jersey, 2008.

REFERENCES :

1. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest "Introduction to Algorithms", Prentice Hall of India, New Delhi, 2011
2. Tremblay and Sorenson, "An Introduction to Data Structures with Applications" Tata McGraw-Hill, New Delhi, 2004.
3. Lipschutz S., and Pai, "Data Structures", Tata McGraw-Hill, New Delhi, 2007.

PRACTICALS:

Exercises involving

- Stack, Queue, Linked List
- Sorting and Searching Techniques

NOTE : Implementation using C/C++

12E503 INDUCTION AND SYNCHRONOUS MACHINES

3 1 0 3.5

THREE-PHASE INDUCTION MOTORS: Principle of operation – Types of construction - 3-phase windings – Torque equation – Torque-Slip characteristics – Maximum torque – Effect of rotor resistance. (6+1)

Equivalent circuit – Phasor diagram – Performance calculation from circle diagram - Induction Generators – Testing. (5+3)

CONTROL OF THREE-PHASE INDUCTION MOTORS: Methods of starting: DOL, Auto-Transformer, Star-Delta and Rotor resistance starters. Speed control Methods: By changing frequency, number of poles, and slip. Electrical Braking - Crawling and Cogging. (5+2)

SINGLE-PHASE INDUCTION MOTORS: Principle of operation – Double revolving field theory – Equivalent circuit – Types - Methods of self-starting – Universal Motors. (4+2)

SYNCHRONOUS GENERATORS: Types - Constructional features – Winding factors – EMF equation – Armature reaction – Voltage regulation – Pre-determination of regulation by synchronous impedance, mmf, and Potier methods. (7+3)

Load characteristics – Power expression – Parallel operation – Synchronisation and synchronising power – Active and reactive power sharing – Alternator on infinite Busbar – General load diagram. (7+1)

SYNCHRONOUS MOTORS: Principle of operation – Methods of starting – Phasor diagrams – V-curves and Inverted V-curves - Power/Power-angle relations – Synchronous condensers – Hunting and methods of Suppression. (5+2)

TWO REACTION THEORY: Salient pole machine analysis – Phasor diagrams – Voltage regulation – Power / Power angle relation – Determination of X_d and X_q . (6+1)

Total = L : 45 + T : 15 = 60

TEXT BOOKS:

1. A.E.Fitzgerald, Charles Kingsley. Jr., and Stephen D. Umans, "Electric Machinery", Tata McGraw-Hill, New Delhi, 2011.
2. Murugesh Kumar K, "Electrical Machines Vol. II", Vikas Publishing House, New Delhi, 2010

REFERENCES:

1. Say M G., "Performance & Design of AC Machines", CBS Publishers & Distributors, New Delhi, 2002.
2. Bhattacharya S.K., "Electrical Machines", Tata McGraw-Hill, New Delhi, 2011.
3. Bandyopadhyay M.N., "Electrical Machines – Theory and Practice", Prentice Hall India, New Delhi 2009.
4. Kothari D. P. and Nagrath I. J., "Electrical Machines", Tata McGraw-Hill, New Delhi, 2006.
5. Ashfaq Husain, "Electric Machines", Dhanpat Rai & Co., New Delhi, 2011.

12E504 GENERATION, TRANSMISSION AND DISTRIBUTION**3 0 0 3**

POWER GENERATION: Structure of Electric Power System, Generation, Transmission & Distribution Scenario - Types of generation, Generating Stations: Thermal Power Plant, Hydro Power Plant, Gas Power Plant, Nuclear Power Plant, Introduction to Renewable Energy Sources - Load capacity factor - Connected load factor - Load duration curve - Selection of units - Cost of generation - Tariffs. (9)

TRANSMISSION SYSTEMS AND LINE PARAMETERS: Various systems of transmission – Advantages of high transmission voltages – Introduction to HVDC Transmission - Comparison of conductor materials required for various overhead systems. Electrical constants - Resistance, Inductance and capacitance of Single and 3 Phase lines - Effects of earth on capacitance - Skin effect - Proximity effect - Transposition - Bundled conductors –Typical Configuration of Line Supports, Conductor Types and Electrical Parameters of 400,110, and 11 kV lines. (11)

MODELLING AND PERFORMANCE OF TRANSMISSION LINES: Short and medium transmission lines - Phasor diagrams - Nominal T and Pi methods - Line regulation - Efficiency. Rigorous solution for long line - ABCD constants - Ferranti effect - Tuned power lines - Surge impedance and surge impedance loading. (7)

INSULATORS AND UNDERGROUND CABLES: Insulators - Types - Potential distribution over a string of suspension insulators - Methods of increasing string efficiency. Corona – Factors affecting corona – Sag in overhead lines - causes - **Underground Cables:** Types - Capacitance and insulation resistance - Sheath effects - Grading - Stresses - Comparison between overhead lines and underground cables. (11)

DISTRIBUTION SYSTEMS: Substations and its Types – Typical Key Diagram of a 11kV / 400V Substation, Feeders, distributors and service mains - Radial and ring main systems - Calculation of voltage in distributors with concentrated and distributed loads. (7)

Total 45**TEXT BOOKS:**

1. Mehta V K, Rohit Mehta , "Principles of Power Systems", S.Chand & Co., New Delhi, 2011
2. Duncan Glover J, Mulukutla S. Sarma, Thomas Jeffrey Overbye, Thomas J. Overbye, "Power System Analysis and Design", Thomson Learning, New Delhi, 2008.

REFERENCES:

1. Soni M L, Gupta P V, Bhatnagar U S and Chakrabarathi A, "A Text Book on Power System Engineering", Dhanpat Rai & Co., New Delhi, 2008.
2. Uppal S L, "Electrical Power Systems ", Khanna Publishers, New Delhi, 2009.
3. Wadhwa C L, "Electrical Power Systems", New Age International, New Delhi, 2012.
4. Kothari D P and Nagrath J, "Power System Engineering", Tata McGraw-Hill, New Delhi, 2008

12E505 CONTROL SYSTEMS**3 1 0 3.5**

INTRODUCTION: Open loop and closed loop systems – Examples, Control system components. (2+0)

SYSTEM REPRESENTATION: Transfer function of physical systems: Mechanical systems - Translational and Rotational systems, Electrical network, Thermal and hydraulic systems. Transfer function of DC Generator, DC servomotor, AC servomotor and Synchro, Transfer function of overall systems. Block diagram - reduction techniques. Signal flow graphs – Mason' gain formula. (10+3)

TIME RESPONSE ANALYSIS: Standard Test signals –Time response of zero, first and second order systems, Performance criteria, Type of systems. Steady-state error constants – position, velocity and acceleration error constants. Generalized error series – Feedback characteristics of control systems. Controllers – P, PI and PID control modes. (9+2)

FREQUENCY RESPONSE ANALYSIS: Frequency domain specifications – peak resonance, resonant frequency, bandwidth and cut-off rate, correlation between time and frequency responses for second order systems. Polar plot, Bode plot – Gain Margin and Phase Margin. (6+3)

STABILITY OF SYSTEMS: Characteristic equation – Location of roots of characteristic equation – Absolute stability and Relative stability. Routh-Hurwitz criterion of stability – Necessary and sufficient conditions. Nyquist Stability- Principle of argument – Nyquist path – Nyquist stability criterion – Determination of Nyquist stability – Assessment of relative stability. Bode Plot – Assessment of stability, Nichols Chart. (9+3)

ROOT LOCUS: Root locus concept, Rules for construction of root loci, problems, stability analysis. (4+2)

COMPENSATORS: Lag, Lead and Lag-Lead Compensators – Transfer function and Characteristics (2+0)

STATE VARIABLE ANALYSIS: Introduction to state-space analysis – Physical variable, Phase variable and Canonical variable forms. Transfer function from state-space representation. (3+2)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Gopal M, "Control Systems – Principles and Design" Tata McGraw-Hill, New Delhi, 2012.
2. Norman S Nise, "Control System Engineering ", John Wiley & Sons, New Delhi, 2012.

REFERENCES:

1. Nagrath I J and Gopal M, "Control System Engineering", New Age International, New Delhi, 2011.
2. Benjamin Kuo, "Automatic Control Systems", Prentice Hall of India, New Delhi, 2010.
3. Ogata K, "Modern Control Engineering", Prentice Hall of India, New Delhi, 2010.

12E510 INSTRUMENTATION AND CONTROL LABORATORY

0 0 3 1.5

1. Study of MATLAB.
2. Transfer function of DC Motor. a) Armature Control Mode. b) Field Control Mode.
3. Transfer function of AC Servomotor and Study of Synchros.
4. Time & Frequency Response of a Second Order System using MATLAB.
5. Study of response of First and Second Order Systems using Linear System Simulator.
6. Study of response of a Second Order System with PID Controller using Simulink
7. Calibration of Temperature Sensors (RTD / thermo couple / thermistor).
8. Measurement of linear displacement using LVDT and Measurement of strain using Strain gauge
9. Study of characteristics of capacitive and light transducers
10. Measurement of a physical variable using PC.

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

12E511 INDUCTION AND SYNCHRONOUS MACHINES LAB

0 0 3 1.5

1. Load Test on 1- Phase and 3-Phase Induction Motors
2. No load Test and Blocked Rotor Test on 3-Phase Induction Motor (circle diagram)
3. Electrical Braking of 3-Phase Induction Motor
4. Load Test on 3-phase Alternator and determination of Voltage regulation
5. Predetermination of voltage regulation of Alternator by EMF and MMF Methods
6. Predetermination of voltage regulation of Alternator by ZPF Method
7. Predetermination of voltage regulation of Alternator by Bus bar Loading
8. Determination of V and Inverted V Curves of Synchronous Motor
9. Load test on 3-Phase Induction Generator
10. Predetermination of voltage regulation of Salient Pole Alternator by Blondel's Method

REFERENCES:

1. Murugesh Kumar K, "Electrical Laboratory Exercises", Vikas Publishing House, New Delhi 2003

SEMESTER 6

12E601 DIGITAL SIGNAL PROCESSING

3 1 0 3.5

DISCRETE-TIME SIGNALS AND SYSTEMS: Need and benefits of Digital Signal Processing – Signal classification and basic operations on them – LTI system – Impulse response - Convolution sum and Correlation - I/O relationship - determination of Impulse response and Step response using Z transformation - A Typical DSP system. (9+5)

DISCRETE TRANSFORMS: Fourier Series and Fourier Transform - Discrete Fourier Transform (DFT) - Properties – DIT-FFT and DIF-FFT radix2 algorithms- linear filtering via circular convolution - inverse FFT. (9+3)

DESIGN OF DIGITAL FILTERS: Characteristics of IIR and FIR filters - Design techniques for analog filters-frequency transformation-Digital IIR filter design: impulse invariant and bilinear transform methods - FIR filter design using Window functions - Realization structures of filters: direct, cascade and parallel forms. (9+3)

FINITE WORD LENGTH EFFECTS: A/D quantization noise – Product round off errors - Finite word length effects in IIR and FIR filters. (9+3)

GENERAL-PURPOSE DIGITAL SIGNAL PROCESSORS: Computer architectures for signal processing – pipelining - hardware multiplier – accumulator - special instructions - extended parallelism : SIMD, VLIW, and super-scalar processing. (9+1)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Lonnie C Ludeman, "Fundamental of Digital Signal Processing", Wiley India, New Delhi, 2011.
2. Emmanuel C Ifeakor, Barrie W Jervis, "Digital Signal Processing : A practical approach", Pearson Education, New Delhi, 2004.

REFERENCES :

1. John G Proakis, "Digital Signal Processing : Principles , Algorithms, and Applications", Pearson Education, New Delhi, 2012
2. Sanjit K Mitra, "Digital Signal Processing : A Computer based Approach", Tata McGraw-Hill, New Delhi, 2010.

12E602 POWER ELECTRONICS

3 1 0 3.5

POWER SEMICONDUCTOR DEVICES: Introduction - Power Diodes - Power Transistors - Power MOSFETs - IGBTs - Thyristor family : SCRs, Triacs, GTOs, MCT and IGCT - Static and Dynamic characteristics - Protection circuits - Series and parallel connections. (7+2)

AC TO DC CONVERTERS : Uncontrolled Bridge Rectifiers – 1-Phase and 3-Phase – R, RL and RLE load – Average load voltage and load current – effect of free-wheeling diode – controlled rectifiers –1-Phase and 3-Phase half wave converters - single phase half and fully controlled bridge converters – continuous and discontinuous operation – average load voltage and load current for continuous mode – effect of free-wheeling diode - input power factor for ripple free load current – 3 phase half and fully controlled converters (no analysis) – Dual converters. (9+4)

AC TO AC CONVERTERS: Single phase full wave controller with R and RL load - Estimation of RMS load voltage, RMS load current and input power factor - Three phase AC voltage controllers (No analysis). (6+2)

DC TO DC CONVERTERS: Principle of step-up and step-down operation - Single quadrant DC chopper with R, RL and RLE load - Time ratio control - Estimation of average load voltage and load current for continuous current operation - Two quadrant and four quadrant DC choppers. (6+2)

DC TO AC CONVERTERS: Types - Voltage source and current source inverters - Single phase bridge inverters - Three phase bridge inverters - Control of AC output voltage - Harmonic reduction. (6+2)

CONTROL CIRCUITS: Functional requirements of switching control circuits - Generation of control signals for single phase AC to DC converters - Cosine wave crossing control, ramp comparator approach. Generation of timing pulses for DC choppers - power converter control using microprocessors. (6+2)

APPLICATIONS: UPS – SMPS – Reactive power compensation techniques. (5+1)

Total = L :45 + T :15 = 60

TEXT BOOKS:

1. Rashid M H, "Power Electronics – Circuits, Devices and Applications", Prentice Hall of India, New Delhi, 2011.
2. P.S.Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2006.

REFERENCES:

1. Vedam Subramanyam, "Power Electronics", New Age International, New Delhi, 1996
2. Joseph Vithayathil, "Power Electronics", Tata McGraw-Hill, New Delhi, 2010
3. L.Umanand, "Power Electronics : Essentials & Applications", Wiley India, New Delhi, 2009

12E603 COMPUTER AIDED POWER SYSTEM ANALYSIS**3 0 0 3**

INTRODUCTION: One line diagram- Per unit representation- Two winding and three winding Transformers - reactance diagram - Symmetrical components. (7)

NETWORK FORMULATION & MODELLING: - Primitive network and its representation – bus incidence matrix – Formation of Y_{bus} - Z_{bus} building algorithm - modeling of synchronous machines, transformers, transmission lines, loads - Π -equivalent circuit of transformer with off-nominal tap ratio. (6)

SHORT CIRCUIT STUDIES: Types of faults - Algorithms for fault calculations – sequence impedance matrices - Symmetrical components - Symmetrical and unsymmetrical short circuit faults - Analysis using Z_{bus} – Introduction to open conductor faults.

LOAD FLOW STUDIES: Formulation of load flow problem - bus classification – Solution by Gauss - Seidal , Newton - Raphson and Fast decoupled methods - Comparison –DC load flow method - equation and limitation. (9)

ECONOMICAL OPERATION OF GENERATING STATIONS: Economical scheduling of thermal plant without losses – Transmission Loss formula – Economic load dispatch using loss formula and Newton-Raphson method - Algorithm for short-term Hydro-Thermal scheduling. (7)

STABILITY STUDIES: Steady state and transient stability - Swing equation and its solution by modified Euler and Runge - Kutta methods - Equal area criterion – applications - methods of improving transient stability- Voltage stability limit – PV and VQ curves. (8)

Total 45**TEXT BOOKS:**

1. Abhijit Chakrabarti, Sunita Halder, "Power System Analysis, Operation and Control", Prentice Hall India, New Delhi, 2010.
2. Hadi Saadat,"Power System Analysis", Tata McGraw-Hill, New Delhi, 2010

REFERENCES:

1. Gupta B R, "Power System Analysis and Design", S.Chand & Co., New Delhi, 2008
2. Wadhwa C L "Electrical Power Systems", New Age International, New Delhi, 2009.
3. D.P.Kothari, I.J.Nagrath, "Modern Power System Analysis", Tata McGraw-Hill, New Delhi, 2011.
4. John J. Grainger and William D. Stevenson JR, "Power System Analysis", Tata McGraw-Hill, New Delhi, 2005.
5. Pai M.A, "Computer Techniques in Power System Analysis" Tata McGraw-Hill, New Delhi, 2006

12E604 POWER SYSTEM PROTECTION AND SWITCHGEARS**4 0 0 4**

INTRODUCTION: Principles and need for protective schemes – nature and cause of faults – types of fault – current limiting reactors. CTs and PTs and their applications in their protection schemes. (8)

PROTECTIVE RELAYS: Definition - Requirement of relays - Universal relay torque equation - IDMT relays, Non-directional and directional over current IDMT relays – Earth fault relays - Distance relays: Impedance, Mho and Reactance relays - Differential protection - Negative sequence relays - Pilot (Translay) relay – Power line carrier communication - Carrier and Microwave pilot relays – Under frequency relays - Introduction to static relays - Microprocessor and computer based protective relaying. (12)

APPARATUS AND LINE PROTECTION: Alternator, transformer, Busbar and motor protection schemes – Feeder Protection: radial and ring main system. Microprocessor based protective schemes. (10)

CIRCUIT BREAKERS: Functions of switchgear - Elementary principles of arc extinction - Arc control devices - Recovery voltage and restriking voltage - current chopping and capacitance current breaking - Bulk oil, low oil, air break, air blast, and sulphur hexafluoride and vacuum circuit breakers - HVDC breakers - Rating - Testing of circuit breakers. (10)

SURGE AND SURGE PROTECTION: Switching surges - Lightning phenomenon – Traveling waves on transmission lines - Over voltage due to lightning - Protections against lightning - Lightning arresters – Types - Lightning arrester selection - Surge absorbers. (10)

EARTHING AND INSULATION CO-ORDINATION: Solid, resistance and reactance Earthing - Arc suppression coil - Earthing transformers – Earth wires - Insulation co-ordination: Definition - Determination of line insulation - Insulation levels of sub-station equipment - Co-ordination amongst items of substation equipment - Introduction to Indian Electricity rules. (10)

Total 60

TEXT BOOKS:

1. Badri Ram and Vishwakarma D N , "Power System Protection and Switchgear" Tata McGraw-Hill, New Delhi , 2011.
2. Ravindranath B and Chander M, "Power System Protection and Switchgear", New Age International, New Delhi, July 2011.

REFERENCES:

1. Soni M L, Gupta P V, Bhatnagar U S and Chakrabarti A, "A Text Book on Power Systems Engineering", Dhanpat Rai & Co., New Delhi, 2003.
2. Wadhwa C L, "Electrical Power Systems", New Age International, New Delhi, 2012.
3. Sunil S Rao, "Switchgear Protection and Power Systems", Khanna Publishers, New Delhi, 2012.

12M070 ECONOMICS FOR ENGINEERS**2 1 0 2.5****INTRODUCTION:** Definition – Nature – Scope and Significance of Economics for Engineers. (4+0)**DEMAND AND SUPPLY:** Demand – Types – Determinants – Law of Demand – Elasticity of Demand – Types – Significance – Supply – Market price determination – Case Study in Demand Forecasting – Meaning – Methods – Consumer Survey – Trend Projections – Moving average. (4+2)**COST AND REVENUE:** Concepts – Classifications – Short run and long run cost curves – Revenue – Concepts – Measurement of Profit.(Case Study) (4+2)**MARKET STRUCTURE:** Perfect Competition – Characteristics – Price and output determination in short run and long run – Monopoly – Price Discrimination – Monopolistic Competition – Product Differentiation – Oligopoly and Duopoly. (4+2)**MARKET FAILURE:** Causes – Type of Goods – Rivalrous and Non-rivalrous goods – Excludable and Non-excludable goods – Solutions – Government Intervention. (6+0)**MONEY AND BANKING:** Money – Functions – Quantity theory of money – Banking – Commercial Banks – Functions – Central Bank (RBI) – Functions – Case Study in Recent Development in Banking. (3+3)**FOREIGN EXCHANGE:** Terms of Trade – Balance of Payments – Exchange rate determination – Methods of foreign payments – International Institutions – IMF, IBRD. (3+3)**BUSINESS CYCLE AND NATIONAL INCOME:** Meaning – Phases of business cycle - Inflation – Causes – Control measures – Deflation - National Income – Concepts – Methods of calculating national income – Problems in calculating national income.(2+3)**Total (L:30+T:15) = 45****TEXT BOOKS:**

1. Dewett. K.K, "Modern Economic Theory", S. Chand and Company Ltd, New Delhi, 2010.
2. Lipsey & Chrystal, "Economics", Oxford University Press, 2010

REFERENCES:

1. Paul A Samuelson & William, "Economics", Tata McGraw-Hill, New Delhi, 2010.
2. Thingan M.L "Money, Banking, International Trade and Public Finance", Vrinda Publication, 2009.
3. Ahuja H.L, "Macro Economic Theory and Policy", S.Chand and Co, New Delhi, 2010.
4. Francis Cherinullem "International Economics", McGraw-Hill Education, 2008.
5. Dutt and Sundaram "Indian Economy", S.Chand and Co, New Delhi, 2011

12E610 POWER ELECTRONICS LABORATORY**0 0 3 1.5**

1. Characteristics of MOSFET, IGBT, SCR and TRIAC
2. Single Phase and Three Phase Diode Bridge Rectifier with R and RL Load
3. Single Phase Half and Fully Controlled Thyristor Converter with R and RL Load
4. DC Chopper with R and RL Load
5. Single Phase AC Voltage Controller with R and RL Load
6. Single phase PWM Inverter
7. Three Phase PWM Inverter
8. Three Phase AC Voltage Controller with R and RL Load
9. Three Phase Fully Controlled Thyristor Converter
10. Simulation of Controlled and Uncontrolled Converters

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

08E611 DIGITAL SIGNAL PROCESSING LABORATORY

0 0 3 1.5

1. Generation of Basic Signals i) Unit impulse ii) Unit step iii) Exponential iv) Ramp v) Sinusoidal
2. Basic operations on signals i) Shifting ii) Folding iii) Time scaling iv) Signal addition iv) Signal multiplication
3. Implementation of Convolution sum
4. Computation of Impulse response of the LTI system
5. Determination of frequency response of the LTI systems
6. Computation of DFT
7. Design of IIR filters by BLT method
8. Design of IIR filters by Impulse Invariant method
9. Design of FIR filters using windows
10. Implementation of convolution sum using DSP Code Composer Studio

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012

SEMESTER 7

12E701 ELECTRIC DRIVES AND CONTROLS

3 0 0 3

INTRODUCTION TO ELECTRIC DRIVES: History and development of electric drives, Characteristics of Electrical & mechanical loads, Classification of electric drives, Basic elements & advantages of variable speed drives. Modes of operation, closed loop control of drives - Selection of power rating for drive motors with regard to thermal overloading and load variation. (8)

DC DRIVES: Speed control of DC motors - Ward - Leonard scheme - Thyristor converter fed dc drives: - Single, two and four quadrant operations - Chopper fed DC drives : - Time ratio control and current limit control - Single, two and four quadrant operations - Effect of ripples on the motor performance. (10)

AC DRIVES: Speed control of 3 phase Induction Motors - Stator control: PWM &V/f control, rotor control: Rotor resistance control - Static control of rotor resistance using DC chopper - Static Kramer and Scherbius drives – Introduction to Vector Controlled Induction Motor Drives - Speed control of 3 phase Synchronous Motors - True synchronous and self-controlled modes of operations. (10)

RELUCTANCE MOTOR DRIVES: DC servo drives -principle of operation - AC servo drives- principle of operation - Stepper motor – principle of operation –SRM drives - principle of operation - drives. (8)

DIGITAL CONTROL AND DRIVE APPLICATIONS: Digital techniques in speed control - Advantages and limitations - Microprocessor/Microcontroller and PLC based control of drives, networking of drives - Selection of drives and control schemes for Steel rolling mills, Paper mills, Cement mills, Machine tools, Lifts and Cranes. Solar and battery powered drives. (9)

Total 45

TEXT BOOKS:

1. Dubey G K, "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2012.
2. Bose B K, "Modern Power Electronics and AC Drives", Pearson Education, New Delhi, 2003.

REFERENCES:

1. Ion Boldea and Nasar S A", "Electric Drives", CRC Press LLC, New York, 2005.
2. Krishnan R, "Electric Motor Drives: Modeling, Analysis and Control, Prentice Hall of India, New Delhi, 2002
3. Vedam Subramanyam, "Electric Drives: Concepts and Applications", Tata McGraw-Hill, New Delhi, 2004.

12E702 ELECTRICAL MACHINE DESIGN

3 0 0 3

GENERAL ASPECTS: Rating and dimensions – Temperature rise – heating and cooling curves – rating of electric motors - insulation requirements – insulation materials - Output equation of DC and AC machines - Choice of specific electric and magnetic loadings - Separation of D and L for rotating machines. (7)

MAGNETIC CIRCUIT CALCULATIONS: MMF for air-gap - Net iron length – MMF for Iron - MMF for teeth – Real and Apparent flux densities - Leakage flux (5)

DC MACHINES: Choice of number of poles - Length of air-gap – Armature design – conductor and slot dimensions – magnetic circuit design- Design of field system, Interpoles, Commutator and Brushes. (7)

TRANSFORMERS: Output equation – design of core and winding - Window and Yoke dimensions - Overall dimensions - No load current calculation – Temperature rise of Transformers- Design of tanks and cooling tubes. (8)

INDUCTION MOTORS: 3-phase motor - length of air-gap – Stator design - conductor and slot dimensions – Design of cage and wound rotor - No-load current calculation - Stator and rotor resistance – leakage reactance - Dispersion coefficient –single phase motor- Design of stator and rotor. (10)

SYNCHRONOUS MACHINES: Salient pole machines - Short circuit ratio – Air-gap length – Armature design - Design of rotor and field winding – Turbo-alternator- design of stator and rotor. (8)

Total 45

TEXT BOOKS:

1. Sawhney A K, Chakrabarti A, "A Course in Electrical Machine Design", Dhanpat Rai & Co., New Delhi, 2006.
2. Mittle V N and Mittle A, 'Design of Electrical Machines', Standard Publications and Distributors, New Delhi, 2009.

REFERENCES:

1. M.V.Deshpande,"Design and Testing of Electrical Machines" Prentice Hall of India, New Delhi, 2010.
2. Shanmugasundaram A, Gangadharan G and Palani R, "Electrical Machine Design Data Book", New Age International Publishers, New Delhi, 2011.
3. Sen S K, "Principles of Electric Machine Design with Computer Programmes", IBH Publishing, New Delhi, 2006.
4. Agarwal R K, 'Principles of Electrical Machine Design', S.K.Kataria and Sons, New Delhi, 2009.

12E703 OPERATING SYSTEMS

3 0 0 3

INTRODUCTION: Operating system – Function – Evolutions of Operating Systems - Serial processing- Batch Processing - Multiprocessing - Time-sharing, Advanced Operating Systems – Need for advanced OS - Distributed OS – Multiprocessor OS – Database operating system – Real-time OS. (5)

MEMORY MANAGEMENT: Single contiguous allocation – Partitioned allocation – Paging – Virtual memory concepts – Swapping – Demand paging – Page replacement algorithms – Segmentation – Segmentation with paging. (9)

PROCESS MANAGEMENT: Introduction to processes – Scheduling objectives - Scheduling Criteria - Types of scheduling algorithms – Performance comparison – Inter-process communications - Synchronization – Semaphores – Deadlock - Prevention, Recovery, Detection – Avoidance. (11)

DEVICE AND FILE MANAGEMENT: Principles of I/O hardware – I/O software – Disks – Disk Scheduling Algorithms–File Systems – Files-Directories- File system implementation – Allocation methods – Security – Protection mechanisms. (9)

CASE STUDIES:

LINUX – History – Design Principles – Kernel modules – Process Management – Scheduling – Memory Management – File Systems – Input and Output – Inter-process Communication – Network Structure – Security. (6)

WINDOWS 2000 – History – Design Principles – System Components – Environmental Subsystems – File System – Networking – Programmer Interface. (5)

Total 45

TEXT BOOK:

1. Silberschatz A, Galvin P and Gagne G, "Operating System Concepts", John Wiley & Sons, Singapore, 2011.
2. Deitel H M, "An Introduction to Operating Systems", Pearson Education, New Delhi, 2011.

REFERENCES:

1. Andrew S Tanenbaum, Albert S Woodhull, "The MINIX book Operating Systems: Design and Implementation," Pearson Education, New Delhi 2006.
2. Mukesh Singhal and Niranjana G Shivaratis, "Advanced Concepts in Operating Systems", Tata McGraw-Hill, New Delhi, 2004.
3. William Stallings, "Operating Systems", Prentice Hall of India, New Delhi, 2009.
4. Dhamdhare D M, "Operating Systems: A Concept - based Approach", Tata McGraw-Hill, New Delhi, 2012.

12E710 POWER SYSTEMS LABORATORY

0 0 3 1.5

1. Computation of Line Parameters and modelling of transmission lines
2. Formation of a bus admittance matrix (Y-Bus)
3. Determination of a bus impedance matrix (Z-Bus) using building algorithm.
4. Determination of sequence impedances of 3-phase Alternator
5. Symmetrical and Unsymmetrical short - circuit fault analysis
6. Solution of power-flow problem using Gauss-Seidel method.

7. Solution of power-flow problem using Newton-Raphson method..
8. Economic Load Dispatch of thermal power plants.
9. Transient analysis of power systems network using PSCAD.
10. Characteristics of over current / Thermal overload relays.

REFERENCES:

1. Hadi Saadat, "Power System Analysis", Tata McGraw-Hill, New Delhi, 2010
2. Laboratory Manual, Prepared by EEE Department, 2012.
3. Nayak Power Systems, "Introduction to PSCAD", Bengaluru, 2010.

12E711 DESIGN LABORATORY

0 0 3 1.5

1. Cross-sectional 2D view of Electrical Machines using AUTOCAD
2. Effect of air-gap variation for 3 -phase induction motor
3. Measurement of illumination for different types of lamps
4. Closed loop speed control of DC Motor using SIMULINK
5. Performance Analysis of Induction motor using RMxprt
6. Solar Cell Characteristics
7. Load test on Variable Frequency Drive
8. Testing on Over Current Relays
9. CAD of Electrical Machines (DC/AC Machines)
10. Performance analysis of special machines using MotorPro

REFERENCES:

1. Laboratory Manual, Prepared by EEE Department, 2012.

12E720 PROJECT WORK I

0 0 4 2

Project Work I

- ❖ Identification of a real life problem in thrust areas
- ❖ Developing a mathematical model for solving the identified problem
- ❖ Finalisation of system requirements and specification
- ❖ Proposing different solutions for the problem based on literature survey
- ❖ Future trends in providing alternate solutions
- ❖ Consolidated report preparation

SEMESTER 8

12E820 PROJECT WORK II

0 0 12 6

The project involves the following:

- ❖ **Preparing a project - brief proposal including**
 - ❖ Problem Identification
 - ❖ A statement of system / process specifications proposed to be developed (Block Diagram / Concept tree)
 - ❖ List of possible solutions including alternatives and constraints
 - ❖ Cost benefit analysis
 - ❖ Time Line of activities
- ❖ **A report highlighting the design finalization [based on functional requirements & standards (if any)]**
- ❖ **A presentation including the following:**
 - ❖ Implementation Phase (Hardware / Software / both)
 - ❖ Testing & Validation of the developed system
 - ❖ Learning in the Project
- ❖ **Consolidated report preparation**

DEPARTMENT PROFESSIONAL ELECTIVES
(A Minimum of Three electives)

12E001 HVDC AND FLEXIBLE AC TRANSMISSION SYSTEMS

3 0 0 3

GENERAL ASPECTS: Historical development of HVAC and HVDC system. HVDC system configuration and components - comparison – Economic technical performance – Reliability – Limitations. (6)

CONVERTER CIRCUITS AND ANALYSIS: Introduction to single phase and three phase converters. Converters for HVDC system – 6 pulse converter and 12 pulse converter. Analysis of 6 pulse converter with and without impedance – With overlap less than 60 degrees - With overlap greater than 60 degrees - Complete characteristics of HVDC converter –rectifier mode and Inverter mode of operation - equivalent circuits. (9)

CONTROL: Basic means of control – Power reversal – constant current versus constant voltage control characteristics - desired features of control. Ideal and actual steady state characteristics and combined rectifier and inverter characteristics –Constant minimum ignition angle control, constant current control, constant extinction angle control and tap changer control. (9)

MIS-OPERATION OF CONVERTERS AND HARMONICS: Introduction to converter disturbance - causes and effects – By pass action in bridges -Commutation failure. Characteristic and un-characteristic harmonics – Troubles due to harmonics – Means of reducing harmonics. (5)

INTRODUCTION TO FACTS: Fundamentals of AC power transmission, transmission problems and needs, emergence of FACTS. Power flow equations- Relative importance of controllable parameters. Basic types of FACTS controllers. (6)

SHUNT AND SERIES COMPENSATORS: Introduction - Principles of reactive power control - principle of operation of Variable Impedance Type Static Var Generators- TCR, TSC and FC-TCR. Introduction to switching converter type var generators - basic operating principle of STATCOM. Introduction to series compensation- basic principle of operation of GCSC and TSSC. (10)

Total 45

TEXT BOOKS:

1. Kimbark E W, "Direct Current Transmission", Wiley Interscience , New York,1971.
2. Narain G. Hingorani, Laszlo Gyugyi, "Understanding FACTS: Concepts & Technology of Flexible AC Transmission System", Wiley India Pvt. Ltd., 2011.

REFERENCES:

1. Mohan Mathur P, Rajiv K Varma, " Thyristor-Based Facts Controllers for Electrical Transmission Systems", John Wiley and Sons Inc., India, 2011
2. Arrillaga J, "High voltage Direct Current Transmission", IEE Publications, London, UK, 1999.
3. Padiyar K R, "HVDC Transmission Systems", New Age International Publishers Ltd., New Delhi , 2002.

12E002 SPECIAL MACHINES AND CONTROLLERS

3 0 0 3

STEPPER MOTORS: Types - Constructional features – principle of operation – variable reluctance motor – single and Multi-stack configurations – Permanent Magnet Stepper motor – Hybrid stepper motor. Different modes of Excitation - theory of torque predictions – Drive systems and circuit for open-loop and closed-loop control of stepper motor. (8)

SWITCHED RELUCTANCE MOTORS: Constructional features – principle of operation –Torque Equation - Power Converters for SR Motor – Rotor Sensing Mechanism & Logic Controller – Sensorless Control of SR motor - Applications. (8)

PERMANENT MAGNET BRUSHLESS DC MOTORS: Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations – Power controllers – Motor characteristics and control – Applications. (8)

PERMANENT MAGNET SYNCHRONOUS MOTORS: Principle of operation, EMF, power input and torque expressions, Phasor diagram, Power Controllers, Torque speed characteristics, Self control, Vector control, Current control Schemes – Applications. (8)

LINEAR MOTORS : Linear Induction motor (LIM) classification – construction – Principle of operation – Concept of current sheet – goodness factor – DC Linear motor (DCLM) types – circuit equation - DCLM control applications – Linear Synchronous Motor (LSM) – Types – Applications. (9)

SERVOMOTORS: Servomotor – Types – Constructional features, principle of operation - control applications. (4)

Total 45

TEXT BOOKS:

1. Kenjo T, "Stepping Motors and their Microprocessor Controls", Clarendon Press London, 2003.
2. Miller T J E, "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, New Delhi, 1989

REFERENCES:

1. Naser A and Boldea L, "Linear Electric Motors: Theory Design and Practical Applications", Prentice Hall Inc., New Jersey 1987.
2. K. Venkataratnam, "Special Electrical Machines", Universities Press, India, 2009.
3. Kenjo, T and Naganori, S "Permanent Magnet and brushless DC motors", Clarendon Press, Oxford, New Delhi, 1989.
4. Floyd E Saner, "Servomotor Applications", Pittman, London, 1993.
5. William H Yeadon, Alan W Yeadon, Handbook of Small Electric Motors, McGraw-Hill, New Delhi, 2001.

12E003 RENEWABLE ENERGY SOURCES**3 0 0 3**

INTRODUCTION: Trends in energy consumption - Energy sources and their availability – Yield Energy ratio: Classification of Energy sources, Conventional and renewable sources. (2)

SOLAR POWER SYSTEMS: Solar Thermal Systems: Principle and operation – Low, medium and high temperature systems. Solar Photovoltaic Systems: Solar cells and their characteristics - Influence of insolation and temperature - PV arrays – Maximum Power Point Tracking Algorithms – Buck-Boost Converters, Grid connected PV System – Overview of Islanding - Stand alone PV systems (10)

WIND ENERGY SYSTEMS: Nature and Power in the wind - Wind Energy Conversion System (WECS) - Components and Classification of a WECS - Yaw and Pitch Control - Betz model - Wind Turbines – Types - Horizontal and vertical axis wind turbines. Generators for WECS – Types - Selection of Generators – Operation and Control of Grid-connected and Self-excited Induction Generators – Permanent Magnet Synchronous Generators - Schemes for Fixed and Variable Speed Wind Turbines. (11)

FUEL CELLS: Principle and operation – Types – Efficiency – Effect of Polarization on Efficiency - Construction and Working of H₂O₂ and Proton Exchange Membrane Fuel Cell. Introduction to Hydrogen Energy Production and Storage. (8)

MISCELLANEOUS SOURCES: Energy from Oceans – Magneto Hydro Dynamic Systems – Geo-thermal Energy. (7)

MODELING AND SIMULATION: Need for Simulation - Introduction to Toolboxes in MATLAB – SIMULINK, Modeling of PV Cell – Simulating the Characteristics of a PV cell – Parameters for Modeling Induction Generator and Fuel cell in MATLAB. (7)

Total 45**TEXT BOOKS:**

1. Khan B H, "Non-conventional Energy Resources", Tata McGraw-Hill, New Delhi 2009
2. Mukund R Patel, "Wind and Solar Power Systems", CRC Press, New York, 2005.

REFERENCES:

1. Rai G D, "Non-conventional Energy Sources", Khanna Publishers, New Delhi, 2004.
2. Bhadra S N, Banerjee S, Kastha D, "Wind Electrical Systems", Oxford University Press, New Delhi, 2008
3. Colleen Speigel, "PEM Fuel Cell Modeling and Simulation Using MATLAB", Academic Press, New Delhi, 2008
4. Roger A. Messenger, "Photovoltaic Systems Engineering", CRC Press, New York, 2010.

12E004 UTILIZATION OF ELECTRICAL ENERGY**3 0 0 3**

ELECTRIC TRACTION: Requirements of traction system - Systems of traction - Systems of track electrification - Speed-Time curves - Tractive effort - Power of traction motor - Specific energy consumption – Block Diagram of Modern Locomotive – Main and Auxiliary Power supply circuits – Current Collection Systems -Motors for traction - Starting and speed control - Electric braking. (11)

ELECTRIC HEATING AND WELDING: Advantages of electric heating – Types of Heating - Resistance heating - Temperature control, Induction heating – induction furnace - Dielectric heating - Choice of voltage and frequencies for Dielectric heating – Welding - Equipments for Welding - Resistance welding - Arc welding - Laser welding – Ultrasonic Welding (8)

ILLUMINATION: Nature of light - Luminous intensity - Illumination - Brightness - Lamp efficiency - Luminous efficiency - Laws of illumination - Electrical sources of light - Fluorescent lamp, Sodium Vapour lamp, Mercury Vapour lamp – CFL – LED Lighting systems - Polar curves - Calculation of illumination - Indoor and outdoor Lighting schemes (8)

REFRIGERATION AND AIR CONDITIONING: Refrigeration Systems – Refrigerants – Types of Refrigeration Systems – Electrical Circuit of a Domestic Refrigerator – Trouble shooting of Refrigerator. Air Conditioning Systems – Types - Electrical circuit of window and Central Air Conditioning Systems. (8)

ECONOMIC ASPECTS OF UTILISATION: PF and its improvement - Load curves - Load factors - Its improvement – Depreciation – Types. Introduction to Availability based Tariff - Demand side Management –Peak clipping – Peak shifting – valley filling - Use of

off-peak energy - Trends in Conservation : Green Buildings. Introduction to Energy conservation and Energy auditing - Energy efficiency in thermal & electrical utilities - Case studies. (10)

Total 45

TEXT BOOKS:

1. Garg G C, "Utilisation of Electric Power and Electric Traction", Khanna Publishers, New Delhi, 2008.
2. Openshaw Taylor E "Utilisation of Electric Energy", Orient Blackswan, Hyderabad, 2012.

REFERENCES:

1. Wadhwa C L, "Generation, Distribution and Utilization of Electrical Energy" New Age International Publishers, New Delhi, 2012.
2. Tripathy, S.C., "Electric Energy Utilisation and Conservation", Tata Mc Graw-Hill, New Delhi, 1993.
3. Suryanarayanan, N.V., "Utilization of Electric Power Including Electric Drives and Electric Traction", New Age International Publishers, New Delhi, 2010
4. Abbi Y P, Shashank Jain, "Handbook on Energy Audit and Environment Management", Teri Press, New Delhi, 2006
5. J.Nanda and D.P.Kothari, "Recent Trends in Electrical Energy Systems", Prentice Hall of India, New Delhi, 1988.

12E005 ADVANCED CONTROL SYSTEMS

3 0 0 3

CONTROLLER DESIGN: Design and Performance analysis of P, PI, PID Controllers – Ziegler-Nichols tuning of PID Controller, Cohen Coon tuning Method. (8)

COMPENSATOR DESIGN: Classical design, Examples - Realisation of compensating Networks - Lead, lag, lag-lead networks - Lead compensation, lag compensation, lag-lead compensation - Network compensation – root locus approach. (8)

STATE SPACE ANALYSIS: State space representations – State Transition Matrix – Solution of State equations - Controllability and Observability – Pole placement by state feedback. (9)

SAMPLED DATA SYSTEM: Sampling process – Sample and hold - Reconstruction of sampled signals - Hold circuits - zero and first order hold - Z and Inverse Z transform - Pulse transfer function - Step response. (8)

NON-LINEAR SYSTEMS: Introduction – Properties of Non-Linear systems – Describing function for simple non-linearities like on-off relay, dead zone, saturation and relay with hysteresis. Basic concepts – singular points – construction of phase plane trajectory for linear and non-linear second order system – Isocline method – stability evaluation and limit-cycle. (12)

Total 45

TEXT BOOKS:

1. Ogata K, "Modern Control Engineering", Prentice-Hall of India, New Delhi, 2010.
2. Gopal M, "Modern Control Systems Theory", New Age International Publishers, New Delhi, 2011.
3. Benjamin C Kuo, "Automatic Control Systems", John Wiley & Sons, New York, 2010.

REFERENCES :

1. Nagrath I J and Gopal M, "Control System Engg", New Age International Publishers, New Delhi, 2011.
2. Norman S. Nise, "Control system Engineering", John Wiley & Sons, New York, 2011.
3. Aggarwal K K, "Control Systems Analysis and design", Khanna Publishers, New Delhi, 2004.
4. Gopal M, "Digital Control and State Variable Methods", Tata McGraw-Hill, New Delhi, 2008.

12E011 SMART GRID

3 0 0 3

INTRODUCTION: Overview of Electrical Grid – Definition of Smart Grid – Functional Characteristics – Inventory of Smart Grid Technologies – Operating Principles and Models of Smart Grid Components. Smart Grid Architectural Frame Work – Standards – Interoperability and security of smart grids – Applications. (7)

DISTRIBUTED GENERATION SOURCES AND MICROGRIDS: Microgrids – Definitions and components – Topologies – Distributed Energy sources : Solar Photovoltaic, small and Medium Sized Wind Turbines, Fuel Cells – Modeling and Grid Integration Issues. Islanding Inverters, Smart Switches. Distribution Automation: Fault Detection, Isolation and Restoration, SCADA for Distribution Automation. (10)

ADVANCED METERING INFRASTRUCTURE (AMI): Smart Meters – Benefits and Applications of Smart Metering – AMI Architecture – Components Overview. Smart Meter Requirements and Technology: Neighborhood Area Communications (NAN) – Home Area Network Topology (HAN) – Power Line carriers – HAN Gateways. Field Area Networks (FAN) – Requirements, IP based networks. Overview of Smart Metering. (10)

SMART GRID NETWORKING AND COMMUNICATIONS: Smart Grid Architecture – Communication Devices Overview – Smart Grid Networking Standards: Internet Protocol Suite, SCADA Standards - Smart Grid Networking Technologies: Public Wired Technologies, Public Wireless Technologies, Private Wired Technologies and Private Wireless Technologies. (10)

SMART APPLIANCES AND CYBER SECURITY IN SMART GRIDS: Smart appliance Technology – Communication Modules – HAN – Pricing for Smart Appliances on demand. Security issues in DG, Distribution Automation, AMI, Electric Vehicle Management Systems – Approach to assessment of smart grid cyber security risks – Methodologies. (8)

Total 45

TEXT BOOKS:

1. James Momoh, "SMART GRID : Fundamentals of Design and Analysis", John Wiley and Sons, New York, 2012
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley & Sons, New Jersey, 2012.

REFERENCES:

1. Ryszard Strzelecki, Grzegorz Benysek, "Power Electronics in Smart Electrical Energy Networks", Springer, New Zealand, 2008.
2. Yang Xiao, "Security and Privacy in Smart Grids", CRC Press, New York, 2012.
3. Tony Flick, Justin Morehouse, "Securing the Smart Grid : Next Generation Power Grid Security", Academic Press, Boston, 2011.
4. Yang Xiao, "Communication and Networking in Smart Grids", Taylor and Francis, New Delhi, 2012.

12E012 VLSI DESIGN

3 0 0 3

OVERVIEW OF VLSI DESIGN METHODOLOGY: VLSI design process - Architectural design - Logical design - Physical design - Layout styles – Full-custom – Semi-custom approaches. (3)

BASIC ELECTRICAL PROPERTIES OF MOS AND CMOS CIRCUITS: MOS Transistor – Threshold voltage - Pass transistor - Transmission gate - Basic DC equations - Second order effects - MOS modules - Small signal AC characteristics - nMOS inverter - Steered input to an nMOS inverter - Depletion mode and enhancement mode pull-ups - CMOS inverter - DC characteristics - Inverter delay – Power consumption in CMOS gates – Static dissipation – Dynamic dissipation. (9)

VLSI FABRICATION TECHNIQUES: An overview of wafer fabrication - Wafer processing - Oxidation - Patterning - Diffusion - Ion implantation - Deposition - Silicon gate nMOS process – CMOS processes – n-well - p-well - Twintub - Silicon on insulator - CMOS process enhancements - Interconnect - Circuit elements - Latchup - Latchup prevention techniques. (6)

MOS AND CMOS CIRCUIT DESIGN PROCESSES: Layer representations - Stick diagrams - nMOS design style - CMOS design style - Design rules - Need for design rules - Mead Conway design rules for the silicon gate nMOS process - CMOS n-well / p-well lambda based design rules - Simple layout examples. (8)

Sheet resistance - Resistance estimation - Capacitance estimation - Driving large capacitive loads. (3)

nMOS AND CMOS CIRCUIT AND LOGIC DESIGN: Switch logic- Pass transistor and transmission gate - Gate logic - Other forms of CMOS logic - Dynamic CMOS logic - Clocked CMOS logic – Pre-charged domino CMOS logic - Structured design - Simple combinational logic design examples - Parity generator - Multiplexers - Clocked sequential circuits – Two-phase clocking - Charge storage - Dynamic register element - nMOS and CMOS - Dynamic shift register – Semi-static register - JK flip-flop. (9)

SUBSYSTEM DESIGN PROCESS: General arrangement of a 4-bit arithmetic processor - Design of a 4-bit shifter - Design of an ALU subsystem - Implementation of ALU functions with an adder - Carry look ahead adder – Multipliers – Serial-parallel multipliers - Pipelined multiplier array. (7)

Total 45

TEXT BOOKS:

1. Douglas A Pucknell, and Kamran Eshraghian, "Basic VLSI design", Prentice Hall of India, New Delhi, 2005.
2. Neil H E Weste and David Harris, " CMOS VLSI design: Circuits and System Perspective", Pearson Education, New Delhi, 2011.

REFERENCES:

1. Jan M Rabaey, Chandrakasan A, Nikolic B, "Digital Integrated Circuits", Pearson Education, New Delhi 2003.
2. Amar Mukherjee, "Introduction to nMOS and CMOS VLSI system design", Prentice Hall, New Jersey, 1986.
3. Wayne Wolf, "Modern VLSI Design: Systems on Silicon", Pearson Education, New Delhi, 2009.
4. Eugene D Fabricus, "Introduction to VLSI Design", McGraw-Hill, New York, 1990.

12E013 COMMUNICATION SYSTEMS

3 0 0 3

AM SYSTEM: Introduction to communication systems - Amplitude modulation theory - Frequency Spectrum - Representation - Power relation - AM Generation – Class C power Amplifier – Evolution & description of SSB – Balanced Modulator – Advantages of SSB Transmission - AM transmitter – AM receiver - AM envelope detector – Superhetrodyne receiver. (10)

FM SYSTEM: Frequency Modulation - Phase Modulation –Representation and Frequency spectrum of FM wave – Effects of noise on carrier- Pre-emphasis and De-emphasis - FM Generation : Direct method – Stabilized reactance modulator – FM Transmitter – FM Receiver - Comparison of Wide band and Narrow band FM. (10)

DIGITAL COMMUNICATION SYSTEM–. Advantages of Digital Data transmission – Sampling – Pulse Code Modulation – source codes-error control codes - line codes . Digital Modulation schemes: Digital amplitude modulation, Frequency Shift Keying and Phase Shift Keying – BPSK and QPSK- FSK transmitter and receiver. (10)

FIBRE OPTIC SYSTEM: History of fibre optics - optical fibres versus metallic cables-optical fibre communication system - light propagation through optical fibres - fibre configurations - acceptance angle and acceptance cone - losses in optical fibre cables, light sources, light detectors, lasers. (8)

ADVANCED COMMUNICATION SYSTEMS: Introduction to cellular radio telephones, Wireless Access methods, Wireless LAN – Introduction to ISDN and BISDN. (7)

Total 45

TEXT BOOKS:

1. Kennedy G and Davis B , “Electronic Communication systems”, Tata McGraw-Hill, New Delhi, 2011.
2. Wayne Tomasi, “Advanced Electronic Communication Systems”, Pearson Education, New Delhi 2004.

REFERENCES:

1. Keiser, “Optical Fibre Communications”, Tata McGraw-Hill, New Delhi, 2010.
2. Theodore S Rappaport, “Wireless Communication”, Pearson Education, New Delhi, 2002
3. Simon Haykin, “Communication Systems”, Wiley Publications, Singapore, 2008.

12E014 NEURAL NETWORKS & FUZZY SYSTEMS

3 0 0 3

INTRODUCTION TO NEURAL NETWORKS: Differences between Biological and Artificial Neural Networks - Typical Architecture, Common Activation Functions, McCulloch - Pitts Neuron, Simple Neural Nets for Pattern Classification, Linear Separability - Hebb Net, Perceptron, Adaline, Madaline - Architecture, algorithm, and Simple Applications. (7)

PATTERN ASSOCIATION: Training Algorithms for Pattern Association - Hebb rule and Delta rule, Hetero-associative, Auto-associative and Iterative Auto-associative Net, Bidirectional Associative Memory - Architecture, Algorithm and Simple Applications. (7)

NEURAL NETWORKS BASED ON COMPETITION: Kohonen Self-Organising Maps, Learning Vector Quantization, Counter Propagation - Architecture, Algorithm and Applications. (7)

ADAPTIVE RESONANCE AND BACKPROPAGATION NEURAL NETWORKS: ART1 and ART2 - Basic Operation and Algorithm, Standard Backpropagation Architecture, derivation of Learning Rules, Boltzmann Machine Learning - Architecture, Algorithm and Simple Applications. (6)

CLASSICAL AND FUZZY SETS AND RELATIONS: Properties and Operations on Classical and Fuzzy Sets, Crisp and Fuzzy Relations - Cardinality, Properties and Operations, Composition, Tolerance and Equivalence Relations, Simple Problems. (6)

MEMBERSHIP FUNCTIONS: Features of membership function, Standard forms and Boundaries, fuzzification, membership value assignments, Fuzzy to Crisp Conversions, Lambda Cuts for fuzzy sets and relations, Defuzzification methods. (7)

APPLICATIONS OF NEURAL NETWORKS AND FUZZY LOGIC: Applications of Neural Networks: Pattern Recognition - Image compression – Communication - Control systems - Applications of Fuzzy Logic: Fuzzy Pattern Recognition - Fuzzy Image compression - Fuzzy Logic Controllers. (5)

Total 45

TEXT BOOKS:

1. Laurene Fausett, “Fundamentals of Neural Networks”, Pearson Education India, New Delhi, 2004.
2. Sivanandam S N, Sumathi S, Deepa S N, “Introduction to Fuzzy Logic using MATLAB”, Springer-Verlag, Berlin Heidelberg, 2007.
3. Sivanandam S N, Sumathi S, Deepa S N, “Introduction to Neural Networks using Matlab 6.0,” Tata McGraw-Hill, New Delhi, 2006

REFERENCES:

1. Timothy Ross, “Fuzzy Logic with Engineering Applications”, Mc Graw-Hill, Singapore, 2002.
2. Zimmermann H J, “Fuzzy set theory and its Applications”, Allied Publisher, New Delhi, 2006.
3. Klir G J, and Folger T, "Fuzzy Sets, Uncertainty and Information", Prentice Hall of India, New Delhi, 2008.
4. Zurada J M, "Introduction to Artificial Neural Systems", Jaico Publishing House, Mumbai, 2006.
5. Mohammad H Hassoun, "Fundamentals of Neural Networks", Prentice Hall of India, New Delhi, 2002.

12E015 ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

3 0 0 3

8086 MICROPROCESSOR: Architecture – Pin description – Operating modes – Registers – Interrupts – Bus cycle – Addressing modes – Typical configuration of 8086 system – Overview of Instruction set. (7)

80286 MICROPROCESSOR: Functional block diagram - Modes of operation – Real and protected mode – Memory management and protection features. (8)

80386, 80486 PROCESSORS: 80386: Functional block diagram - Programming model - Addressing modes and instruction set overview – Address translation - Modes of operation - 80486 processor - Functional block diagram - Comparison of 80386 and 80486 processors. (8)

PENTIUM MICROPROCESSOR: Introduction – Architecture – Special Pentium registers – Memory management. (7)

PIC MICROCONTROLLER: Architecture – Memory structure – Register File – Addressing modes – Interrupts – Timers: Modes of operation. (7)

PIC PERIPHERAL FUNCTIONS AND SPECIAL FEATURES: PWM output – Analog to Digital converter – UART – Watchdog timer – RESET Alternatives – Power Down mode – I²C Bus operation (8)

Total 45

TEXT BOOKS:

1. Barry B Brey, "The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium and Pentium Pro processor, Pentium II,III,4 and Core-2 with 64-bit Extensions", Prentice Hall of India, New Delhi, 2012.
2. Douglas V Hall, "Microprocessors and Interfacing: Programming and Hardware", Tata McGraw-Hill, New Delhi, 2012.
3. John B Peatman, "Design with PIC Microcontroller, McGraw-Hill, Singapore, 2003.

REFERENCES:

1. Mohammed Rafiquzzaman, "Microprocessors and microcomputer based system design", Taylor & Francis, New Delhi, 1995.
2. Walter A Triebel, Avtar Singh . "The 8088 and 8086 microprocessors Programming Interfacing software, Hardware and Applications", Pearson Education, New Delhi, 2009.
3. Myke Predko, "Programming and Customizing the PIC Microcontroller", McGraw-Hill, New York, 2007.

12E021 ADVANCED DATA STRUCTURES

3 0 0 3

INTRODUCTION: Introduction to Analysis of Algorithms– Best Case and Worst Case complexities - Amortized time complexity - Complexity for bubble sort, quick sort. (7)

SEARCHING: Introduction to Linear Search, Binary search, and Binary search trees. **HASHING:** Hash function – separate chaining – open addressing – linear probing – quadratic probing – double hashing - rehashing. (8)

AVL TREES: Definition – Height – Searching – insertion and deletion of elements, AVL rotations – Analysis. (6)

MULTIWAY SEARCH TREES: Indexed Sequential Access – m-way search trees – B-Tree – Searching, insertion and deletion - B+ trees – Tries - Red-Black trees. (9)

BINOMIAL HEAP AND FIBONACCI HEAP: Binomial trees and binomial heaps – Operations on binomial heap – Structure of Fibonacci heaps – merge heap operations, decreasing a key and deleting a node – Bounding the maximum degree. (7)

GRAPHS: Definition – Representations (Adjacency matrix, packed adjacency list and linked adjacency list) – Network representation – Shortest path algorithm - Graph search methods (Breadth first and depth first traversals) – Minimum spanning tree. (8)

Total 45

TEXT BOOKS:

1. Yedidayah Langsam, Moshe J. Augenstein and Aaron M.Tanenbaum, "Data Structures using C and C++", Pearson Education, New Delhi, 2009.
2. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest, "Introduction to Algorithms", Prentice Hall of India, New Delhi, 2011.

REFERENCES :

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, New Delhi, 2010
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson - freed, "Fundamentals of Data structures in C", Universities Press, Hyderabad, 2008.
3. Adam Drozdek, "Data Structures and Algorithms in C++", Cengage Learning, New Delhi, 2006.

12E022 COMPUTER NETWORKS

3 0 0 3

INTRODUCTION: Computer Networks – A perspective – Goals – Applications – Classification of Networks - Layered Architecture for Communication – Advantages – Examples - OSI Model – TCP/IP Model – Protocols and Protocol Data Units (PDUs) (6)

DATA COMMUNICATION TECHNIQUES: Data Types – Digital / Analog – Signaling Techniques - Digital / Analog – MODEM – CODEC – Error and Flow Control Techniques - Asynchronous and Synchronous Communication – Start-Stop Protocol - BISYNC – HDLC Protocols. (10)

LOCAL AREA NETWORKS (IEEE 802) : Topology: Star – Ring – Bus – Channel Access Techniques: FDM and TDM – CSMA – CSMA/CD – Ethernet LAN (802.3) – Switched LAN - Token BUS LAN (802.4)– Token Ring LAN (802.5) – Industrial Networking: CAN Bus – WiFi, WiMAX. and PAN. (12)

NETWORKING ISSUES: Wide Area Network (WAN) – X.25 Procedures – Datagram switching and Virtual Circuit Switching - Internetworking: internet - Routers – Gateways – Internet Protocol (IP) – IP Addresses – Classification – Special IP Addresses – Transmission Control Protocol (TCP) – Internet Applications – Examples. (11)

NETWORK SECURITY: Network Attacks – Firewalls – Packet Filtering – Encryption / Decryption Techniques – Public Key Cryptography – Digital Authentication – Digital Signatures. (6)

Total 45

TEXT BOOKS:

1. Behrouz A Foruzan, "Data Communications and Networking", McGraw-Hill, New York, 2012.
2. Behrouz A Foruzan, "TCP/IP Protocol Suite", Tata McGraw-Hill, New Delhi, 2010.

REFERENCES:

1. William Stallings, "Data and Computer Communication", Pearson Education, New Delhi, 2009.
2. Basandra S.K, "Local area Networks", Galgotia Publications, New Delhi, 1993.
3. Youlu Zheng, Shakil Akhtar, "Networks for Computer Scientists and Engineers", Oxford University Press, New Delhi, 2006.
4. Stanford H Rowe and Marsha L Schuh, "Computer Networking", Pearson Education, New Delhi, 2005.

12E023 SOFTWARE PROJECT MANAGEMENT AND QUALITY ASSURANCE

3 0 0 3

INTRODUCTION: Project definition – software projects – software projects Vs other projects - activities covered by software project management – overview of project planning – stepwise project planning – Project Evaluation : Strategic assessment – Technical assessment – cost benefit analysis – cash flow forecasting – cost benefit evaluation techniques – risk evaluation. (10)

ACTIVITY PLANNING: Objectives – project schedule – sequencing and scheduling activities – network planning models – forward pass – backward pass – activity float – shortening project duration – activity on arrow networks – risk management – nature of risk – types of risk – managing risk – hazard identification – hazard analysis – risk planning and control. (10)

MONITORING AND CONTROL: Creating the framework – collecting the data – visualizing progress – cost monitoring – earned value – prioritizing monitoring – getting project back to target – change control – managing contracts – introduction – types of contract – stages in contract placement – typical terms of a contract – contract management – acceptance. (10)

MANAGING PEOPLE AND ORGANIZING TEAMS : Introduction – understanding behavior – organizational behavior: a background – selecting the right person for the job – instruction in the best methods – motivation – the oldman–hackman job characteristics model – working in groups – becoming a team – decision making – leadership – organizational structures – stress – health and safety – case studies. (7)

SOFTWARE QUALITY: Introduction – software quality in project planning – importance of software quality – ISO 9126 – software quality measures – techniques to enhance software quality – Quality plan. (8)

Total 45

TEXT BOOKS:

1. Bob Hughes and Mike Cotterell "Software Project Management", Tata McGraw-Hill, New Delhi, 2011.
2. Pankaj Jalote "Software Project Management in Practice", Pearson Education, New Delhi, 2005.

REFERENCES:

1. Ramesh and Gopalswamy: "Managing Global Projects ", Tata McGraw-Hill, New Delhi, 2005.

12E024 ADVANCED COMPUTER ARCHITECTURE

3 0 0 3

INTRODUCTION: Computer architectural classification: Flynn's classification – Data flow versus Control flow computers – Parallelism in uniprocessor systems – Balancing of subsystem bandwidth – Parallel processing applications. (3)

MEMORY AND INPUT/OUTPUT SUBSYSTEMS: Hierarchical Memory Structure: Memory hierarchy – Optimisation –Addressing schemes for main memory – Multiple module memories – Memory interleaving – Virtual Memory System: Concepts – Paged Memory System – Segmented memory System – Memory with Paged Segments – Memory allocation and Management: Classification of memory Policies – Optimal Load Control – Memory Management Policies – Cache Memory and Management: Characteristics – Cache Memory Organisation – Fetch and Main Memory Update Policies – Block Replacement Policies – Performance evaluation and enhancement – Input Output Subsystems: Characteristics – Interrupt Mechanisms and Special Hardware – I/O Processors and I/O Channels. (9)

PIPELINING AND VECTOR PROCESSING: Principles of pipelining – Instruction and Arithmetic pipelines – Instruction prefetch and branch handling – Data buffering and Busing structures – Internal forwarding and Register tagging – Hazard detection and resolution – Job sequencing and Collision prevention – Vector Processing: Characteristics – Pipelined Vector Processing methods – Vectorization and optimization methods. (9)

ARRAY PROCESSING: SIMD Array Processors – Masking and data routing mechanisms – Inter PE communications – Interconnection networks – Parallel Algorithms for Array Processors – Associative Array Processing – systolic array processing. (8)

MULTIPROCESSOR ARCHITECTURE: Functional structures: Loosely coupled multiprocessors – Tightly coupled multiprocessors – Processor characteristics for multiprocessing – Multiprocessor scheduling strategies – Interconnection networks– Parallel memory organization – Parallel Algorithms for Multiprocessors (8)

INTRODUCTION TO RISC ARCHITECTURE: Instruction execution characteristics – Instruction execution charts – Register files – Register optimization – Reduced Instruction Set Architecture – RISC pipelining – RISC versus CISC. (8)

Total 45

TEXT BOOKS:

1. Hwang K, and Briggs F A, "Computer Architecture and Parallel Processing", Tata McGraw–Hill, New Delhi, 2012.
2. Stallings W, "Computer Organization and Architecture: Designing for Performance", Pearson Education, New Delhi, 2010.

REFERENCES:

1. David Patterson and John L Hennessy, "Computer Organisation and Design: The Hardware/Software Interface", Elsevier Publishers, Waltham, 2011.
2. Hwang K, "Advanced Computer Architecture – Parallelism, Scalability and Programmability", Tata McGraw–Hill, New Delhi, 2008.

12E025 PERSONAL COMPUTER SYSTEMS

3 0 0 3

PC PROCESSOR: 8088 Architecture - Addressing modes - Instruction set - Features of Pentium processors. (8)

AT ARCHITECTURE: System units - Task allocations of system board - Timer - DMA and interrupt controller - Memory map - I/O map - AT bus. (ISA) specifications - PCI bus - Extended memory and Expanded memory. (8)

PERIPHERAL INTERFACE: Keyboard - Speaker - Printer - Display adapters - VGA standard - Floppy disk and hard disk formats - CD ROM structure – USB Basics. (8)

ASSEMBLY LANGUAGE PROGRAMMING: Program Development stages - Macro Assembler - Directives (real-mode only) - Linker - Debugger. (7)

STRUCTURE OF MS-DOS: BIOS - DOS kernel - Command processor - Boot record - File directory - MS-DOS booting process - Program segment prefix - COM and EXE files - BIOS and DOS interrupts - Structure of device drivers. (7)

WINDOWS: Structure of window systems - Windows 98 - System architecture - Device drivers for windows - Virtual memory management - Windows based applications - MS-DOS based applications. (7)

Total 45

TEXT BOOKS:

1. Douglas V Hall, "Microprocessors and Interfacing: Programming and Hardware", Tata McGraw-Hill, New Delhi, 2012.
2. Mathivanan N, "Microprocessors, PC Hardware and Interfacing", Prentice Hall of India, New Delhi, 2005.

REFERENCES:

1. Barry B Brey, "The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro- processor, Pentium II, Pentium III, Pentium 4, and Core 2 with 64-bit extensions : Architecture, Programming and Interfacing", Prentice Hall of India, New Delhi, 2012.
2. Ray Duncan, "Advanced MSDOS Programming", BPB Publications, New Delhi, 1994.

3. Andrew Macghee, Ryan Marshall "Microsoft Windows 98 Resource Kit", Microsoft Press, Washington, 1998.
4. Muhammed Ali Mazidi, J.G.Mazidi and Danny Causey, " The X86 PC Assembly Language, Design and Interfacing", Pearson Education, New Delhi, 2010.

PROFESSIONAL ELECTIVES WITH LAB

12E031 PLC AND DISTRIBUTED CONTROL SYSTEM

3 1 2 4

INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLERS: Definition and History of PLC - Manufacturing and assembly Processes - PLC Advantages and Disadvantages – Overall PLC System Architecture – PLC CPU, Input and Output Modules. Input, and output, On/Off devices- Input and output analog devices (6+2+2)

PROGRAMMING OF PLC: Programming Languages: Ladder Diagram, Function Block Diagram, Instruction List, Structured Text and Sequential Function Charts – Ladder Diagram: Basic relay Instructions, Timer and Counter Instructions, Arithmetic and Comparison Functions – Creating Ladder Diagrams using Process Control Descriptions (10+5+10)

NETWORKING OF PLCs: Levels of Industrial Control -Types of Networking – Remote I/O Expansion - Cell Control by PLC - Networks Basics - Introduction to Field Bus and Process Bus - ControlNet and DeviceNet Networks – EtherNet. (6+2+6)

HUMAN-MACHINE INTERFACES: Human-Machine Interactions: Models for Human-Machine Interactions, Systems of Human-Machine Interactions – User Machine interfaces: User-Machine interface system, User-Machine interface Hardware – Industrial Application Example: Human Machine interfaces in Robotic systems. (6+2+6)

SCADA: SCADA Systems: Hardware – Software – Open Systems and Communication Standards - Fundamentals of SCADA-Communications, Remote Terminal Unit, PLCs as RTUs – Communication Architectures and Philosophies – SCADA Protocols: HDLC and MODBUS. (8+2+4)

DISTRIBUTED CONTROL SYSTEMS (DCS): Introduction - Emergence of DCS Architecture – Comparison of Architectures - Local Control Unit: Architecture - Process Interfacing Issues - operator interface – engineering interfaces. (9+2+2)

Total = L:45 + T:15 + P:30 = 90

PRACTICALS:

Exercises involving

- Ladder Logic Programs
- Applications using PLC

TEXT BOOKS:

1. Gary Dunning, "Introduction to Programmable Controllers", Delmar, a Division of Thomson Learning, New York, 2008.
2. Frank D. Petruzella, "Programmable Logic Controllers", Tata Mc Graw-Hill, New Delhi, 2011.
3. Michael P Lukas, "Distributed Control systems", Van Nostrand Reinhold Company, New York, 1995

REFERENCES:

1. Peng Zhang, "Advanced Industrial Control Technology", Elsevier, 2010.
2. David Bailey, Edwin Right, "Practical SCADA for Industry", Newnes (Elsevier), Mumbai, 2003.
3. John W. Webb and Ronald A. Reis, "Programmable logic controllers: Principles and Applications", Prentice Hall India, New Delhi, 2009

12E032 COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES

3 1 2 4

COMPUTER AIDED DESIGN (CAD): Need for CAD - Nature of design problem - Analysis and synthesis approaches - Preparation of design procedures - Branching - Decision and structure tables - Iterative procedures - Flow charting. (7+0+2)

COST ESTIMATION: Aim and importance - Material cost -Labour cost -Overhead cost -Running cost - Life cycle cost. (5+2+2)

OPTIMUM DESIGN: Selection of objective function, variables and constraints - Effects of variables on objective function and performance - Non-linear programming approach. (6+3+2)

COMPUTER AIDED DRAWING: Introduction - Graphic input & output devices – AutoCAD-Program files - Installation - Screen menu structure - Fixing the size of a drawing - Set-up option - On-line help - Text fonts, shapes - Blocks - Copy - Array - Erasing facilities - Editing - Fill - Zoom - Pan - Hatching - Isoplane - Elevation, View point - Dimensioning techniques - Introduction to 3D drawing - Taking hard copy using printer and plotter. (6+3+6)

INDUCTION MACHINE DRAWINGS: Cross sectional views - Development of winding diagram. (5+2+6)

FINITE ELEMENT ANALYSIS: Mathematical formulation – discretisation – shape functions – stiffness matrix – solution techniques – post processing - Numerical solution for partial differential equations. (8+2+6)

TYPICAL DESIGN EXAMPLE: Three phase Induction motor – Design analysis - Performance predictions - Flow chart for feasible design – Design using motor design software. (8+3+6)

Total = L :45 + T :15 + P:30 = 90

PRACTICALS:

Exercises involving

- CAD of AC/DC Machines using C / Matlab Programming
- Electrical Machine drawing using Auto CAD
- Analysis of Special Electrical Machines using MotorPro

TEXT BOOKS:

1. Sen S K, "Principles of Electric Machine Design with Computer Programmes", IBH Publishing, New Delhi, 2009.
2. Silvester P P and Ferrari, 'Finite Element for Electrical Engineers', Cambridge University Press, London, 1995.

REFERENCES:

1. Vishnu Murthy, K. M., "Computer-aided Design of Electrical Machines", BS Publications, Hyderabad, 2008
2. Ramamoorthy M, "Computer Aided Design of Electrical Equipment", Affiliated East-West Press, New Delhi, 1987.
3. Robert M Thomas, "Advanced Techniques in AutoCAD", BPB Publications, New Delhi, 1988.
4. Veinott C G, "Computer Aided Design for Electric Machinery", MIT Press, London, 1972.
5. Sham Tickoo, "AutoCAD 2007 with Applications", Tata McGraw-Hill, New Delhi, 2001.

12E033 VIRTUAL INSTRUMENTATION SYSTEMS

3 1 2 4

INTRODUCTION: Block diagram and Description of a Virtual Instrument - Hardware and Software - Advantages of Virtual instruments over conventional instruments. History of LabVIEW. (3+2+0)

SOFTWARE OVERVIEW: LabVIEW - Graphical user interfaces - Controls and Indicators - 'G' programming - Labels and Text - Shape, Size and Color - Owned and free labels - Data types, Format, Precision and representation - Data flow programming - Editing - Debugging and Running a Virtual instrument - Graphical programming palettes and tools - Front panel objects - Functions and Libraries. (10+3+4)

PROGRAMMING STRUCTURES: FOR loops, WHILE loops, CASE structure, Formula nodes, Sequence structures - Arrays and Clusters - Array operations - Bundle - Bundle/Unbundle by name, graphs and charts - String and File I/O - High level and Low level File I/O's - Attribute modes: Local and Global variables. (12+3+16)

DATA ACQUISITION AND I/O FUNCTIONS: Classification of signals, real-world signals, DAQ: Structure, Resolution, Gain, conversion rate, Connecting signal to DAQ boards, DAQ Assistant and I/O functions in LabVIEW, Measurement and Automation Explorer. (8+3+4)

HARDWARE ASPECTS: Instrument Connectivity - GPIB Hardware & Software specifications - Serial Communication - PXI / PCI: Controller and Chassis Configuration. (6+2+3)

LABVIEW APPLICATIONS: Image Acquisition – Machine vision system, Machine Vision Hardware and Software, Introduction to NI-IMAQ and IMAQ Vision. Motion Control: Components of a motion control system, Software for configuration, Prototyping and Development - General Applications. (6+2+3)

Total = L:45 + T:15 : P:30 = 90

PRACTICALS:

Exercises involving

- Creation of VIs
- Understanding concepts of Arrays, Cluster, Loops, Structures, Graphs, Charts
- DAQ Assistant
- Understanding concepts of Image Acquisition Functions
- Understanding concepts of Motion Control Functions

TEXT BOOKS:

1. Sanjay Gupta and Joseph John, "Virtual Instrumentation using LabVIEW", Tata McGraw-Hill, New Delhi, 2010.
2. Jovitha Jerome, "Virtual Instrumentation using LabVIEW", Prentice Hall of India, New Delhi, 2011

REFERENCES:

1. LabVIEW: Basics I & II Manual, National Instruments, Bengaluru, 2005.
2. Garry M Johnson, "LabVIEW Graphical Programming", Tata McGraw Hill, New Delhi, 2011.

12E034 DIGITAL SYSTEM DESIGN

3 1 2 4

SYSTEM DESIGN USING PLDs AND CPLDs: Structure of PLDs – PAL16L8, PAL18P8, PAL16R6 - Complex PLDs (CPLDs) – Altera Max 7000 series – PLD design process – Design of combinational and sequential circuits using PLDs – Adder – Sequence detector – counters - shift register - Design of state machines using Algorithmic State Machines (ASM) chart as a design tool. (9+3+3)

INTRODUCTION TO FIELD PROGRAMMABLE GATE ARRAYS (FPGAs): Types of FPGA – Xilinx XC3000 series – Logic Cell Array (LCA) – Configurable Logic Blocks (CLB) – Input/Output Blocks (IOB) – Programmable Interconnection Points (PIP) – Introduction to ACT 2 family and Xilinx SPARTAN, VIRTEX - FPGA Design examples. (8+2+4)

INTRODUCTION TO VHDL: Digital System Design process – Levels of abstraction – VHDL: Design entities, Architectural body – Data types - Scalar types – Composite types – Access types – File types – Operators and expressions – Data objects. Concurrent and sequential statements: Concurrent Signal Assignment – Conditional Signal Assignment – Signal Drivers – Inertial, transport and delta delays – Sequential control – Wait-if–Case – Loop – Next – Exit – Null process – Component instantiation – Block – Generics – Assert. (10+4+10)

SUBPROGRAMS, PACKAGES AND CONFIGURATIONS: Functions – Procedure– Package – Package declarations – Sub program declaration – Package body – Libraries – Predefined attributes – Configuration – Behavioural, Dataflow and Structural modeling of digital circuits – Simple VHDL codes. (9+4+10)

TESTING IN DIGITAL CIRCUITS AND DESIGN FOR TESTABILITY: Detection of faults in combinational logic circuits –Stuck-at-fault model – Path sensitising method – Fault detection in synchronous sequential circuits – Design for testability – Adhoc techniques – Scan registers – Level Sensitive Scan Design – Boundary Scan - Built-in-self test. (9+2+3)

Total = L:45 + T:15+P:30 = 90

PRACTICALS:

Exercises involving

- Design and Simulation of Combinational and Sequential Circuits using VHDL
- Implementation of Combinational and Sequential Circuits using Xilinx FPGA boards

TEXT BOOKS :

1. Nelson V P, Nagale H T, Carroll B D, and Irwin J D, "Digital Logic Circuit Analysis and Design", Prentice Hall International, New Jersey, 1996
2. Roth C H, "Digital Systems Design using VHDL", Thomson Asia, Singapore, 2006.
3. Volnei A. Pedroni, "Circuit Design and Simulation with VHDL", Prentice Hall of India, New Delhi, 2010.
4. Abramovici M B, Brever and Friedman D, "Digital Systems Testing and Testable Design", Jaico Publishing House, New Delhi, 1997.

REFERENCES:

1. Robert K Dueck, "Digital Design with CPLD applications and VHDL", Thomson Learning, Singapore, 2004.
2. Samuel C Lee, "Digital Circuits and Logic Design", Prentice Hall of India, New Delhi, 2007.
3. Palmer, JE., Perlman D.E., "Introduction to Digital Systems", Tata McGraw-Hill, New Delhi, 1996.

12E035 JAVA PROGRAMMING

3 1 2 4

OBJECT ORIENTATION IN JAVA: Introduction - Data Types - Operators - Declarations - Control Structures - Arrays and Strings - Input/output - Java Classes - Fundamentals - Methods - Constructors - Scope rules - this keyword – object-based Vs object-oriented programming - Inheritance-Reusability - Composing class - - Abstract classes - Abstract Functions – Method Overloading and Method Overriding- Wrapper Classes. (9+2+8)

PACKAGES AND INTERFACES: Packages - Access protection - Importing packages - Interface - Defining and Implementing Interface - Applying Interface - Variables in Interfaces. (6+2+4)

EXCEPTION HANDLING: Fundamentals - Exception types - Uncaught Exception - Using Try and Catch - Multiple catch clauses - Nested Try statements - Throw - Throws - Java Built-in Exception – Subclassing Exceptions. (4+2+2)

MULTI -THREADED PROGRAMMING: Java thread model - Priorities - Synchronization - Messaging - Thread class and runnable Interface - Main thread - Creating the Thread - Synchronization – Inter-thread Communication - Deadlock. (4+2+4)

I/O, APPLETS: I/O basics - Stream - Stream Classes - Predefined stream - Reading/Writing console input - Applet fundamentals - Native methods.- GUI Components - Applets - Java Scripts – AWT / Swings. (12+2+4)

INTRODUCTION TO NETWORK PROGRAMMING: Fundamentals - Internet Addresses - Internet Protocols - DNS - Internet Services - Socket programming, UDP, TCP. (5+2+4)

JAVA DATABASE PROGRAMMING: JDBC – Database Connection and Table Creation – Execution of Embedded SQL Statements - ResultSet and ResultSetMetaData – Examples. (5+3+4)

Total = L :45 + T :15 : P : 30= 90

PRACTICALS:

Exercises involving

- Object orientation in Java
- Run-time Polymorphism, Multithreading, GUI
- Network Programming

Mini Project and Submission of Report

TEXT BOOKS:

1. Patrick Naughton and Herbert Schildt, "JAVA - The Complete Reference", Tata McGraw-Hill, New Delhi, 2011.
2. Deitel and Deitel, "JAVA - How to Program", Pearson Education, New Delhi, 2004.

REFERENCES:

1. Kennath Litwak, "Pure Java 2: A Code-Intensive Premium Reference", Tech Media Publications, New Delhi, 2000

12E036 RELATIONAL DATABASE MANAGEMENT SYSTEMS

3 1 2 4

INTRODUCTION: Purpose of database systems – data abstraction – data models – instances and schemas – data independence – data definition language – database manager – database users - data warehousing and ERP- over all system structure. (5+1+0)

E-R MODEL: E-R model – E-R diagram, reducing E-R diagram to tables - Enhanced Entity Relationship (EER) – subclass - superclass –specialization and generalization. (5+2+0)

RELATIONAL MODEL: Structure of relational databases – the relational algebra – tuple and domain relational calculus – modifying the databases. (6+2+5)

RELATIONAL COMMERCIAL LANGUAGES: SQL – Query-by-example (QBE), Query integrity constraints – domain constraints – referential integrity – functional dependencies –assertions – triggers. (7+2+15)

RELATIONAL DATABASE DESIGN: pitfalls in relational database designs – normalisation using multivalued dependencies, join dependencies. Domain-key normalform. Mapping relational data to file data directory storage, buffer management. Typical database design approach for: Airline reservation systems – Inventory control – Library information system. (10+4+10)

FILE ORGANIZATION AND STORAGE: Heap file - hashing techniques – indexes - B-trees and B* trees - secondary storage devices - RAID technology - different levels of RAID. (6+2+0)

TRANSACTION PROCESSING: Desirable properties of transactions - concurrency control - locking techniques - concurrency control - database recovery techniques - ARIES recovery algorithm - database security and authorization - security issue - access control based on granting/revoking of privileges. (6+2+0)

Total = L:45+T:15+P:30 = 90

PRACTICALS:

Exercises involving

- SQL Programming
- Relational Database Design

Mini Project using Oracle and submission of report

TEXT BOOKS:

1. Abraham, Siberschatz, Henry.F.Korth and Sudharshan. S, "Database System Concepts", Tata McGraw-Hill, New Delhi, 2010.
2. Ramez Elmasri and Shamkant Navethe, "Fundamentals of Database Systems", Pearson Education, New Delhi, 2008.
3. Raghuram and Ramakrishnan, "Database Management Systems", Tata McGraw-Hill, New Delhi, 2004.

REFERENCES:

1. Sumathi S and Esakkirajan S, "Fundamentals of Relational Database Management Systems", Springer-Verlag, Germany, 2007.
2. Thomas Connolly, Carolyn Begg, "Database system", Pearson Education, New Delhi, 2008.
3. Jeffrey A Hoffer, Mary B Presscott, Fred R Mcfadden " Modern database Management Systems", Pearson Education, New Delhi, 2011.

12E037 EMBEDDED SYSTEM DESIGN

3 1 2 4

INTRODUCTION TO EMBEDDED SYSTEM: Embedded system, Functional building block of embedded system, Characteristics of embedded system applications, Challenges in embedded system design, Embedded system design processes. (8+2+0)

ARCHITECTURE OF EMBEDDED SYSTEM: Computer architecture taxonomy, CPUs – Programming input and output, Supervisor mode, Exceptions & Traps, Co-processors, Memory system mechanisms - CPU bus - Memory devices - I/O devices - Component interfacing - Assembly and linking - Basic compilation techniques – Program optimization (10+3+10)

OS FOR EMBEDDED SYSTEMS: Introduction to RTOS, Multiple tasks and multiple processes, Context switching, Operating system, Scheduling policies, Interprocess communication mechanisms. Introduction to μ C/ OS II (10+3+4)

PERFORMANCE ISSUES OF EMBEDDED SYSTEMS: CPU Performance, CPU power consumption, Program level performance analysis, Analysis and optimization of program size, energy and power, Evaluating operating system performance, Power management and optimization strategies for processes, Multiprocessors – CPUs and accelerators, Multiprocessor performance analysis (9+3+6)

DESIGN & IMPLEMENTATION: Development and debugging, Manufacturing, Testing, Program validation and Testing, Distributed embedded architecture, Networks for Embedded Systems - I²C Bus, CAN Bus, Design examples: Cell phones, Digital Still Cameras, Elevator Controller. (8+4+10)

Total 45

PRACTICALS:

Exercises involving

- Design and development of an Embedded System

Mini Project and submission of report

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer Systems Design", Reed Elsevier Publications, Gurgaon, Haryana, 2008.
2. Rajkamal, "Embedded Systems – Architecture, Programming and Design", Tata McGraw-Hill, New Delhi, 2010.

REFERENCES:

1. David E Simon, "An Embedded Software Primer", Pearson Education India, New Delhi, 2004.
2. Sriram V Iyer, Pankaj Gupta, "Embedded Real-time Systems Programming", Tata McGraw-Hill, New Delhi, 2008.

ONE CREDIT COURSES

12EK01 LV SWITCHGEARS

1 0 0 1

CONTACTORS: Introduction to LV Switchgear – Typical industrial electrical layout. Introduction to contactors – Difference between switch and contactor – Types of contactors – Utilization category – Selection of contactors – Name plate details – Limits of operation – Special types of contactors. (3+0+1)

RELAYS AND FUSES : Introduction to overload relay – Types of overload relay – Types of motor failures – Utilization category and trip class – Selection of overload relay – Introduction to Fuses. HRC fuse – Types and Utilization category. Introduction to digital protection techniques. (3+0+1)

SWITCHES AND STARTERS : Introduction to switch – Types of switches – Utilization category – Selection of switches. Introduction to motor starters – Types of starters – Control and Power wiring circuits – Selection of starters – Types of timers. (3+0+1)

CIRUIT BREAKER : Introduction to circuit breaker – Types of circuit breaker – Selection of Air circuit breaker – Introduction to MCCB and MCB – Difference between relay and release. (2+0+1)

LAB SESSION

Assembling and maintenance of contactors.

- Testing the pickup and drop off voltagess in contactors. (1)
- Testing of thermal overload relay. (1)
- Control wiring practice on DOL and Star Delta Starter. (1)
- Demo on various LV Switchgear products. (1)

L:11+T:0+P:4 Total 15

TEXT BOOK:

1. Sunil S Rao, "Switch Gear and Protection", Khanna Publishers, New Delhi, 2012.

REFERENCE:

1. Wadhwa C L, "Electrical Power Systems", New Age International, New Delhi, 2010.
2. Madhava Rao T S, "Power Systems Protection : Static Relay with Microprocessors Application" , Tata McGraw-Hill, 2004.

12EK02 CAD TOOLS FOR VLSI DESIGN AUTOMATION**1 0 0 1**

Introduction to VLSI Design Process: Design flow – Role of CAD tools in the design process. (2+0+0)

Design Capture: Features of Mentor Graphics-Design Architect IC, a tool for schematic capture, netlisting, simulation setup and results viewing - Creating an Inverter using DA_IC- ELDO simulator. (2+0+1)

Simulation: Features of Advance MS simulator, a tool for verification platform for AMS design and verification - Exercises. (3+0+1)

Physical Layout: Features of the IC Station Tool Suite for full custom IC design flow editing, Schematic-driven layout and top-level floor planning/routing – Exercises. (2+0+1)

Physical Verification: Features of Calibre LVS for physical verification tool, for layout versus schematic – Exercises. (2+0+1)

L:11+T:0+P:4 Total 15**Reference Text Book**

1. Michael John Sebastian Smith, "Application-Specific Integrated Circuits" Addison-Wesley Publishing, New Delhi, 2010
2. WayneWolf," Modern VLSI Design: Systems on Chip Design" , Pearson Education, New Delhi, 2007.
3. Laboratory Manual Prepared by EEE Department, 2012.
4. http://www.mentor.com/products/ic_nanometer_design

12EK03 DIGITAL DESIGN WITH VERILOG HDL**1 0 0 1**

Introduction : Digital Design, Verification, and Hardware description languages. (2+0+0)

Verilog for Design: Introduction to Logic Synthesis, Synthesizable Constructs - Inferring Combinational Circuit elements - Inferring Sequential Circuit elements - State Machines - Counters - Encoders/Decoders - Synthesis of Loops - Data Path - Design Partitioning / Methodology - Synthesizable Code-care about, Sensitivity list and Simulation Synthesis mismatch conditions. (3+0+0)

Verilog for Verification: Delay Modeling in Verilog on Briefly behavioral constructions, Fork-join, Events - Clock Generation - Data Generation, Deterministic, Random - Some Systems Tasks - Test Bench Architecture. (3+0+0)

Design Examples: RISC Stored Program Machine - UART Design (3+0+0)

Mini Project Implementation (0+0+4)

Mini Projects Specification and Scope Discussions

Review of Projects - Presentation by student groups (15 min per student group)

Feedback on the Design Project

L:11+T:0+P:4 Total 15**REFERENCE TEXT BOOK:**

1. Michael D. Ciletti, "Advanced Digital Design with the Verilog HDL", Pearson Education, New Delhi, 2011.
2. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", Prentice Hall International, New Jersey, 2003.

12EK04 ENERGY AUDITING AND CONSERVATION TECHNIQUES

1 0 0 1

Introduction : Mandatory Auditing requirements – Audit purpose, scope and frequency - Energy Auditing & Conservation concepts and its Importance – Energy conservation opportunities in electrical power supply sector -The Energy Conservation Act, 2001 and its features. (3)

Energy Audit Methodology and Management System: Overview of Electrical energy audit, tools for electrical energy audit- billing, tariff, demand, power factor and load factor. Duties and responsibilities of energy systems auditors. (3)

Energy Conservation in Electrical Systems: Overview of Electrical energy requirements - pumps, fans, lighting and Variable Speed Drives. Electrical energy conservation - industrial motors, air conditioning and refrigeration systems. (3)

Energy Auditing in Industrial Lighting and Green buildings: Choice of lighting, energy saving, control of lighting, lighting standards, lighting audit, use of different lighting technologies, electronic ballast. Overview of Green buildings. (3)

Practical Sessions:

- Power factor Measurement & Compensation Techniques 1
- Energy Saving Techniques - Lighting, air conditioning, pumps & fans 1
- Case studies and exercises 1

Total = T :12 + P : 3 = 15

REFERENCES:

1. Donald R Wulfinhoff, "Energy Efficiency Manual", Energy Institute Press, USA, 1999.
2. Tripathy S C, "Electrical Energy Utilization and Conservation", Tata McGraw-Hill, New Delhi, 1991.
3. Thiruvengadam S, Srinivasan P S, "Energy Management In Electrical Energy System", ISTE Publication, New Delhi, 1999

SCIENCE AND HUMANITIES ELCTIVES

MATHEMATICS ELECTIVE

12M040 OPTIMIZATION TECHNIQUES

3 1 0 3.5

LINEAR PROGRAMMING: Graphical method for two dimensional problems, central problem of linear programming – Definitions, simplex algorithm, phase I and phase II of simplex method. (10+3)

Simplex Multipliers, dual and primal, dual simplex method, transportation problem and its solution, assignment problem and its solution by Hungarian method, Karmarkar's method, statement, conversion of the Linear Programming problem into the required form, algorithm. (10+4)

NON LINEAR PROGRAMMING (ONE DIMENSIONAL MINIMIZATION): Introduction, unrestricted search, exhaustive search, interval halving method – Fibonacci method. (8+3)

NON LINEAR PROGRAMMING (UNCONSTRAINED OPTIMIZATION): Introduction, random search method, univariate method, pattern search methods, Hooke and Jeeves method, simplex method, gradient of a function, steepest descent method, conjugate gradient method. (10+3)

DYNAMIC PROGRAMMING: Introduction, multistage decision processes, principles of optimality, computation procedures.

(7+2)

Total L:45+T:15=60

TEXT BOOKS:

1. Singiresu S Rao, "Engineering Optimization Theory and Practice", New Age International, New Delhi, 2011.
2. Hamdy A Taha , "Operations Research – An introduction", Pearson Education , New Delhi, 2012.

REFERENCES:

1. Kambo N S, "Mathematical Programming Techniques", East West Press, New Delhi,2005.
2. Hillier / Lieberman, "Introduction to Operations Research", Tata McGraw Hill, New Delhi, 2012.
3. Kalyanmoy Deb, " Optimization for Engineering Design, Algorithms and Examples", Prentice Hall, New Delhi, 2010.

12M041 STOCHASTIC MODELS

3 1 0 3.5

BASICS OF PROBABILITY: Random variables, conditional probability, expectations (6+2)

STOCHASTIC PROCESSES: Introduction, Poisson process, Markov chains: Classification of states of Markov chains, absorption probability, period, steady state probabilities (8+3)

CONTINUOUS TIME MARKOV CHAINS: Introduction, Kolmogorov forward equation, Kolmogorov backward equation, steady state probabilities, Birth - Death processes (8+3)

QUEUEING THEORY: Introduction, characteristics, steady state solution: M/M/1, M/M/1/K, M/M/c, M/M/c/k Models, queues with unlimited service. Network of queues: Open queueing networks, closed queueing networks, cyclic queues. (13+4)

BROWNIAN MOTION: Introduction, first passage time distribution, maximum, zeros of Brownian motion, Brownian motion with drift, Geometric Brownian motion (10+3)

Total L:45+T:15=60

TEXT BOOKS:

1. Saeed Ghahramani, "Fundamentals of Probability with Stochastic Processes", Prentice Hall, New Jersey, 2005.
2. Trivedi K S, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", PHI Learning Pvt. Ltd, New Delhi, 2009.

REFERENCES:

1. Sheldon M Ross, "Stochastic Processes", Wiley India Pvt. Ltd, New Delhi, 2008.
2. Medhi J, "Stochastic Processes", New Age International Publishers, New Delhi, 2008.
3. Minh, D L (Paul), "Applied Probability Models", Duxbury Thomson Learning, Singapore, 2002
4. Gross D, Harris C M, "Fundamentals of Queueing Theory", Wiley India Pvt. Ltd, New Delhi, 2009.
5. Sheldon M Ross, "Introduction to Probability Models", Academic Press, New Delhi, 2003.

12M042 GRAPH THEORY AND ITS APPLICATIONS

3 1 0 3.5

BASIC CONCEPTS: Graphs - directed and undirected, subgraphs, graph models, degree of a vertex, degree sequence, Havel-Hakimi theorem (statement only), hand-shaking lemma. Walk, trail, path, connected graph, distance, diameter, isomorphic graphs. common classes of graphs, matrix representation – Adjacency and incidence. (7+2)

CONNECTIVITY: Vertex and edge connectivity, characterization of 2-connected graphs, vertex and edge cuts, single-source single-destination Network flow problem. (7+2)

SPANNING TREES: Matrix tree theorem, Cayley's formula, depth-first and breadth-first search algorithms, minimum spanning tree – Prim's and Kruskal's algorithms, shortest path – Dijkstra's algorithm. (7+3)

EULERIAN AND HAMILTONIAN GRAPHS: Eulerian and Hamiltonian graphs – definition and conditions for existence, application - Route inspection problem – Fleury's algorithm, travelling salesman problem. (6+2)

PLANAR GRAPHS: Euler formula and its consequences, Kuratowski's characterization (concept and statement), planarity algorithms. (6+2)

MATCHINGS: Matching in unweighted graphs - Berge's theorem, Hall's theorem, Tutte's perfect matching theorem, applications. (6+2)

VERTEX - COLORING: Vertex - coloring, bounds, largest degree first algorithm, applications - assignments of frequencies, fast register allocation, scheduling problem. (6+2)

Total L:45+T:15=60

TEXTBOOKS:

1. Jonathan Gross and Jay Yellen, "Graph Theory and its Applications", CRC Press, New York, 2005.
2. Douglas B West, "Graph Theory", Prentice Hall, New Delhi, 2009.

REFERENCES:

1. Bondy J A and Murty U S R, "Graph Theory, Springer", New York, 2008.
2. Narsingh Deo, "Graph Theory with Applications to Engineering And Computer Science", Prentice Hall, New Delhi, 2010.
3. Vago I, "Graph Theory Application to the Calculation of Electrical Networks", Elsevier Science Publishing Co., Inc, New York, 1985.

PHYSICS ELECTIVES

12M050 SCIENCE OF MATERIALS FOR ELECTRICAL ENGINEERING

3 0 0 3

ELECTRICAL PROPERTIES: Conducting materials-free electron theory(Classical and Quantum)-Fermi Dirac Statistics-Band theory of solids-the density of states. Dielectrics-types of polarization-measurement of dielectric permittivity-Loss factor-Dielectric loss mechanism. Magnetostriction – electron ballistics-electron guns-electron gun for electron beam machining-electric discharge plasma-EDM machining. (9)

MAGNETIC PROPERTIES : Types of magnetic materials-domain theory-hysteresis- hard and soft magnetic materials-Applications-eddy current brakes, magnetic lenses. Superconductivity –Meissners effect- Josephson junction, SQUID magnetometer, superconducting magnets, and magnetic levitation. (9)

QUANTUM MECHANICS: Wave particle duality, de Broglie waves- Heisenberg's uncertainty principle. Wave function-normalization. The wave equation. Schrodinger's equation of motion: Time dependent form, steady-state form. Particle in a box. Quantum Tunneling and applications to Scanning Tunneling Microscope and Tunnel diode (9)

PHYSICS OF SEMICONDUCTOR DEVICES: P type and N type semiconductors-the effective mass-P-N junction, rectifier equation -Hall effect-Quantum tunneling. Bipolar transistor. The field effect transistor- Integrated circuits—Heterojunction-Quantum well, wire, dots- Optical properties of Semiconductors: LD, LED, Photo diode (9)

ADVANCED MATERIALS : Liquid crystals-types-application as display devices-photonic crystals-ferroelastic materials-multiferroics, Bio mimetic materials. Composites-nanophase materials-physical properties and applications. (9)

Total 45

TEXT BOOKS:

1. William D CallisterJr, "Materials Science and Engineering-An Introduction", John Wiley and Sons Inc., Sixth Edition, New York, 2007.
2. Arthur Beiser " Concepts of Modern Physics" , Tata Mcgraw Hill , 2002.

REFERENCES:

1. Leonid V Azaroff, "Introduction to Solids", Tata Mcgraw-Hill ,2006
2. Van Vlack, "Elements of Material Science And Engineering", Pearson Education India, 2008
3. Sze, S.M, "Physics of Semiconductor Devices", John Wiley and Sons, 2007

12M051 PHYSICS FOR SOLAR PV SYSTEMS AND SOLID-STATE LIGHTING SYSTEMS

3 0 0 3

SOLAR RADIATION: Photometry- photometric units and quantities. Cosine law. Black body radiation spectrum. Wien's displacement law. Solar spectrum. Solar motion - celestial sphere, astronomical co-ordinates. Need for solar tracking. Atmospheric absorption. Air mass. Diurnal and seasonal variations in solar radiation. Climatic and geographic factors. Terrestrial solar illumination. (9)

TYPES OF SOLAR ENERGY CONVERTORS: Thermal and PV systems. Advantages of PV systems. Semiconductor PV systems. IV characteristics. Other electrical parameters. Conditions for maximum power transfer. Conversion efficiency. (8)

PHYSICS OF SEMICONDUCTOR JUNCTIONS: Elemental and compound semiconductors. Band structure of silicon p-n junctions and III-V compound semiconductor junctions. light emission and absorbtion. Creation and recombination of electron hole pairs. Lattice mediated recombination conservation of momentum. Direct and indirect band gap semiconductors. Structure of Solar PV devices and solid state lighting devices- LEDs. Factors limiting efficiency of conversion of light energy to electrical energy (PV) and vice versa (Lighting) High power LEDs (10)

SOLID STATE LIGHT SOURCES: IV characteristics of LEDs. Manufacturing spread in Cut-in voltage. Combination of LED units for higher power-special considerations. Series parallel combinations. Minimising thermal losses. Reflector surfaces for multiple sources. Uniformity of illumination. (9)

CHARACTERITICS OF LIGHT SOURCES: Absorbtion and emission spectra. Transmission and absorption characteristics of housings for electro-optical devices. Flourescence. Modification of spectra of LED sources. Flourescent materials for solid state lighting- White-light sources and near-white light sources. Degradation and life. (9)

Total 45

TEXT BOOKS:

1. Jasprit Singh , "Electronic and Optoelectronic Properties of Semiconductor Structures", Cambridge University Press 2003
2. Arturas Zukauskas, Michael S. Shur, Remis Gaska, "Introduction to Solid-State Lighting", Wiley-Interscience, 2002

REFERENCES:

1. Arthur Beiser " Concepts of Modern Physics" Tata Mcgraw Hill , 2002
2. Rong-Jun Xie, Yuan Qiang Li, Naoto Hirotsaki, Japan; Hajime Yamamoto , "Nitride Phosphors and Solid-State Lighting", CRC Press,2011
3. Sze , S.M "Physics of Semiconductor Devices" , John Wiley and Sons, 2007

CHEMISTRY ELECTIVE**12M060 ELECTROCHEMISTRY FOR ELECTRICAL SCIENCES****3 0 0 3**

METAL FINISHING: Electroplating – fundamentals, plating parameters- polarization and overvoltage, current and energy efficiency, the Hull cell, the Haring-Blum cell. Mechanism of electrodeposition of metals - electroplating of Cu, Ni, and Cr. Fundamentals of electroless deposition – Ni and Cu electroless plating. (10)

METAL FINISHING IN ELECTRONIC INDUSTRY: Plated through hole PCB's, electroforming - fabrication of CD stampers and wave guides. Electropolishing, electrochemical machining, electrochemical etching of semiconductors, electrochemical etching of copper from PCBs. (9)

PROTECTIVE COATINGS: Conversion coatings - anodizing – characteristics of anodic film on aluminium - determination of thickness of anodic film. Phosphating, chromating - applications. Electrophoretic painting and the technology of electropriming. (7)

ELECTROCHEMICAL ENERGY SOURCES: Batteries – characteristics - voltage, current, capacity, electricity storage density, power, discharge rate, cycle life, energy efficiency and shelf life. Primary and secondary batteries – dry cell, lead- acid battery, Ni - Cd and Lithium ion batteries. Batteries for various applications. (10)

FUEL CELLS: Classification, working principle, components, applications and environmental aspects of solid oxide, molten carbonate, direct methanol and proton exchange membrane fuel cells, hydrogen as fuel - the role of chemistry in overcoming the challenges in the production, storage and utilization. (9)

Total 45**TEXT BOOKS:**

1. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, 1993.
2. Rajagopal C and Vasu K I, 'Conversion coatings', Tata McGraw-Hill, 2000.
3. Dell, Ronald M Rand, David A J, "Understanding Batteries", Royal Society of Chemistry, 2001.
4. Aulice Scibioh M.and Viswanathan B, "Fuel Cells – Principles and Applications", University Press, 2006

REFERENCES:

1. "Electroplating, Anodizing and Metal treatment", Hand book, NIIR board, 2004.
2. Lindon David, "Handbook of Batteries", McGraw Hill, 2002.
3. Hoogers G (Ed), "Fuel cell handbook" CRC, Boca Raton, FL, 2003.

12M061 ENERGY STORING DEVICES AND FUEL CELLS**3 0 0 3**

BATTERY CHARACTERISTICS: Voltage, current, capacity, electricity storage density, power, discharge rate, cycle life, energy efficiency, shelf life. (6)

PRIMARY CELLS: Fabrication, performance aspects, packing and rating of zinc-carbon, magnesium, alkaline, silver oxide cells. (8)

SECONDARY BATTERIES: Fabrication, performance aspects and rating of lead acid and sealed lead acid battery, nickel-cadmium, lithium ion batteries. (8)

BATTERIES FOR ELECTRIC VEHICLES: Metal / air, zinc-bromine, sodium-beta alumina and lithium / iron sulphide batteries. Photogalvanic cells. Battery specifications for cars. (8)

FUEL CELLS: Classification , working principle, components, applications and environmental aspects of alkaline, phosphoric acid, solid oxide, molten carbonate, direct methanol and proton exchange membrane fuel cells. (9)

HYDROGEN AS FUEL: Sources of hydrogen - Hydrogen production – gas clean-up – various methods of hydrogen storage. Hydrogen as an engine fuel - features and limitations. Ideal efficiency of a fuel cell. (6)

Total 45**TEXT BOOKS:**

1. Dell, Ronald M Rand, David A J, "Understanding Batteries", Royal Society of Chemistry, 2001.
2. Aulice Scibioh M.and Viswanathan B, "Fuel Cells – Principles and Applications", University Press, 2006

REFERENCES:

1. Lindon David, "Handbook of Batteries", McGraw Hill, 2002.
2. Kiehne H.A, "Battery Technology Handbook", Expert Verlag, Renningen Malsheim, 2003
3. Hoogers G (Ed), "Fuel cell handbook" CRC, Boca Raton, FL, 2003.

HUMANITIES ELECTIVE**12M071 INDUSTRIAL PSYCHOLOGY, SOCIOLOGY AND GLOBAL ISSUES****2 1 0 2.5****MANAGEMENT:** Concept –Importance - Principles of Management – Functions of Management–Skills and Management Levels. (4)**ORGANISATION AND LEADERSHIP:** Various classifications - Leadership styles and Communication in organization. (2+1)**HUMAN RESOURCE MANAGEMENT:** Definition – Importance – Functions – Training & development. (4+2)**GLOBALISATION AND ITS IMPACT ON HRM:** Work force diversity - Cross cultural Mgt and Multicultural Mgt. (4+2)**INDUSTRIAL PSYCHOLOGY:** Objectives – Individual behaviour - Group behaviour-Group Dynamics – Motivation – Perception– Industrial Fatigue. (3+3)**WORK ETHICS:** Professional Values & Ethics – Need – Issues - Challenges. (4)**SOCIOLOGY:** Definition – Scope – Significance – Society – Community – Institutions – Culture – Socialization – Social systems. (2+2)**GLOBAL ISSUES:** Environmental issues – Natural resources – Pollution. Social issues – National integration – Corruption – Terrorism – Regionalism – Communalism - Adolescent problems - Causes and consequences. (2+2)**INDIAN CONSTITUTION:** Introduction and Evolution of Indian Constitution, – Fundamental Rights and Duties - Centre-State Relations– Union Government – Powers and Functions. (5+3)**Total L: 30+T: 15 = 45****TEXT BOOKS:**

1. Vikram Bisen and Priya, "Industrial Psychology", New Age International (P) Ltd., Publishers, New Delhi, 2010.
2. Shankar Rao C N, "Sociology", Sultan Chand & Co., New Delhi, 2010.

REFERENCES:

1. Harold Koontz, Heinz Wehrich and Ramachandra Aryasri, "Principles of Management"- Tata McGraw Hill, New Delhi, 2004.
2. Dezenzo A David and Robbins P Robbins, "Human Resource Management", John Wiley and Sons, Inc, MA., 2002.
3. Murthy C S V, "Business Ethics", Himalaya Publishing House, New Delhi 2007.
4. Basu D P, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi, 2001.

12M072 INDIAN ETHOS AND VALUES**2 1 0 2.5****HUMAN VALUES AND ETHOS:** Meaning and Significance of Values – Sources of Individual Values - Value crisis in the Contemporary Indian Society –Moral and Ethical Values. (3+2)**SOCIAL RESPONSIBILITY AND ETHICS:** Concept of Social Responsibility – Need and Importance of Social Responsibility – Business Ethics. (3+3)**APPLICATION OF VALUES:** Relevance of Values in Management – Personal Values and Values at Work place – Values for Managers. (4+2)**WORK ETHICS:** Professional Values & Ethics – Need – Issues – Challenges – Ethical Leadership – Ethical dilemma - Case Study. (4+2)**ORGANIZATIONAL CULTURE AND ITS CHALLENGES:** Elements of strong organization culture – Brooks Perterson's classification of culture. (5)**SHARED VALUES IN THE ORGANIZATION AND ITS IMPACT:** Need to identify and share values – the Value Construct and How to Promote Shared Values. (6)**UNIVERSAL VALUES:** Cross Cultural Values - Impact of Culture on Organizations and Managing Workforce Diversity. (3+2)**INTERPERSONAL RELATIONSHIP:** Managing emotions – Emotional Intelligence – Building Better interpersonal Relations – Dealing with Subordinates – Case Study. (2+4)**Total L: 30+T: 15 =45**

TEXT BOOKS:

1. Tripathi A N, "Human values" – New Age international Pvt. Ltd., New Delhi, 2002
2. Murthy C S V., "Business Ethics", Himalaya Publishing House, New Delhi, 2007.

REFERENCES:

1. Jayshree Suresh, Raghavan B S, "Professional Ethics", S. Chand & Company Ltd., New Delhi, 2005.
2. Nandagopal R and Ajith Sankar RN, "Indian Ethos and Values in Management", McGraw Hill, New Delhi, 2010.
3. Kiran D R, "Professional Ethics and Human Values", Tata McGraw Hill, New Delhi, 2007.
4. Proceedings of National Conference on Integrating values & Social Concerns With Technical Education, PSG College of Technology, 2010.

12M073 HUMAN RESOURCE MANAGEMENT**2 1 0 2.5**

NATURE AND SCOPE OF HUMAN RESOURCE MANAGEMENT: Meaning and Definition of HRM, Objectives and Functions of HRM, Models of HRM, HRM in a changing Environment, Human Resource Management in the wake of Globalisation. (4)

TRAINING AND DEVELOPMENT: Principles of Learning, Objectives, Types and Training Methods, Management Development: Its Meaning, Scope and Objectives. (4+2)

WAGE AND SALARY ADMINISTRATION: Principles and Techniques of Wage Fixation, Job Evaluation, Incentive Schemes. (4+2)

PERFORMANCE APPRAISAL: Process, Methods, Factors that distort appraisal, Case studies in Methods to Improve Performance, Role of Performance in the Performance Management Process, Performance Appraisal Vs. Potential Appraisal. (3+3)

MORALE AND MOTIVATION OF EMPLOYEES: Morale-importance of Moral and Motivation Methods of Employees, Empowerment – Factors Affecting Empowerment – Process – Benefits. (4+2)

WORK ENVIRONMENT AND TERMS AND CONDITIONS OF EMPLOYMENT: Fatigue – Safety – Accident Prevention Accident Records – Factories Act of 1948 and pollution legislations. (3+2)

INTERNATIONAL HRM: Model, Variables that outline difference between local and International HRM approaches to IHRM, Linking HRM to International Expansion Strategies. (4+1)

TRENDS IN HR: HR Outsourcing – HRIS – Management of Turnover and retention – Workforce Relationization – Managing Separation – Case studies in Trends in Employee Engagement and Retention. (4+3)

Total L: 30+T: 15=45**TEXT BOOKS:**

1. Gary Dessler, "Human Resource Management", Prentice Hall of India, New Delhi, 2009.
2. VSP Rao, "Human Resources Management Text and Cases", Excel Books, 2010.

REFERENCES:

1. Dezenzo A David and Robbins P Robbins, "Human Resource Management", John Wiley and Sons, Inc, MA., 2002.
2. Aswathappa K, "Human Resource and Personnel Management – Text and Cases", Tata McGraw Hill, New Delhi 2007.
3. Bernardin H John, "Human Resource Management – An experiential Approach", Tata McGraw Hill, New Delhi, 2004.
3. Cascio H Wayne, "Managing Human Resources – Productivity, Quality of Work Life and Profits, Tata McGraw Hill, New Delhi 2004.
4. Cynthia D Fisher and Lyle F Schoenfeldt and James B Shaw, Human Resources Management, biztantra, New Delhi, 2005.

12M074 INDIAN CONSTITUTION AND SOCIETY**2 1 0 2.5**

PREAMBLE AND ITS PHILOSOPHY: Introduction and Evolution of Indian Constitution preamble and its Philosophy. (4)

CENTRE-STATE RELATIONS: Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations. (4+2)

UNION GOVERNMENT: Powers, Functions and Position of President, Vice-President and Council of Ministers. (5+1)

COMPOSITION OF PARLIAMENT: Constitution Amendment Procedure, Financial Legislation in Parliament. Case Study. (3+2)

FEDERAL SYSTEM: Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers. Composition and powers of the State Legislature. (5+3)

JUDICIARY: The Union Judiciary - Supreme Court and High Court. (4+2)

PUBLIC SERVICES: All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services. (3+2)

INTERNATIONAL POLITICS: Foreign Policy of India, Foreign Policy of USA, International Institutions like UNO, WTO, SAARC and Environmentalism. (2+3)

Total L: 30+T: 15 =45

TEXT BOOKS:

1. Dr Durga Dasbasu, "Introduction to the Constitution of India", Lexisnerxis Butterwrths Wathax, Nagpur, 2010.
2. Basu D D, "Introduction to the Constitution of India" - Prentice Hall of India, New Delhi, 2001.
3. Briji Kishore Sharma, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi 2005.

REFERENCES:

1. Pandey J N, "Constitutional Law of India" - Central Law Agency, 1998.
2. Hoshiar Singh, "Indian Administration" - Kitab Mahal, New Delhi, 2003.
3. "Constitution of India", Eleventh Edition, Eastern Book Company, 1990.
4. Jain M C, "The Constitution of India", Law House, New Delhi, 2001.
5. Shukla V N, "Constitution of India", 2011.

12M075 ELEMENTS OF SOCIOLOGY AND ENVIRONMENT

2 1 0 2.5

SOCIOLOGY: Definition – Scope – Significance - Society – Community – Association – Institutions – Culture – Socialization – social systems. (7)

FAMILY AND MARRIAGE IN INDIA: Family and Marriage – Meaning - Characteristics – Types – Changing functions – Recent trends – Impact of westernization and globalization on family and marriage systems in India. (6)

SOCIAL ISSUES IN INDIA: Problems of national integration – corruption – terrorism – regionalism – gender discrimination – communalism – causes and consequences. Adolescent problems - Alcoholism – Drug addiction – juvenile delinquency – crime - AIDS – Population growth – Causes and consequences. (8)

SOCIAL CONTROL : Meaning – importance - Types of agencies – Role of education in social control – value education for total well being – Eternal values – Pollution of mind – respect for all religion – human dignity – respect for parents, teachers and fellow beings. Human rights – Importance of socialization – role of family, and society in personality development. (4+4)

GLOBAL ISSUES : Environmental issues – natural recourses – environmental pollution – air, water, soil, noise and thermal – need for public awareness – role of individual in prevention of pollution. Climate change – global warming – ozone layer, acid rain, nuclear accidents and holocaust. Environmental protection Act – Air (prevention & control of pollution) Act - Water Act – Forest Conservation Act. (2+6)

ROLE OF ENGINEERS IN ENVIRONMENTAL PROTECTION : Importance of environment in human health – Hazardous waste and environmental problems – toxic waste management in India – Nuclear energy and radioactive wastes – Energy from waste – Role of IT in environment protection and human health – role of engineers in environmental protection. (3+5)

Total L: 30+T: 15 =45

TEXT BOOKS:

1. Ram Ahuja , "Social Problems in India ", Rawat Publication, Jaipur, 2010
2. Shankar Rao C N – Sociology- Sultan Chand & Co. New Delhi, 1995

REFERENCES:

1. Kapadia K M , "Marriage & Family in India", Oxford University Press, 1996.
2. Deepankar Roy, "Principles of Sociology", Indian Publishing House, New Delhi, 2008.
3. Edward Alsworth Ross, "The Principles of Sociology", Nabu Press, 2010.

12M076 PRINCIPLES OF MANAGEMENT

2 1 0 2.5

PRINCIPLES OF MANAGEMENT: Meaning, Definition and Significance of Management, Basic Functions of Management – Planning, Organizing, Staffing, Directing and Controlling. (5)

ENGINEERS AND ORGANIZATIONAL ENVIRONMENT: Social, Economic, Technological and Political. Social Responsibility of Engineers. (2+2)

MANAGEMENT CONCEPTS: MBO, Theory Z, Kaizen, Six Sigma, Quality Circles and TQM. (Case Study) (3+2)

BUSINESS PROCESS REENGINEERING: Need for BPR, Various phases of BPR, Production and Productivity in six sigma and TQM – Factors Influencing Productivity. (4+2)

ORGANISATIONAL BEHAVIOUR: Significance of OB, Role of Leadership, Personality and Motivation, Stress, Attitudes, Values and Perceptions at work. (7+3)

INDUSTRIAL AND BUSINESS ORGANIZATION: Growth of Industries (Small Scale, Medium Scale and Large Scale Industries). Forms of Business Organizations. Resource Management – Internal and External Sources. (2+1)

HUMAN RESOURCE MANAGEMENT: Importance, Objectives and Functions, Job Analysis and Recruitment, Selection and Placement, Training and Development – *Case Discussion*. (4+3)

WELFARE IN INDUSTRY: Working condition, service facilities, legal legislation – Factories Act, 1948 and Workmen's Compensation Act. (3+2)

Total L: 30+T: 15 =45

TEXT BOOKS:

1. Harold Koontz, Heinz Wehrich and Ramachandra Aryasri, "Principles of Management" - Tata McGraw Hill, New Delhi, 2009.
2. Mamoria C B, "Personnel Management", Sultan Chand & Sons, New Delhi, 2008.

REFERENCES:

1. Robin Fincham and Peter Rhodes, "Principles of Organisational Behaviour" Oxford University Press., 2010.
2. Gupta C B, "Management Theory and Practice" Sultan Chand and Sons., New Delhi, 2009.
3. Rao V S P, "Management Text and Cases" Excel books, New Delhi, 2009.
4. Fred Luthans, "Organisational Behaviour" Mc-Graw Hill, New York, 2005.
5. Aswathappa K, "Human Resource and Personnel Management – Text and Cases", Tata McGraw Hill, New Delhi, 2007.
6. Khanna O P, "Industrial Engineering & Management", Dhanpat Rai Publications, New Delhi, 2003.
7. Joepeppard and Philip Rowland, "Business Process Reenginerring", Kogan PAGE, 1996.
8. Gary Dessler, "Human Resource Management", Prentice Hall of India, New Delhi, 2009.

12M077 ENTREPRENURSHIP

2 1 0 2.5

INTRODUCTION TO ENTREPRENEURSHIP: Definition – Characteristics and Functions of an Entrepreneur – Common myths about entrepreneurs – Importance of Entrepreneurship. Seminar in R5 & R6. (4)

CREATIVITY AND INNOVATION: The role of creativity – The innovation Process – Sources of New Ideas – Methods of Generating Ideas – Creative Problem Solving – Entrepreneurial Process. (3+2)

DEVELOPING AN EFFECTIVE BUSINESS MODEL: The Importance of a Business Model – Components of an Effective Business Model – Case studies in Developing and Writing the Business Plan. (3+2)

APPRAISAL OF PROJECTS: Importance of Evaluating Various options – Case studies in Appraisal Techniques. (4+3)

FORMS OF BUSINESS ORGANIZATION: Sole Proprietorship – Partnership – Limited liability partnership - Joint Stock Companies and Cooperatives. (3+1)

FINANCING THE NEW VENTURE: Determining Financial Needs – Sources of Financing – Equity and Debt Funding – Case studies in Evaluating Financial Performance. (4+3)

THE MARKETING FUNCTION: Industry Analysis – Competitor Analysis – Marketing Research for the New Venture – Defining the Purpose or Objectives – Gathering Data from Secondary Sources – Gathering Information from Primary Sources – Analyzing and Interpreting the Results – The Marketing Process. (3+2)

MANAGING GROWTH OF NEW VENTURES: Challenges of Growth – Strategies for Firm Growth – Internal and External Growth Strategies. (4+1)

ETHICAL AND SOCIAL RESPONSIBILITY CHALLENGES FOR ENTREPRENEURS: Ethics, Values and Social Responsibility – Ethics and Business Decisions. (2+1)

Total L: 30+T: 15 =45

TEXT BOOKS:

1. Robert D Hisrich, Michael P Peters and Dean Shepherd, "Entrepreneurship", Tata McGraw Hill, New Delhi, 2007.
2. Donald F Kuratko and Richard M.Hodgetts, "Entrepreneurship", South-Western Publishers ,Mason, USA, 2009..

REFERENCES:

1. Thomas W Zimmerera and Norman Scarborough M, "Essentials of Entrepreneurship and Small Business Management", Prentice Hall of India, New Delhi, 2009.
2. Marc J Dollinger, "Entrepreneurship – Strategies and Resources", Pearson Education, New Delhi 2003.
3. Sudha G S, "Management and Entrepreneurship Development", Indus Valley Publication, New Delhi, 2009.
4. Mary Coulter, "Entrepreneurship in Action", Prentice Hall of India, New Delhi, 2006.
5. Successful startups, IIM, Ahmadabad.
6. Successful Entrepreneurs, CII.
7. Vasant Desai, "The Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House, 2010.

LANGUAGE ELECTIVES

12M080 PROFESSIONAL ENGLISH

3 0 0 3

COMMUNICATION SKILLS USING LITERARY TEXTS: Comprehension and critical evaluation of literary essays – focus on language style, vocabulary, variety of expression, and emphasis techniques – review of short stories – critical appreciation of poetry - review of a novel. (12)

ESSENTIALS OF PROFESSIONAL COMMUNICATION: Intra and interpersonal communication, interview techniques, group communication, public speaking, and Presentation techniques - style and writing techniques, email writing, and cross – cultural communication. (10)

FOCUS ON SOFT SKILLS: Etiquette, body language, telephone conversation, and team building. (4)

REPORT WRITING: Format and different types of formal reports, memos, and proposals. (5)

PROFESSIONAL SKILLS: Presentations and reviews – group discussions – mock interviews, and case studies. (14)

Total 45

TEXT BOOK:

1. Monograph prepared by the Faculty, Department of English, in 2012.

REFERENCES:

1. Dhanavel, S.P., "English and Soft Skills", Orient BlackSwan, Hyderabad, 2010.
2. Murphy, Herta A, Hildebrandt, Herbert W and Thomas, Jane P, "Effective Business Communication", Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 2008.
3. Sharma, C.M. Ed., "Twelve Short Stories: An Anthology of Short Stories", Oxford University Press, New Delhi, 2001.
4. Amitav Ghosh, "River of Smoke", Penguin India, New Delhi, 2011.
5. Priyadarshi Patnaik, "Group Discussion and Interview Skills", Indian Institute of Technology, Kharagpur, 2011.

12M081 BASIC GERMAN

3 0 0 3

INTRODUCTION: German culture, tradition, universities and companies, alphabet, greetings, vocabulary. (3)

GRAMMAR: Pronouns, verbs (sein and haben) and their conjugations, articles, question words, statements and questions, negation, countries, nationalities and languages, simple dialogues. (7)

USAGE OF NOUNS and ADJECTIVES: Singular and plural, possessive pronouns, family, professions, number system, a short text and dialogues related to family - exercises. (8)

IRREGULAR VERBS: Subject – verb agreement (with regular and irregular verbs), accusative and dative declensions of pronouns and articles, modal verbs and their related grammatical structure. (4)

SYNTAX: Word order and sentence formation, usage of nicht/kein, usage of modal verbs and dialogues. (4)

TIME: Formal and informal expressions, usage of adverbs, daily routines, related verbs and question words, related vocabulary and grammar, sample dialogues and exercises. (8)

Invitations and telephone conversations. (2)

SKILLS TRAINING: Listening, speaking, reading, and writing (9)

TEXT BOOKS:

1. Rosa-Maria Dallapiazza, Eduard von Jan and Til Schönherr , " Tangram aktuell 1" Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2006.
2. Hermann Funk, Christina Kuhn and Silke Demme, " studio d A1", Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2009.

REFERENCES:

1. Mukhopadhyay, Ajayita, " Viva üben macht Spaß-2", Viva Education Pvt. Ltd., New Delhi, 2008.
2. Mukhopadhyay, Ajayita, " Viva üben macht Spaß-3", Viva Education Pvt. Ltd., New Delhi, 2008.
3. Kursisa, Anta et al., "Fit für fit in Deutsch 1 und 2", Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2010.

12M082 BASIC FRENCH

3 0 0 3

INTRODUCTION: French Culture and Civilization, Grammar and Vocabulary.

(2)

UNIT-1: Getting to know - and invite responses to the call - describe people-definite and indefinite articles - kind of nouns and adjectives, negation and interrogation - the present conjugation - paris monuments and public places - the lives of four different parisian professions.

(11)

UNIT-2: Expressing the order and the obligation to request and order - evaluate and appreciate, congratulate and thank - partitive articles, demonstrative adjectives and possessive prepositions and adverbs of quantity and imperative of reflexive verbs - a region of france burgundy - daily life in the countryside.

(11)

UNIT-3: Telling and reporting - advise - complain and reprimand - explain and justify - pronouns-near future - past tense and imperfect tense - several regions of france - different social worlds.

(11)

UNIT-4: Ask for permission - prohibition - make projects - discuss and debate -pronouns <en> and <y> - relative pronouns and superlatives - conjugation of the future - past and present continuous récent - the regional administrative life - economic and ecological problems - tradition and modernity.

(10)

Total 45

TEXT BOOK:

1. Philippe Dominique, et al., "Le Nouveau Sans Frontières", CLE International, 1999.

REFERENCES :

1. Mathurin Dondo, "Dondo Modern French Course ", Oxford University Press, Great Britain, 1997.
2. Margaret Lang and Isabelle Perez, "Modern French Grammar", Paris, 1996.

12M083 BASIC JAPANESE

3 0 0 3

INTRODUCTION: Geographic and socio - economic perspective to japan, japanese people and culture basic greetings and response, script, method of writing hiragana and katakana, combination sounds and simple words.

(5)

GRAMMAR: Fundamental structure of sentences – particles and particle phrases, affirmation, negation, interrogation, self introduction, demonstratives, place markers, numerals and sentences in polite speech.

(10)

VERBS: Past and non past tense, polite form of verbs and their uses - interactive functions of different verb forms, expressions of time-days of the week, month and time of the day, conversation related to customs, habits and completion of action.

(10)

NOUNS AND ADJECTIVES: Types of adjectives, combination of noun with `i` and `na` adjectives, negation and past forms of adjectives - uses of noun and adjective sentences, existence of things/persons/animals/etc., positional nouns.

(9)

ADVANCED EXPRESSIONS: Expressions of abilities, likes, dislikes, skills, need, desire etc., expressions of giving and receiving, comparisons and reasoning, expressing counters of different objects.

(6)

SKILLS TRAINING: Writing (basic structure of kanjis), listening, speaking, origami, method of using chopsticks.

(5)

Total 45

TEXT BOOK:

1. Minna no Nohongo – Romaji ban, 3A Corporation, Tokyo, 2000.

REFERENCE:

2. Minna no Nihong- I, Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2007.

OTHER DEPARTMENT ELECTIVE

MANAGEMENT ELECTIVE

(To be offered by the PSG Institute of Management)

12M095 FINANCIAL AND MANAGERIAL ACCOUNTING

3 0 0 3

Introduction.	(3)
Financial Statements.	(3)
Transactional Analysis.	(3)
Current Assets.	(3)
Property, Plant & Equipment.	(3)
Liabilities.	(3)
Owner's Equity.	(3)
Income Statement.	(3)
Statement of Cash Flows.	(3)
Fundamental Interpretations of Financial Statements.	(3)
Financial Statement Analysis.	(3)
Managerial Accounting.	(3)
CVP Analysis.	(4)
Budgets & Performance.	(3)
Segments & Flexible Budget.	(3)

Total L: 45

TEXT BOOK:

1. Marshall and McManus, "Accounting: What the Numbers Mean", shrink-wrapped with the student supplement: Study Outlines, Solutions to odd-numbered problems and Ready-Notes, 5th Edition, Irwin-McGraw Hill Publishers.

REFERENCE:

1. <http://highered.mcgraw-hill.com/sites/0072379006>.

12M096 MANAGERIAL FINANCE

3 0 0 3

Overview; Managerial Finance, Taxes.	(5)
Financial Statements and Analysis.	(5)
Cash Flow and Financial Planning.	(5)
Working Capital & Current Asset Management.	(5)
Current Liabilities Management.	(5)
Time Value of Money.	(5)
Capital Budgeting & Cash Flows.	(5)
Risk & Return.	(5)
Interest Rates.	(5)

Total L: 45

TEXT BOOK:

1. Gitman and Lawrence J, "Principals of Managerial Finance-Brief", 3rd Edition, Addition Wesley, Longman, Inc 2003

REFERENCE:

1. <http://finance.utoledo.edu/tutors.htm>

12M097 APPLIED BUSINESS STATISTICS

3 0 0 3

Statistics, Data and Statistical thinking.	(4)
Describing Sets of Data.	(4)
Basic Probability Concepts.	(4)
Discrete Random Variables.	(3)
Continuous Random Variables.	(3)
Sampling Distributions.	(3)
Estimation with Confidence Interval, Single Sample.	(3)
Hypothesis Testing, Single Sample.	(3)
Inferences Based on Two Samples.	(3)
Simple Linear Regression.	(3)
Multiple Linear Regression.	(4)
Analysis of Variance.	(4)
Categorical Data Analysis.	(4)

Total L: 45

TEXT BOOK:

1. McClave, Benson and Sincich, "Statistics for Business and Economics", 9th Edition, Prentice Hall, 2004

12M098

MARKETING SYSTEMS

3 0 0 3

Introduction and Overview.	(3)
Marketing: managing Profitable Customer Relationships.	(3)
Company and Marketing Strategy.	(3)
Marketing in the Digital Age.	(2)
The Marketing Environment.	(2)
Managing Marketing Information.	(2)
Consumer Markets and Buyer Behaviour.	(2)
Business Markets and Business Behaviour.	(2)
Segmentation.	(2)
Products, Services and Branding.	(2)
New Product Development.	(2)
Pricing Considerations.	(2)
Pricing Strategies.	(2)
Marketing Channels.	(2)
Integrated Marketing Communications.	(2)
Advertising, Public Relations.	(3)
Personal Sellin.	(3)
The Global Marketplace.	(3)
Forecasting.	(3)

Total L: 45

TEXT BOOK:

1. Kotler and Armstrong, "Principles of Marketing", 10th Edition, Upper Saddle NJ: Prentice Hall

12M099

ANALYSIS OF MANUFACTURING AND SERVICE SYSTEMS

3 0 0 3

Operations As a competitive weapon 3.	(3)
Operations Strategy.	(3)
Project Management.	(3)
Managing Processes.	(3)
Process Analysis.	(3)
Process Performance and Quality.	(3)
Constraint Management.	(3)
Process Layout.	(3)
Lean System.	(3)
Supply Chain Strategy.	(3)
Location.	(3)
Inventory Management.	(3)
Sales and Operations Planning.	(3)
Resource Planning.	(3)
Scheduling.	(3)

Total L: 45

TEXT BOOK:

1. Lee J Krajewski, Larry P Ritzman and Majon K Malhotra, "Operations Management – Processes and Value Chains", 8th Edition, PHI Learning P.Ltd., New Delhi, 2008

HUMANITIES ONE CREDIT COURSES

120K01 PERSONALITY DEVELOPMENT – “A CAREER COPING STRATEGY”

1 0 0 1

KNOWING ONESELF: Explore habits, attitudes, preferences and experience and tune them to suit the organizations, Become aware of strengths and weaknesses, talents and problems, emotions and ideas, Know your ambitions, goals and values, IQ, EQ & SQ. (5)

SELF MANAGEMENT: Time management, Ability to Socialize. (2)

INTEGRATED PERSONALITY DEVELOPMENT: Recognizing the growth of different dimensions of one's personality such as, Physical, Intellectual, Emotional, Moral, Social and Spiritual. (4)

PERSONAL COMPETENCES: Developing rapport, Listening skills, Developing tem spirit, Assertiveness and negotiation skills, Leadership Skills, Giving and receiving constructive Criticism, Positive thinking and creative thinking, Interview techniques and grooming. (4)

Total: 15

REFERENCES:

1. RajivK Mishra, "Personality Development", Rupa & Co., 2008.
2. Selvam S. K. P., "Personality Development", Aph Publishing Corporation, 2010.
3. Materials provided by Guest Speakers.

120K02 STOCK MARKET OPERATIONS AND ON-LINE TRADING

1 0 0 1

FINANCIAL MARKETS: Types of investments, Characteristics of investments. (5)

STOCK EXCHANGES IN INDIA: BSE & NSE Trading, Computation of Index. (2)

DERIVATIVES: Call and Put Options Futures and Forward Contracts, Swaps. (3)

DEMAT ACCOUNT AND TRADING ACCOUNT ON-LINE TRADING: Order placing, Cancellation of order, Speculation. (5)

Total:15

REFERENCES:

1. Bhalla, "Investment Management", Sultan Chand Books in India, 2008.
2. MachuRaju, "Indian Financial Market", Vikas Publishing House, 2nd Edition, 2002.
3. Panday I. M., "Financial Management", Vikas Publishing House, 9th Edition, 2007.

120K03 FINANCIAL ACCOUNTING AND COST ACCOUNTING FOR ENGINEERS

1 0 0 1

INTRODUCTION OF ACCOUNTING: Branches of Accounting – Types of Accounting Concepts and Conventions – Subsidiary Books. (3)

TRADING, PROFIT & LOSS ACCOUNT: Balance Sheet. (3)

COST ACCOUNTING: Concepts – Objectives – Methods of Costing. Cost Sheet – Elements of Cost – Cost Concepts – Classification – Cost Sheet. (3)

JOB ORDER COSTING: Features Objectives – Procedure – Job Cost Sheet. Activity Based Costing – Methodology – Applications (3)

CURRENT TRENDS IN ACCOUNTING: Annual Reports – Skill Application. (3)

Total: 15

REFERENCES:

1. Grewal T.S., "Double Entry Book-Keeping", Sultan Chand & Sons, 5th Edition.
2. Shukla, "Principles of Accounting", Sultan Chand & Sons, New Delhi, 2005.
3. Gaur & Narang, "Cost Accounting", Kalyani Publishing Co., Ltd., New Delhi, 2011.

120K04 VALUES AND ETHICS AT WORK PLACE

1 0 0 1

HUMAN VALUES AND ETHOS: Meaning and Significance of Values – Sources of Individual Values - Value crisis in the Contemporary Indian Society –Moral and Ethical Values. (4)

APPLICATION OF VALUES: Relevance of Values in Management – Personal Values and Values at Work place – Values for Managers. (2)

WORK ETHICS: Professional Values & Ethics – Need – Issues – Challenges – Ethical Leadership – Ethical dilemma - *Case Study*. (4)

SHARED VALUES IN THE ORGANIZATION AND ITS IMPACT: Need to identify and share values – the Value Construct and How to Promote Shared Values. (2)

UNIVERSAL VALUES: Cross Cultural Values - Impact of Culture on Organizations and Managing Workforce Diversity. (3)

Total : 15

REFERENCES:

- 1 Tripathi A. N., "Human values" – New Age international Pvt. Ltd., New Delhi, 2002.
- 2 Murthy C.S.V., "Business Ethics", Himalaya Publishing House, 2007.
- 3 Jayshree Suresh, Raghavan B.S., "Professional Ethics", S. Chand & Company Ltd., New Delhi, 2005.
- 4 Nandagopal R. and Ajith Sankar RN., "Indian Ethos and Values in Management", McGraw Hill, New Delhi, 2010.
- 5 Kiran D. R., "Professional Ethics and Human Values", Tata McGraw Hill, New Delhi, 2007.
- 6 Proceedings of National Conference on Integrating values & Social Concerns with Technical Education, PSG College of Technology, 2010.

120K05 INSURANCE & RISK MANAGEMENT

1 0 0 1

INTRODUCTION TO RISK MANAGEMENT: Risk in Our Society. (3)

INSURANCE AND RISK: Client Side – Components of the Costs of Risk. (3)

PRINCIPLES OF INSURANCE: Insurance Company Operations – Documents. (3)

MASS CONTROL: Insurance Intermediaries – Insurance Companies and their Role in Deducting Business / Role Risks. (3)

FINANCIAL RISKS: Shift of Risks – Risk Derivatives. (3)

Total: 15

REFERENCES:

1. George E Rejda, "Principles of Risk Management & Insurance", 11th Ed., 2010.
2. John Hull, "Risk Management & Financial Institution", 2012.
3. Alka Mittal & S. L. Gupta, "Principles of Insurance & Risk Management", 2006.

12OK06 EXPORT - IMPORT MANAGEMENT**1 0 0 1****INTRODUCTION:** Export – Import Business – Preliminaries for starting Export – Import Business – Registration. (3)**EXPORT PROCEDURES:** Obtaining an Export Licence – Export Credit Insurance – Procedures and Documentation. (3)**FOREIGN EXCHANGE:** Finance for Exports – Pricing - Understanding Foreign Exchange Rates. (3)**IMPORT PROCEDURES:** Import Policy – Licence - Procedure and Documentation. (3)**EXPORT INCENTIVES:** Incentives – Institutional Support. (3)**Total:15****REFERENCES:**

1. C. Ramagopal, "Export Import Procedures - Documentation and Logistics", New Age International.
2. "Inco terms Export Costing and Pricing with Case Studies Case Law and Exercises", Paras Ram Anupam Publications, Edt. 23, Rs 495.
3. Cherian and Parab, "Export Marketing", Himalaya Publishing House, New Delhi, 2008.
4. Rathod, Rathor and Jani, "International Marketing", Himalaya Publishing House, NewDelhi, 2008.
5. "Government of India: Export-Import Policy, procedures, etc.", (Volumes I, II and III) NewDelhi.
6. "Government of India: Handbook of Procedures, Import and Export Promotion", New Delhi.
7. Duty Drawback, "(with New Drawback Rates w.e.f. 1st October, 2011)", Nabhi's Board of Editors, 49th edition, October 2011, Rs.670.
8. "Duty Entitlement Pass Book Scheme (DEPB)", Nabhi's Board of Editors, 24th, September 2010, Rs.340.
9. "EXPORTERS Manual and Documentation with Free Complimentary book How to Export (OUT OF PRINT)", Nabhi's Board of Editors, 2009, Rs.695.
10. "How to Export 2012", Nabhi's Board of Editors, 19th Edition, August 2012, Rs 240.
11. "How to Import 2012", Nabhi's Board of Editors, 18th Edition, August 2012, Rs.190.
12. M I Mahajan, "Import Policy procedures and Documentation 2012-13", Edt. 7, Jain Book Publishers, Rs 650.

12OK07 CORPORATE COMMUNICATION**1 0 0 1****INTRODUCTION:** Basics of Corporate Culture, Etiquette, Code governing manners and conduct, Personal Grooming, People relationship, Worthy goals/ideals. (3)**CORPORATE COMMUNICATION (ORAL):** Communicating in Organizational Settings, Recognizing effective Communication, Mastering Listening and Nonverbal Communication Skills, Overcoming Barriers to Communication, Communicating in Teams and Cross, Culturally and Fine, Tuning Corporate Communication Skills. (4)**WRITTEN COMMUNICATION:** Planning, Writing, and completing business messages, Writing messages for Electronic Media, Creating effective E-mail messages, Writing routine and positive and negative messages, Writing persuasive messages, Guidelines for writing Reports and proposals/Format and layout of Business Documents. (5)**PRESENTATION AND NEGOTIATION SKILLS.** (3)**Total: 15****REFERENCES:**

1. Herta A. Murphy, Hebert W. Hildebrandt, and Jane P. Thomas, "Effective Business Communication", McGraw – Hill, VII Edition, New Delhi, 2008.
2. Courtland L. Bove'e, John V. Thill, and Mukesh Chaturvedi, "Business Communication Today", Dorling Kindersley India (Pvt) Ltd., 2009.

12OK08 INTERPERSONAL SKILLS**1 0 0 1****INTRODUCTION:** Process of Communication, Types of Communication, Barriers to Communication, Case studies. (2)

ORAL COMMUNICATION: Communication in the work place. (1)

- Conversational Skills. (1)
- Presentation Skills (1)
- Interview Techniques (2)
- Team Management Skills (1)

Spoken English	(2)
Personality Development	(2)
Practicals	(3)
Total:15	

REFERENCES:

1. Kitty O Locker and Stephen Kyo Kaczmarek, "Business Communication", McGraw – Hill, III Edition, New York, 2008.
2. Ashraf Rizvi M., "Effective Technical Communication", McGraw – Hill, New York, 2005.
3. Sasikumar V., Kiranmai Dutt P. , and Geetha Rajeevan, "Oral Communication Skills", Cambridge University Press India Pvt. Ltd., New Delhi, 2009.

12OK09 SOFT SKILLS

1 0 0 1

- SOFT SKILLS:** Importance and types of soft skills, Hand skills Vs soft skills in the world of work. (2)
- INTERPERSONAL SKILLS:** Significance, Interpersonal Skills for Team building, Making small Talks. (1.5)
- EMAIL ETIQUETTE:** Do's and Don'ts of Email drafting. (3)
- NEGOTIATION SKILLS:** The need and Significance of negotiation Skills in work contexts. (2)
- CROSS CULTURAL COMMUNICATION:** The need for Cross Cultural Communication in the global context, Understanding Cross Cultural Communication. (1.5)
- CORPORATE COMMUNICATION:** The Essence of Corporate Communication, Conversations in Transactional Situations, Discussions/Meetings/Team Skills, Social Grace, Attitude Building. (5)

Total: 15

REFERENCES:

1. E.H. McGrath, S.J. "Basic Managerial Skills for All" Prentice – Hall of India Private Limited, New Delhi , 2008.
2. Kumar E. Suresh. "Communication Skills & Soft Skills : An Integrated Approach". Pearson Education India, 2011.
3. Herta A. Murphy, Hebert W. Hildebrand t, and Jane P. Thomas, "Effective Business Communication", McGraw – Hill, VII Edition, New Delhi, 2008.
4. Courtland L. Bove'e, John V. Thill, and Mukesh Chaturvedi, "Business Communication Today", Dorling Kindersley India (Pvt) Ltd., 2009.

12OK10 TECHNICAL WRITING

1 0 0 1

- INTRODUCTION:** Fundamentals of Technical Writing, Using multifarious resources, Collecting and Organizing information, Understanding Audience/Readers, Analyzing Source credibility. (4)
- TECHNICAL WRITING:** Use of Language, Punctuation and Mechanics, Pre-writing Techniques, Documentation, Manipulating Written material, Proof reading, Paraphrasing and Summarizing. (4)
- REPORT WRITING:** Types of Reports, Creating an outline for Project Reports, Drafting information verbally and visually, Handling Presentation Tools, MS Word/MS Power Point, Using the library and the Internet, Quoting Bibliographical references, Plagiarism. (5)
- PRACTICAL:** Spotting the Error, Rewriting a given document, Producing Oral Reports. (2)

Total : 15

REFERENCES:

1. Blake, Gary & Robert W. Bly. The Elements of Technical Writing: The essential guide to writing. NY: MacMillan, 1993. ISBN: 0-02-013085-6
2. Society for Technical Communication. *Technical Communication* 38, 4(1991). Special Issue: Collaborative Writing.
3. Tichy, Henrietta J. *Effective Writing For Engineers, Managers, Scientists*. New York: John Wiley, 1988.
4. Strunk, William, Jr., and White, E. B. *The Elements of Style*. New York: Macmillan, 1979.

12OK11 MEASUREMENTS FOR SCIENCE AND ENGINEERING WITH OPEN SOURCE TOOLS

1 0 0 1

- BLOCK DIAGRAM OF THE EXPEYES PLATFORM AND ITS FUNCTIONAL DESCRIPTION:** Fundamental building blocks of the ExpEYES user library in C and Python. ExpEYES Graphical User interface. Using the input and output terminals. Voltage current ratings and timing. Measuring voltage and current . Voltage and current sources. Studying waveforms- amplitude, frequency and time measurement. FFT analyser. (7)

PYTHON PROGRAMMING BASICS: Introduction to the MinGW IDE. Experiment development using Python or C. Temperature measurement using PT100 and LM35. Oscillatory motion. Cooling curves. Magnetic induction. Capacitor charge and discharge. LCR circuits. Optical measurements-light sensor for timing signals. Electrical conductivity of electrolytes . Ultrasonic sensors. (8)

Total = L: 15 = 15

REFERENCES:

1. Ajith kumar BP, ExpEYES User Manual , IUAC publications New Delhi, 2012
2. Ajith kumar BP , ExpEYES Junior User manual, IUAC publications New Delhi, 2012
3. Ajith kumar BP, ExpEYES Programmers manual, IUAC publications, New Delhi, 2012
4. Ajith Kumar B.P, Python for Education, IUAC publications New Delhi , 2010
5. Mark lutz, Learning Python, O'Reilly media, 2009, USA
6. WEB RESOURCES:
7. Versions 2012 of IUAC publications for expEYES available for download on-line under OGL at
8. IUAC official website www.iuac.res.in
9. System hardware and software source files and other resources available at ExpEYES official website <http://expeyes.in>
10. Python programming language official website www.python.org