

BE (Electronics and Communication Engineering)

BE (ECE) - I SEMESTER

THEORY			SESSIONAL		
CODE	TITLE	UNIT	CODE	TITLE	UNIT
HU 1101	Technical English	1.0	ME 1102	Engineering Graphics	1.0
PH 1101	Physics- I	1.0	CP 1202	Unix & C Programming	1.0
CH 1201	Engineering Chemistry	1.0	PH 1102/	Physics Lab./	
MA 1101	Mathematics- I	1.0	CH 1202	Chemistry Lab.	0.5
ME 1101	Engineering Mechanics	1.0	PE 1102	Work Shop Practice- I	0.5
			GA 1002	NCC/ NSS/ PT & Games/ Creative Arts	0.5

BE (ECE) - II SEMESTER

MA 2101	Mathematics- II	1.0	ME 2102	Computer Aided Drafting	1.0
EE 2101	Basic Electrical Engineering	1.0	CH 1202/	Chemistry Lab./	
CP 2101	Data Structure in C++	1.0	PH 1102	Physics Lab.	0.5
CH 2103	Environmental Science	1.0	ME 2104/	Engineering Mechanics Lab./	
PH 2103	Physics- II	1.0	EE 3102	Basic Electrical Engineering Lab.	0.5
			CP 2102	Data Structure Lab.	0.5
			PE 2102	Workshop Practice- II	0.5
			GA 2002	NCC/ NSS/ PT & Games/ Creative Arts	0.5

BE (ECE) - III SEMESTER

MA 3103	Mathematics III	1.0	EC 3102	Basic Electronics Lab	0.5
EE 3101	Introduction to System Theory	1.0	EC 3104	Electronic Instruments and	
PH 3101	Material Science	1.0		Measurements Lab	0.5
ME 3207	Principle of Mechanical Engg.	1.0	PH 3102	Material Science Lab	0.5
EC 3101	Basic Electronics	1.0	EE 3102	Basic Electrical Lab	0.5
EC 3103	Electronic Instruments and		GA 3002	NCC/NSS/ PT & Games/ Creative Arts	0.5
	Measurements	1.0			

BE (ECE) - IV SEMESTER

EC 4101	Digital Electronics	1.0	EC 4102	Digital Electronics Lab.	0.5
EC 4105	Discrete & Integrated Analog Circuits	1.0	EC 4106	Discrete & Integrated Analog	
EC 4107	Semiconductor Devices	1.0		Circuits Lab.	0.5
EC 4111	Analog Communication System	1.0	EC 4112	Analog Communication Lab	0.5
CP 4103	Scientific Computing	1.0	CP 4104	Scientific Computing Lab.	0.5
EE 4105	Network Theory	1.0	GA 4002	NCC/ NSS/ PT & Games/ Creative Arts	0.5

BE (ECE) - V SEMESTER

EC 5101	Microprocessor & Interfacing	1.0	EC 5102	Microprocessor Application Lab	0.5
EC 5103	Electromagnetic Theory	1.0	EC 5106	Digital Communication Lab.	0.5
EC 5105	Digital Communication System	1.0	CP 4106	Data Base Management System Lab	0.5
EC 5107	Data Communication	1.0	EE 6106	Control Systems Lab.	0.5
NC 4105	Data Base Management Systems	NC			
EE 6105	Linear Control Theory	1.0			
EE 4311	Principle of Electrical Machine	1.0			

BE (ECE) - VI SEMESTER

EC 6101	Industrial Electronics	1.0	EC 6102	Instrumentation Lab.	0.5
EC 6103	Computer Communication Networks	1.0	EC 6108	Fiber Optics Comm. Lab.	0.5
EC 6107	Fiber Optics Communication System	1.0	EC 6112	VLSI Design Lab.	0.5
EC 6111	VLSI Design	1.0	EE 5108	Digital Signal Processing Lab.	0.5
CP 4107	Operating Systems	1.0			
EE 5107	Digital Signal Processing	1.0			

BE (ECE) - VII SEMESTER

EC 7101	Telecommunication Switching Circuit & Networks	1.0	EC 7102	Wireless Communication & Networking Lab.	0.5
EC 7103	Antenna & Wave Propagation	1.0	EC 7106	Microwave Lab.	0.5
EC 7105	Microwave Engineering	1.0	EC 7110	Project	1.0
EC 7113	Mobile & Cellular Communication Elective-I Elective-II	1.0			

List of Electives

EC 7107	Fundamentals of Embedded System Design	1.0
EC 7109	Bioelectronic Instrumentation	1.0
BT 8004	Introduction to Bioinformatics	1.0
EC 7111	Information and Coding Theory	1.0
EC 7115	Microelectronics Engineering	1.0
EC 7117	Artificial Intelligence & Expert Systems	1.0
EC 7119	Stochastic and Random Processes	1.0
EC 7121	Advanced Microprocessors	1.0
CP 7101	Soft Computing	1.0
EE 7117	Neural Network	1.0
CP	Mobile Computing	1.0

BE (ECE) - VIII SEMESTER

EC8101	Intelligent Instrumentation	1.0	EC8102	Industrial Instrumentation Lab	0.5
EC8103	Digital Video Signal Coding	1.0	EC8104	Advanced Comm. Lab.	0.5
EC8105	Satellite Comm. System	1.0	EC8110	Project	1.0
MA8101	Principles of Management Elective-III Elective-IV	1.0			

List of Electives

EC8107	Radar Engineering	1.0
EC8109	Optical Networks	1.0
EC8111	VHDL & ASIC Tools	1.0
EC8113	Speech Processing	1.0
EC8117	Digital Signal Processing Architecture	1.0
EC8119	Introduction & Programming of Micro-controllers	1.0
CP 7043	Cryptography & Network Security	1.0
CP 7117	Digital Image processing	1.0
CP 7119	Advanced Computer Architecture	1.0
CP 8121	Pattern Recognition	1.0

FIRST SEMESTER

HU 1101

TECHNICAL ENGLISH

1.0

MODULE – I

Single word substitution, Idioms and phrases, Pairs of words, Common errors, Précis, Comprehension, Expansion.

MODULE – II

Official Correspondence - Memorandum, Notice, Agenda, Minutes, Circular letter, applying for a job, Resume, Demo-official letter.

MODULE – III

Business Correspondence-Types, sales letters; Social Correspondence- Invitation to speak, Congratulations; etc.

MODULE – IV

Report writing; general and technical report, Definition, Types, structure.

MODULE – V

Technical proposals, Definitions, types and format.

MODULE – VI

Research papers and articles.

MODULE – VII

Mechanics of manuscript preparation.

BOOKS FOR REFERENCE:

1. Blickle, Margaret D., and K.W.Houp.
2. Reports for Science and Industry, Henry Holt & Co. N.Y.
3. Duddy, E.A. & M.J. Freeman Written Communication in Business, Amercian book Co. N.Y.
4. Berry, Thomas Elliot, The most Common Mistakes in English Usage; Tata McGraw Hill.
5. Stevensin, B.W., J.R. Spicer and E.C. Ames, English in Business and Engineering. Prentice Hall, Eaglewood
6. Cliffs, N.J.
7. Raul, Asha, Effective Business Communication, Prentice Hall of India.
8. Singh B. Business Correspondence including Bank letters.
9. Singh B. Theory and Practice of Business Correspondence, HPJ Kapoor Publications.
10. Report Writing and Business Correspondence Mohan and Sharma, Tata McGraw Hill Publications, India.
11. Best, W.D. The Students companion, Rupa & Co. Publications.

MODULE – I

Waves and Oscillations: (SS* : Wave motion: longitudinal and transverse waves, plane waves, phase velocity). Wave packets and group velocity, wave equation, superposition of waves (RHK-Ch-18), equation of motion of simple harmonic oscillator and solutions, damped harmonic motion and forced oscillations(RHK 17.2-17.4,17.7,17.8)

[6]

MODULE – II

Fields: Vector and scalar fields, physical and mathematical concepts of gradient, divergence and curl (Cartesian coordinates only), Gauss's theorem and Stokes' theorem (Statements only, SAD-Ch.3).

[5]

MODULE – III

Electromagnetic Theory: Gauss's law in integral and differential form, electric potential and relation with E(SAD 4.5-4.8),(SS*- capacitance(SAD-6.5) and electrostatic energy density (SAD 4.10)), dielectrics, three electric vectors, dielectric susceptibility boundary conditions on E and D(SAD 5.5-5.7, 5.9).

[5]

Ampere's law in integral and differential form, applications.(SAD 7.1-7.4), Hall effect (RHK-32.4), three magnetic vectors (SAD 7.5), magnetic permeability and susceptibility, boundary conditions on B and H (SAD 8.5-8.7).

[5]

Faraday's law in integral and differential form(SAD 9.2-9.3), (SS - Inductance, magnetic energy density (SAD 8.8, 8.9)), continuity equation for charge (SAD 5.8), displacement current (SAD 9.4), Maxwell's equations in free space (SAD 9.5), electromagnetic wave equation for plane waves in dielectric medium and free space, relation between \vec{E} , \vec{B} and \vec{k} , Poynting vector (SAD 10.3-10.7).

[5]

MODULE – IV

Plasma Physics: Plasma state, types of plasma, applications of plasma(FFC-Ch-1,2)

[4]

MODULE – V**Physical Optics:**

Interference: Two-Beam Interference(AG 12.1-12.6), interference in thin films and wedge-shaped layers(AG 13.8-13.9), reflection and anti-reflection coatings(AG 13.2-13.4), applications of interferometry: Newton's rings(AG 13.10), Michelson' Interferometer (AG 13.11)

[5]

Diffraction: Fraunhofer diffraction by single slit(AG 16.1-16.3) , double slit and grating (AG 16.6-16.8), limit of resolution, Rayleigh criterion(AG 16.5), Fresnel diffraction(Qualitative, AG 17.1-17.3)

[5]

Polarization : (SS- Polarization of light, Malus's law, polarization by reflection, Brewster's law, Double refraction) Analysis of linearly and circularly polarized light(RHK 44.1-44.5), Fresnel's equations and their applications (AG 21.1-21.2)

[5]

Text Books:

1. Mathew N.O. Sadiku (SAD), Elements of Electromagnetics, Oxford University Press
2. (2001)
3. A.Ghatak(AG), Optics, 3rd Edition, Tata McGraw Hill, 2005
4. Resnick, Halliday and Krane(RHK), Physics- Part-I & II, 5th Edition, John Wiley (2002)
5. F.F.Chen(FFC), Introduction to Plasma Physics, 2nd Edition, Plenum Press, 1994

References:

1. W.H.Hayt and J.A.Buck, Engineering Electromagnetics, Tata McGraw Hill (2006)
2. M.R.Srinivasan, Physics for Engineers, New Age International, 1996
3. S.N.Sen, Introduction to Plasma Physics, Pragati Prakasan, Meerut -1, India

MODULE – I

Chemical Bonding: Trends in periodic properties (ionization energy, electron affinity, electro negativity), VBT, VSEPR theory, MOT for diatomic molecules and polyatomic molecules, coordination complexes & ligands, CFT, colour and magnetism of coordination complexes, spectrochemical series

MODULE –II

Kinetics and catalysis: kinetics of chain reactions, parallel reactions, side reactions, fast reactions in solutions, flash photolysis, kinetics of catalytic action (acid base catalysis, biological catalysis), application of catalyst in industrially important processes (Haber's processes, Ostwald process, Bergius process)

MODULE – III

Thermo-chemistry and Fuels: Hess's law, entropy, enthalpy and combustion calculations, characterization and application of fossil fuels, solid fuel (carbonization & gassification), liquid fuels (refining, reforming, petrol & diesel, knocking characteristics, octane and cetane number) and gaseous fuels (water gas, producer gas, coal gas and biogas), lubricants and its properties

MODULE –IV

Electrochemistry and corrosion sciences: Redox process cell, potential and free energy, galvanic cells, electrolysis and Nernst's equation, Fuel cells, and its applications, chemical and electrochemical corrosion, general methods of corrosion prevention (with brief introduction to chemistry of paints, varnishes and enamel)

MODULE –V

Fundamentals of spectroscopic techniques: Basic principles of vibrational, rotational and Mossbauer spectroscopy

MODULE – VI & VII

Macromolecules: Classification, Addition and Condensation polymers, molecular weight of polymers (M_n , M_w , M_v), glass transition temperature (T_g), structure property relationship in polymers (chemical, electrical, optical and mechanical), examples and use of inorganic polymers, synthesis of some commercially important polymers and their use (Nylon 6, Nylon 6, 6, PE, PET, PS)

MODULE – VI & VII

An introduction to computational chemistry

Text Book:

1. Applied chemistry A text book for engineers and technologists, H. D. Gesser, Plenum publishers.
2. Inorganic chemistry: J. D. Lee.
3. Engineering chemistry: Sashi Chawla

Reference:

1. Fundamentals of molecular spectroscopy: C. N. Banwell, TMH publication
2. Computational chemistry: E. Lewars, Kluwer publication
3. Physical chemistry: P. W. Atkins

Analytical Trigonometry:

De-Moivre's Theorem and its applications. Expansion of $\sin x$ and $\cos x$ in powers of x . Complex arguments. Separation into real and imaginary parts Gregory's Result. Expansions. Summation of trigonometric Series. Hyperbolic functions.

(8L)

Differential Calculus:

Successive Differentiation. Leibnitz's Theorem. Rolle's Theorem. Lagrange's and Cauchy's Mean value Theorem. Generalised Mean value Theorem. Taylor's and Maclaurin's infinite series. Cartesian and polar subtangent and Subnormal. Pedal equations. Orthogonal intersection of curves. Curvature and radius of Curvature in case of Cartesian parametric, polar, pedal and tangential polar forms. Centre of curvature and evolute. Indeterminate forms L Hospital's Rule. Concavity, convexity and points of inflexion. Asymptotes (cartesian Co-ordinates only).

Functions of two variables. Partial derivatives. Euler's Theorem on Homogeneous functions. Its generalisation and extension. Total differential and derivatives. Errors and Approximations. Taylor's series in case of two variables. Maxima and Minima of two variables. Lagrange's method of Undertermined multipliers in case of two and three variables. Jacobians. Envelope of curves. Tangent planes and Normal lines.

(22L)

Integral Calculus:

Reduction Formula. Beta and gamma functions. Area, length, volume and surface area without the use of multiple integrals.

(9L)

Infinite series:

Convergency and Divergency of infinite series. Tests for Convergence. Comparison Test, p series test, Cauchy's root test. D' Alembert's ratio test, Razabe's Test, Gauss's Test, Logarithmic and Higher logarithmic ratio test (No proof). Leibnitz's Rule for alternating series test.

(6L)

Books Recommended:

1. Higher Trigonometry. Das and Mukherjee (U.N. Dhur & Co.)
2. Differential Calculus. Pran Nath and Agarwal. Tara Publications, Varanasi
3. Integral Calculus. Das and Mukherjee (U.N. Dhur & Co.)
4. Engineering Mathematics. H.K. Dass
5. Higher Engineering Mathematics B.S. Grewal (Khanna Publishers)

Equivalent Force System and Equilibrium: Principles of statics, laws of mechanics, freebody diagram, coplanar, non-coplanar and spatial force system and conditions of equilibrium, vector representation and analysis of forces and moments, Varignon's theorem.

Structural Mechanics: Analysis of simple plane truss by method of sections and methods of joints, analysis of frames and parabolic cables, cantilever and simply supported beams with concentrated, distributed and moment loads, shear force and bending moment diagrams, concept of stress and strain.

Interfacial Friction: Friction and impending motion, static, kinetic and rolling friction, application to inclined planes, wedges, screws jacks and belts.

Kinematics and Kinetics of Particle and Rigid Bodies: Conceptual framework and vector representation of displacement, velocity, acceleration, linear and angular momentum, rectilinear and curvilinear motion in two dimensions, centroidal and non-centroidal rotation, general plane motion, Newton's laws of motion, D'Alembert's principle, equilibrium of dynamic forces.

Work and Energy: Translation and rotation of rigid body about a fixed axis, conservation of energy, energy and work equations in translation and rotational motion, virtual work.

Impulse and Momentum: Impulse force and momentum, conservation of momentum, coefficient of restitution, momentum equation. Vibrating Systems: Inertia, features of a vibrating system, free vibration, systems with single degree of freedom.

Books Recommended:

1. Kumar, Engineering Mechanics
2. Shames, Engineering Mechanics

SECOND SEMESTER

MA 2101

MATHEMATICS- II

1.0

Integral Calculus:

Operations under the sign of integration, Multiple integrals, change of order of integration, Transformation of Co-ordinates, Area, Volume and Surface area of solids using multiple integrals.

(8L)

Ordinary Differential Equations:

Linear differential equations: Bernoulli's from Exact equations, Nonlinear equations, Clairaut's form, Higher order equations with constant coefficients. Cauchy's and Legendre's differential equations. Solution of higher order equation by the change of independent variable, Method of variation of Parameters in Simple cases,

Applications to Engineering problems.

Series solution of Differential equations by the method of Frobenius. (Roots differing by non integer and equal roots).

(14L)

Algebra of Matrices:

Rank of a matrix. Consistency and inconsistency of a system of linear equations. Eigen values and eigen vectors. Cayley Hamilton Theorem.

(3L)

Vector spaces:

Definition, examples and some simple properties. Subspaces, linear combination, linear dependence and independence, Basis and dimension. Norm of a vector, Inner Product. Cauchy-schwartz inequality, orthogonal sets. Gram-schmidt process of construction of orthogonal sets. Parallelogram law and Pythagorean theorem.

(8L)

Vector Calculus and Tensor Analysis:

Differentiation of vectors, Radial and transverse, tangential and normal acceleration of a particle moving on a plane curve. Directional derivatives, Gradient, Divergence and Curl. Expansion Identities. Vector integration. Conservative system of forces. Solenoidal and Irrotational vectors. Theorems of Green, Stoke and Gauss and their applications,

Tensors, transformation of Co-ordinates, contravariant and covariant vectors and Tensors. Rank of a tensor. Addition and multiplication of tensors. Mixed tensors Contraction.

(10L)

Books Recommended:

1. Advanced Engineering Mathematics by E. Kreyszig
2. Advanced Mathematics for Engineers By Chandrika Prasad (Prasad Mudranalaya)
3. Advanced Engineering Mathematics By H.K. Das.

MODULE – I

Introduction: Importance of Electrical Engineering in day-to-day life. Electrical elements and their classification. KCL and KVL equations. Loop current and Node voltage method. D.C. Circuits: Steady state analysis with independent and dependent sources; Series and Parallel circuits; Star-Delta conversion. D.C. Circuit Theorems: Superposition theorem; Thevenin's & Norton's theorem; Maximum Power Transfer theorem.

(12)

MODULE – II

A.C. Single-phase Series Circuits: Common signals and their waveforms. RMS and Average value. Form factor & Peak factor of sinusoidal waveform. Impedance of Series circuits. Phasor diagram. Power. Power factor. Power triangle.

(5)

MODULE – III

A.C. Single-phase Parallel Circuits: Admittance method, Phasor diagram. Power. Power factor. Power triangle.

(5)

MODULE – IV

Resonance and Q-factor, A.C. Circuit Theorems: Superposition theorem; Thevenin's & Norton's theorem; Maximum Power Transfer theorem.

(7)

MODULE – V

Three Phase Circuits: Line and Phase relation for Star and Delta connection. Power relations. Analysis of balanced and unbalanced 3 phase circuits.

(7)

MODULE – VI

Magnetic Circuits: Introduction. Series-parallel magnetic circuits. Analysis of Linear and Non-linear magnetic circuits. Energy storage. A.C. excitation. Eddy currents and Hysteresis losses.

(5)

MODULE – VII

Coupled Circuits (Dot rule), Self and mutual inductances, Coefficient of coupling.
Basic Indicating Instruments: Moving coil and moving iron type instruments.

(4)

Books Recommended:

1. Nagrath and Grabel, Basic Electrical Engineering
2. Fitzerald and Higinbotham, Basic Electrical Engineering

MODULE – I & II

Introduction to C++ and algorithm analysis: C++ classes, C++ details, Using matrices, Mathematical background for algorithm analysis, model and what to analyze, Running Time calculations.

MODULE – III

Lists, Stacks and Queues: Abstract Data Types, The list ADT, The Stack ADT, The Queue ADT

MODULE – IV

Trees: Preliminaries, Binary Trees, The Search Tree ADT – Binary Search Trees, AVL Trees, Splay Trees, Tree Traversals, B-Trees.

MODULE – V

Hashing and Priority Queues: Model and Simple implementations, Binary Heap, Applications of Priority Queues, d-Heaps, Leftist and Skew Heaps.

MODULE – VI

Sorting: Preliminaries, Insertion sort, A Lower Bound for Simple Sorting Algorithms, Shell sort, Heap sort, Merge sort, and Quick sort.

MODULE – VII

Graph Algorithms: Definitions, Topological Sort, Shortest Path Algorithms, Network Flow Problems and Minimum Spanning Tree.

Text Books:

1. Mark A. Weiss – Data Structures & Algorithm Analysis in C++, 2nd Edition, Pearson Education, New Delhi – 2002.

Reference:

1. Gregory L. Heilean – Data Structures Algorithms, and Object Programming, Tata McGraw Hill, New Delhi – 2002.
2. Adam Drozdek – Data Structures and Algorithms in C++, Thomson Learning (Vikas Publishing House) New Delhi – 2001.
3. John R. Hubbard – Data Structures with C++, Tata McGraw Hill, New Delhi, 2004

MODULE– I

Environmental Awareness: Multidisciplinary nature of environmental Science, Definition, scope , importance and need for public awareness (2)

MODULE– II

Ecology and Environment: concept of an ecosystem ,structure and function of an ecosystem, producer ,consumer and decomposer, energy and nutrient flow biogeochemical cycles, food chain ,food web, ecological pyramid (3)

MODULE– III

Environmental Pollution: Segments of environment, sources, pathways and fate of environmental pollutants, causes of environmental pollution , physical ,chemical and biological transformation of pollutants , population explosion, environment and human health, human rights, value education ,women and child welfare (5)

MODULE– IV

Air Pollution: various segments of atmosphere and their significance,classification of air pollutants, toxic effects, sampling and analysis, stationary and mobile emission, sources and their control, photochemical smog ,sulphurous smog, green house effect, global warming, ozone depletion, Air (prevention and control of pollution) Act (10)

MODULE– V

Water Pollution: Water resources ,sources of water pollution ,various pollutants, their toxic effect, potability of water , municipal water supply , disinfection, characteristics of waste water, primary and secondary waste water treatment, BOD and COD measurement and their significance ,rain water harvesting ,water shed management,Water (pollution and control) Act. (12)

MODULE– VI

Natural Resources and Biodiversity: Renewable and non renewable resources, Forest resource, consequences of deforestation, floods and draughts, equitable use of resources for sustainable development, Dams benefits and problems, Biodiversity: ecosystem diversity , threats to biodiversity, conservation of biodiversity. (4)

MODULE– VII

A brief introduction to Noise Pollution, Soil Pollution, Solid Waste Management. (4)

Books Recommended:

1. Sharma and Kaur, Environmental Pollution
2. De, Environment Chemistry

MODULE – I**Special Theory Of Relativity**

Postulates, Galilean transformations, Lorentz transformations, length contraction, time dilation, velocity addition, mass change and Einstein's mass energy relation. (AB: 1.1,1.2,1.4,1.7,1.8,1.9, and Appendix to chapter-1

[6]

MODULE – II**Quantum Mechanics:**

Planck's theory of black-body radiation (AB: 2.2, 9.5, 9.6), Compton effect (AB: 2.7), wave particle duality, De Broglie waves, Davisson and Germer's experiment (AB: 2.4, 3.1, 3.2, 3.3, 3.4, 3.5), uncertainty principle (AB: 3.7, 3.8, 3.9), physical interpretation of wave function and its normalization (AB: 3.2), expectation value (AB: 5.4).

[8]

Schrodinger equation in one dimension (AB: 5.2), solutions of time-independent Schrodinger equation for free particle (AB: 3.6, 5.5, 5.6), particle in an infinite square well, potential barrier and tunneling (AB: 5.7, 5.8), hydrogen atom (qualitative) (HRW: 40-8).

[8]

MODULE – III**Statistical Physics And Thermodynamics:**

Elementary ideas, comparison of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (AB: 9.1, 9.2, 9.3, 9.4).

[4]

Zeroth law, first law, second law, entropy, heat transfer, steady state one-dimensional heat conduction [(HRW: 19-2, 19-9, 21-3, 19-11), (SS: 14.2, 14.7)].

[6]

MODULE – IV**Lasers And Applications:**

Emission of light by atoms, spontaneous and stimulated emission (AB: 4.9, and AG: 23.1), Einstein's A and B coefficients, laser: population-inversion (AG: 23.4), properties of laser radiation, Ruby & He-Ne lasers, applications of lasers (AB: 4.9) and AG: 23.1), elementary ideas of holography (AG: 18.1) and fiber optics (AG: 24.1-24.3).

[8]

MODULE – IV**Nuclear Physics:**

Nuclear forces, binding energy, liquid drop model (AB: 11.1-11.6), fission, nuclear reactors, fusion, energy processes in stars, controlled thermonuclear reactions (AB: 12.9-12.12).

[5]

Text Books:

1. Arthur Beiser, Concepts of Modern Physics, 5th edition, Tata McGraw Hill, 1997.
2. Ajoy Ghatak, Optics, 2nd edition, Tata McGraw Hill, 1997.

Reference Books:

1. Jasprit Singh, Modern Physics for Engineers, John Wiley & Sons, 1999.
2. Kenneth Krane, Modern Physics, 2nd edition, John Wiley & Sons, 1998.
3. Wehr, Richards and Adair, Physics of the Atom, 4th edition, Addison Wesley.

THIRD SEMESTER

MA3101

Mathematics III

1.0

Special Functions:

Bessel's equation: solution and Bessel's function of the first kind, Recurrence relations. Orthogonality of Bessel's Functions. Generating function and Bessel's integral. Legendre's equation: solution and Legendre's polynomials, Rodrigue's Formula. Orthogonarity relations. Generating function and recurrence relation. Definition of Hankekl's function. Elliptic Integral of the first and second kind. Jacobi's form of elliptic integrals.

(8L)

Complex Variables:

Continuity, differentiability and analyticity of a function of a complex variable, Cauchy Riemann differential equations in Cartesian and polar forms. Harmonic functions, Bilinear and conformal transformations. Complex integration, Cauchy's integral theorem and formula. Derivatives. Taylor's and Laurent's Series. Poles and Singularities. Cauchy's Residue Theorem. Contour integration (Poles on real axis excluded)

(13L)

Partial differential equations:

Formation of partial differential equations. Lagrange's first order linear equations. Non linear equations. Higher order differential equations with constant Co-efficients. Non homogeneous equations: solution by separation of variables. Boundary value Problems. wave equation in one dimension and its solution. Derivation of one dimensional heat equation and its solution.

(10L)

Fourier Series and Fourier Transform:

Periodic functions Existence conditions Euler's formulae. Half range series. Fourier series of functions with arbitrary period.

Fourier Integral Formula, Fourier Transform, Inversion Theorem, Fourier sine and cosine transforms and inversion formulae, Linearity property, Convolution or Faltung theorem. Relationship between Fourier and Laplace transform. Finite Fourier Transforms. Heaviside, Unit step function and Dirac Delta Function

(10L)

Statistics:

Mean and variance. Moments. Concept of Random variable. Probability density and Distribution functions Problems, Elements of error analysis

(4L)

Books Recommended:

1. Engineering Mathematics – E. Kreyszig
2. Advanced Engineering Mathematics – C. Prasad
3. Fourier Transforms – I.N. Sneddon

MODULE – I

Introduction to signals and systems: Definition, Basis of classification, Representation of common signals and their properties, System modeling.

(4)

MODULE – II

Analogous System: Introduction, D'Alembert's Principle, Force-voltage and force-current analogies, Electrical analogue of mechanical, Hydraulic and thermal systems.

(5)

MODULE – III

Fourier Transform Method: Introduction, Fourier transform pair, Amplitude spectrum and phase spectrum of signals, Sinusoidal transfer function.

(3)

MODULE – IV

Laplace Transform Method: Introduction, Laplace transform pair, Laplace transformation of common functions, Gate function, Step function and impulse function, Laplace theorems shifting, initial value, final value and convolution theorems.

Inverse Laplace transform by partial fraction expansion and convolution integral method.

(12)

MODULE – V

System Analysis: System Analysis by Laplace Transform method, System response. Natural, forced, transient and steady state responses. Transfer function and characteristic equation, Superposition integral, Concept of poles and zeros, Nature of system response from poles and zeros.

(6)

MODULE – VI

System Stability: Concept of stability, Types, Necessary and sufficient conditions, Routh Hurwitz stability criterion, Limitations and its applications to closed loop systems.

(4)

MODULE – VII

State-Space Concept: Introduction, Definition: State, State variable, State vector and state space, State space representation, Derivation of State model from transfer function, Bush form and diagonal canonical form of state model, Non-uniqueness of state model, Derivation of transfer function from state model, Transition matrix and its properties, Solution of time invariant state equation.

(6)

Text Books:

1. Analysis of Linear Systems – D.K.Cheng.
2. Control System Engineering – Nagrath & Gopal
3. Control System – A. Anand Kumar

Reference Books

1. Networks and Systems – D. Roy Choudhury
2. Signals and Systems - Basu & Natarajan

MODULE – I**Introduction To Crystallography:**

Crystal structures, Space lattice, Symmetry elements, Unit cells, Crystal systems, Packing factors, Miller indices, Single crystals, Polycrystalline materials (WDC 3.1-3.14). Distance between parallel planes, X-ray diffraction & Bragg's law, Laue method, Power Method (WFS 3.11).

[5]

MODULE – II**Imperfections And Strengthening Mechanism In Solids:**

Types of imperfections, Point defects (WDC 4.1-4.3). Dislocations: Edge dislocation & Screw dislocation, Burger's vector, Concepts of dislocation density (WDC 4.5), Surface defects (WDC 4.6), Volume defects (WDC 4.7), vibrational defects (WDC 4.8).

[4]

MODULE – II**Phase Rules:**

Phases (WDC 9.3), Phase Equilibria, Single component systems (WDC 9.5). Binary phase diagrams (WDC 9.6), Microstructural changes during cooling, The Lever rule and its applications (WFS 8.4), Gibbs phase rule (WDC 9.7-9.8, WFS 8.2). Glass transition (WDC 13.8).

[4]

MODULE – III**Mechanical Properties:**

Engineering stress, Engineering strain, stress-strain behaviour, Elastic deformation (WFS 6.2, 6.3). Atomic view of elasticity, Anelasticity, Slip, Slip systems (WDC 7.4), Resolved shear stress (WDC 7.5), Plastic deformation of single and polycrystalline materials (WDC 7.6, WFS 6.5), Strain hardening (WDC 7.10). Recovery (WDC 7.11), Recrystallization, Cold working & Hot working (WDC 7.12, WFS 6.8). Grain Growth (WDC 7.13), Introduction to Fracture, Fatigue and Creep (WDC 8.2.-8.16, WFS 6.11).

[8]

MODULE – IV**Electrical And Magnetic Properties:**

Basic concepts and types of polarization, A.C. effects, Ferro-electricity, Piezo electricity, Ferro and piezo electric materials (WDC 18.24-18.25).

Free electron theory of metals, Band theory of solids, Intrinsic, Extrinsic & compound semiconductor, conductivity, mobility, Temperature dependence of conductivity & carrier concentration (WDC 18.1 – 18.13). Superconductors: elementary introduction, High T_c superconductors (WDC 20.11).

Dia, Para and Ferromagnetism, Antiferromagnetism, Ferrimagnetism, Influence of temperature, Magnetic domains & hysteresis, Magnetic materials, Magnetic storage devices, Memory materials (WDC 20.1 -20.10).

[10]

MODULE – VI**Ceramic, Glasses, Polymers And Composites:**

Common Refractory: Materials, Portland cement composition and its grades (WDC 16.2).

Glasses: Types of glasses, Glass ceramics (WFS 10.9)

Polymers: Polymer classification and properties, Polymer applications, Cable, Insulation, Optical Fibre (WDC 14.1-14.4, 15.2-15.5, 15.10-15.13). Smart polymers for electrical and electronic applications, Conducting polymers (WDC 18.17).

Composites: Fibre reinforced composites (WFS 13.3), Influence of fibre length & orientation (WDC 16.4), Whiskers, Various fibre reinforced composites, plastic and glass fibers (WDC 16.6).

[10]

MODULE – VII

Introduction To Nanotechnology:

Basic concepts of nanotechnology, Nanomaterials: Fabrications & Applications.
[Nanotechnology: M Ratner & D. Ratner (Pearson Education Publication)]

[4]

Texts Books:

1. W. D. Callister, Materials Science and Engineering: An Introduction, John Wiley, 6th Edition, 2003. [WDC]
2. W. F. Smith, Principles of Materials Science and Engineering, McGraw Hill International, 1986. [WFS].

References:

1. The Structure and Properties of Materials, Vol. –I,
2. Mofatt, Pearsall and Wulf, Vol. –III ,
3. Hayden , Mofatt and Wulf, Vol. –IV,
4. Pease, Rose and Wulf, Wiley Eastern. (2)
5. Physical Properties of Materials, M. C. Lovell, A. J. Avery, M. W. Vernon, ELBS.

MODULE – I

Thermodynamic System, control volume, intensive and extensive properties. Zeroth Law of Thermodynamics, Concept of temperature, Heat and work. Thermodynamic properties of pure substances. Thermodynamic property table and charts.

(5 Lectures)

MODULE – II

First law of Thermodynamics, Energy and its forms. Enthalpy, specific heats. First law applied to flow Non-flow and steady processes.

(4 Lectures)

Second law of Thermodynamics, Kelvin-Planck and Clausius Statements, reversible and irreversible process, Thermodynamic (absolute) temperature scale.

(4 Lectures)

MODULE –III

Entropy: Inequality of Clausius and concept of Entropy. Entropy change of a system and control volume. Carnot cycle, Otto cycle, Diesel cycle.

(6 Lectures)

MODULE –IV

Classification and brief description of Low and High Pressure boilers; mountings and accessories; draught and performance of boilers.

(5 Lectures)

MODULE – V

Basic concepts of Conduction, convection and Radiation; one dimensional steady state conduction. Application to composite walls and cylinders, Critical thickness of insulation.

(7 Lectures)

MODULE – VI

Simple stresses and strains, Bending moment and shear force diagrams graphical representation of stress and strains, strain rosettes.

(5 Lectures)

MODULE- VII

Linear single degree of freedom system, free system with damping Balancing of revolving masses in a plane and in different planes.

(9 Lectures)

Books:

1. Fundamentals of Classical Thermodynamics – G.J. Van Wylen and R.E. Sorntag, Second Edition, Wiley Eastern (1984).
2. An Introduction to Thermodynamics – P.K. Nag
3. Thermal Engineering – R.K. Rajput
4. Strength of Materials – F.L. Singer
5. Theory of Machines – Thomas Beven

MODULE – I

Introduction to PN junction diodes, Characteristics of semiconductor diodes, Analysis of simple diode circuits: DC and AC load lines, Zener diode, Characteristics and applications in regulators.

(4)

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill.

MODULE – II

Application of diodes, Rectifiers: Half wave rectifier, Full wave rectifier with π filter.

Clipping and clamping circuits: Elementary diode clippers, Transfer function characteristic, Clipping at two independent levels using diodes and Zener diodes, Operation of an elementary clamping circuit.

(6)

Text Book:

1. "Electronics Devices & Circuits" Millman & Halkias, McGraw Hill.

MODULE – III

Fundamentals of transistors: Introduction to transistor circuits for CB, CE, CC configurations. Transistor biasing and bias stability. JFET & MOSFET, characteristics, biasing and small signal low frequency analysis of CD, CS configurations, FET as VVR,

(6)

Text Book:

1. "Electronics Devices & Circuits" Millman & Halkias, McGraw Hill.
2. "Integrated Electronics" Millman & Halkias, McGraw Hill.

MODULE – IV

Small signal low frequency analysis of CE, CB and CC amplifiers.

(6)

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill.

MODULE – V

Transistor Power Amplifiers: Circuits and Operations of Class A, Class B, Class C and Push-Pull Configurations.

(6)

Text Book:

1. "Electronics Devices & Circuits" Millman & Halkias, McGraw Hill.

MODULE – VI

Logic circuit implementation of Boolean expressions, Adder, Subtractor, Seven-segment Display, Basic concept of TTL & CMOS logic system, Flip-flops.

(5)

Text Book:

1. "Electronics Fundamentals and Applications", D. Chattopadhyay & P. C. Rakshit, New Age International, 5/E

MODULE – VII

Operational amplifiers and its applications: Characteristics, Parameters, Measurements, Emitter Coupled Differential Amplifier, Transfer Characteristics, Voltage gain, Input and Output impedance of Inverting and Non-inverting amplifiers using OP-AMP, Linear and Non-linear applications of OP-AMP: Voltage follower, Phase inverter, Scale changer, Integrator, Differentiator.

(12)

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill.

Reference Books:

1. "Microelectronic Circuits", Sedar and Smith.
2. "Operational Amplifiers and Linear Integrated Circuits" by R. A. Gayakwad, PHI.
3. "Electronic Devices and Circuit Theory", Nashelesky & Boylestead, PHI.
4. "Linear Integrated Circuit", S. Jain & D. Roychoudhury, New Age International.
5. "Electronics Fundamentals and Applications", D. Chattopadhyay & P. C. Rakshit, New Age International.
6. "Electronic Devices and Circuits", Allan Mottershed, PHI.

MODULE – I

Introduction of measurements and measurement systems: Significance of measurements, different methods of measurements, Instruments used in measurements, Electronic Instruments and its classification, Elements of a Generalized Measurement System. Characteristics of instruments, Static characteristics, Errors in measurements, scale, range, and scale span, calibration, Reproducibility and drift, Noise, Accuracy and precision, Significant figures, Linearity, Hysteresis, Threshold, Dead time, Dead zone, Resolution and Loading Effects.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

MODULE – II

Analogue Instruments: Classification and Principles of Operation, Working Details Moving Coil (PMMC) Instruments Construction, DC Ammeter, DC Voltmeter, Series and Shunt type Ohmmeter. Analogue Electronic voltmeter, DC Voltmeter with chopper type DC amplifier, Q-meter.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

MODULE – III

Introduction of DC and AC Bridges: Wheatstone Bridge, Kelvin Double Bridge, Maxwell's Bridge, and Hay's Bridge. Sources of errors in Bridges and their elimination by shielding and grounding.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

MODULE – IV

Digital Instruments: Advantages of digital over analogue processing. Techniques of converting Digital to Analogue (D/A) and Analogue to Digital (A/D). Digital frequency Meter, Digital Voltmeter.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
3. "Electronic Instrumentation", By H. S. Kalsi.

MODULE – V

Oscilloscopes: Basic Subsystems of general purpose CRO, Focusing and deflection in CRO, Dual trace CRO, Storage type Oscilloscope, Application of CRO.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
3. "Electronic Instrumentation", By H. S. Kalsi.

MODULE – VI

Transducers: Definition, Classification, Principle of Analogue transducer: Resistive (Strain Gauge, POT, Thermistor and RTD), Capacitive, Piezoelectric, Thermocouple and Inductive (LVDT) and RVDT) transducer, Working principle of Digital Transducer and Optical transducer. Application of above transducers to be discussed on the basis of Pressure, Displacement, Level, Flow and Temperature measurements.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
3. "Electronic Instrumentation", by H. S. Kalsi.
4. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
5. "Sensors and Transducers", 2/E by D. Patranabis

MODULE – VII

Amplifiers in Instrumentation: Direct Current amplifier, Differential amplifier and Instrumentation amplifier.

Analysers: Wave analyser and Spectrum analyser.

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

FOURTH SEMESTER

EC 4101	DIGITAL ELECTRONICS	1.0
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MODULE – I

Simplification of Boolean Expressions: Karnaugh map, Quine McCluskey method.

(5)

Text Book:

1. "Digital Logic and Computer Design", M. Mano. PHI

MODULE –II

Design of Combinational Circuits: Adders, Subtracters, Multiplexers, Demultiplexers, Encoders, Decoders, Parity Generators and Checkers, Signed number system, BCD adder/subtractor. Hazards, Dynamic and static

(6)

Text Book:

1. "Digital Logic and Computer Design", M. Mano. PHI

MODULE – III

Introduction to various logic families: TTL gates, CMOS gates, Static CMOS Design, Dynamic hazards, Ratioed Logic, Pass-transistor logic, Transmission gate logic, Dynamic CMOS design, Cascading dynamic gates, Domino Logic, Differential CMOS design.

(10)

Text Books:

1. "Digital Integrated Circuit" - A Design Perspective, Rabaey, Chandrakasan, & Nikolic, Pearson Education.
2. "Digital Integrated Circuit Design", Ken Martin, Oxford University Press.

MODULE – IV

Sequential circuits: Basic Concepts, Flip-Flops, Analysis of RS, JK, Master Slaves, T and D Flip-Flops, Controlled Registers, Shift Registers and their applications, Synchronous and Asynchronous counters, Controlled counters, Up/Down counters, Ring counter, Design of an 8x4 ROM, Design of sequential circuits from state diagram, Dynamic Latches & Registers using CMOS and C²MOS .

(12)

Text Books:

1. "Digital Computer Electronics", Malvino, TMH
2. "Digital Integrated Circuits" - A Design Perspective, Rabaey, Chandrakasan, & Nikolic, Pearson Education.

MODULE – V

Multivibrators: Types of multivibrators, Self-bias Bistable multivibrators, Schmitt Trigger, Commutating Capacitors, AMV and MMV using 555 timer and CMOS/TTL circuits, Negative resistance characteristics of Multivibrators.

(4)

Text Book:

1. "Modern Digital Electronics", R. P. Jain, TMH

MODULE – VI

Introduction to programmable Logic Devices: PLA, PAL, Up/Down counter using PAL, Generic array logic, EPLD, FPGA, Xilinx FPGA, Actel FPGA.

(4)

Text Book:

1. "Digital Logic Application and Design", J. M. Yarborough, Thomson.

MODULE – VII

Memories:

Read Only Memories, PROMs, EROMs, EEPROMs, RAMs: Static RAM, Dynamic RAM, Magnetic memories, CD-ROM, Flash memories

(4)

Text Book:

1. "Digital Computer Electronics", Malvino, TMH

Reference Books:

1. "Fundamentals of Digital Logic with Verilog Design", S Brown and Z Vranesic.
2. "Digital Fundamentals", B. Basavaraj, Vikas Publishing House Pvt. Ltd.

MODULE – I

RC Filters: RC loss pass and high pass filters and their response to sinusoidal, step, pulse, square wave and ramp inputs.

(5)

Text Book:

1. "Pulse Digital and Switching Waveforms", Millman & Taub, TMH

MODULE – II

Transistors at high frequencies: Hybrid π model, Amplifier response at high frequencies, Gain- Bandwidth product, FET at high frequencies.

(5)

Text Book:

1. "Integrated Electronics", Millman & Halkias, McGraw Hill

MODULE – III

Low frequency response of RC coupled stage and Multistage amplifiers, Single tuned amplifier, Cascode (CE-CB pair) amplifier.

(6)

Text Book:

1. "Integrated Electronics". Millman & Halkias, McGraw Hill

MODULE – IV

Feedback amplifiers: Classification of amplifiers, Voltage series, Voltage shunt, Current series, Current shunt feedback.

(12)

Text Book:

1. 'Integrated Electronics'. Millman & Halkias, McGraw Hill

MODULE – V

OP-Amp based Oscillators: Barkhausen criterion, Phase shift and Wein bridge oscillators, Hartley and Colpitt's oscillators, Crystal oscillators, Frequency stability.

(5)

Text Books:

1. "Integrated Electronics". Millman & Halkias, McGraw Hill
2. "Basic Electronics" by Rakshit and Chattopadhyay

MODULE – VI

Voltage and current time base generators: Exponential sweep, UJT as a negative resistances switch in sawtooth generators, Miller and Bootstrap time base generators, A simple current sweep, Linearity correction through adjustment of driving waveforms, A transistor current time-base generator.

(6)

Text Book:

1. "Pulse Digital and Switching Waveforms", Millman & Taub, TMH.

MODULE – VII

A/D and D/A Converters: D/A converters – Binary Weighted D/A Converter, Ladder type D/A converters, Specifications for D/A Converters, A/D Converters – Simultaneous A/D converter, Counter type A/D converter, Successive approximation type A/D converter, Dual slope converter, Comparison of converter types.

Text Book:

1. "Digital Integrated Electronics". Taub & Schilling, TMH

Reference Books:

1. "Electronics Circuits: Discrete and Integrated", D. Schilling and C. Belove, McGraw ill.
2. "Modern Digital Electroncis", R. P. Jain, TMH
3. "Digital Principles & Application", Malvino & Leach, TMH.

MODULE – I

Carrier Concentrations: The Fermi level, Electron and Hole concentration at equilibrium, Direct and Indirect recombination of electrons and holes, Hall effect, Steady-state carrier generation, Quasi-Fermi levels.

(7)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, Jhon Wiley Eastern.
3. "Physics of Semiconductor Devices" – S. M. Sze.

MODULE – II

Transport Phenomena: Drift and Diffusion of Carriers, Recombination, Continuity and Diffusion equations, Hynes-Shockley experiment.

(5)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, Jhon Wiley Eastern
3. "Physics of Semiconductor Devices" – S. M. Sze

MODULE – III

P-N Junctions: The Contact Potential, Space Charge at a junction, Steady state condition, Current at a junction, Carrier injection, Junction breakdown, Time variation of stored charge, P-N junction capacitance, Graded junction.

(6)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, John Wiley Eastern

MODULE – IV

Junction Diodes: Varactor Diode, Concept of negative resistance Devices, Tunnel Diode, Current and Voltage in an illuminated junction, Photo Diode, Photo detector, Solar Cells, Light Emitting Diode, Metal Semiconductor Junction. Principle of PIN photo detector and Avalanche photodiode, Noise in photo detectors, Detector response time, Photodiode materials

(8)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Optical Fibre Communications" – G. Keiser, 3/e, McGraw Hill.

MODULE – V

Bipolar Junction Transistor (BJT): Charge transport and current in a BJT, Current transfer ratio, Terminal currents, Generalised biasing, Charge control analysis, BJT switching, Turn-on and Turn-off transients, Base narrowing, Frequency limitations of a transistor.

(5)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Physics of Semiconductor Devices" – S. M. Sze.

MODULE – VI

FET, MOSFET: Principle of Operation and I-V Characteristics of FET, MESFET, MOSFET, MOS Capacitor, Threshold voltage in MOSFET.

(6)

Text Book:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI

MODULE – VII

CCD & Fabrication: The basic CCD, Improved CCD p-n junction fabrication.

(3)

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Integrated Electronics" – Millman & Halkies, Tata McGraw.

MODULE – I

Signal Analysis: Time domain and Frequency domain representation of a signal. Fourier series, Complex Fourier spectrum (Discrete spectrum or line spectrum), Fourier Transform, Properties of Fourier Transform.

Text Books:

1. "Communication Systems", 2/e, S. Haykin, (Chapter – 1 & Chapter – 2).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – II

Representations of Signals and Systems: Energy and power spectral density spectrum, Distortion less transmission, Causality and Physical realizability, pre-envelope and canonical representation of band pass signals.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 2).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – III

Amplitude Modulation Systems: Basics of Amplitude modulation, Square law modulator, Switching modulator, Square law demodulator, Envelope Detector, Double side band suppressed carrier modulation. Balanced and Ring Modulators, Coherent modulator, Quadrature Amplitude Modulation.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 3).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – IV

Amplitude Modulation Systems (Continued): Single side band modulation, Frequency Discrimination and Phase Discrimination modulators, Coherent detection of SSB, Introduction to Frequency Division Multiplexing and Time Division Multiplexing, Superhetrodyne AM receiver and its characteristics.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 3 & 7).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – V

Angle Modulation Systems: Basics of Frequency and phase modulation, Single tone frequency modulation, NBFM, WBFM, Transmission bandwidth of FM wave, Indirect and direct methods of FM generation, Frequency Discriminator, Phase Locked Loop demodulator, Superheterodyne F.M. receiver.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 4).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – VI

Pulse Modulation Systems: Introduction to PAM and other forms of analogue Pulse Modulation.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 7).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – VII

Noise in Communication Systems: Noise, Shot noise, Thermal noise, White noise, Noise Equivalent Bandwidth, Signal to Noise Ratio for coherent detection of DSBSC, SNR for coherent reception with SSB modulation, SNR for AM receiver using envelope detection, Noise in FM reception, FM threshold effect, Pre Emphasis & de-emphasis in FM.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 6).
2. "Communication Systems", B. P. Lathi, 1968

A – NUMERICAL COMPUTING**MODULE – I**

High Speed Computation: Introduction, Computer Arithmetic, Errors, Machine Computation.

Transcendental and Polynomial Equations: Introduction, Bisection Method, Iterative Methods, Rate of Convergence, Methods for Complex Roots, Polynomial Equations.

MODULE – II

System of Linear Algebraic Equations and Eigenvalue Problems: Introduction, Direct Methods, Error analysis, Iteration Methods, Eigenvalues and Eigen Vectors.

Interpolation and Approximation: Introduction to Lagrange and Newton Interpolations, Finite difference operators, Interpolating polynomial using finite differences, Hermite interpolations, Piecewise and spline interpolation.

MODULE – III

Differentiation and Integration: Introduction, Numerical differentiation, Numerical integration, Methods based on interpolation.

Ordinary Differential Equations: Introduction, Euler methods, Single and Multistep methods, Predictor-corrector methods.

B – STATISTICAL COMPUTING**MODULE – IV**

Empirical and Probability Distributions: Basic Concepts, The Mean Variance, and Standard Deviation, Continuous-Type Data, Exploratory Data Analysis, Graphical Comparisons of Data Sets, Probability Density and Mass Functions.

Probability: Properties of Probability, Methods of Enumeration, Conditional Probability, Independent Events, Bayes Theorem.

MODULE – V

Discrete, Continuous & Multivariable Distributions: Random Variables of the Discrete Type, Mathematical Expectation, Bernoulli Trials and the Binomial Distribution, The Moment-Generating Function, The Poisson Distribution, Random Variables of the Continuous Type, The Uniform and Exponential Distributions, The Gamma and Chi-Square Distributions, The Normal Distribution, Distributions of Functions of a Random Variable, Distributions of Two Random Variables.

MODULE – VI

Sampling Distribution Theory: Independent Random Variables, Distributions of Sums of Independent Random Variables, Random Functions Associated with Normal Distributions, The Central Limit Theorem, Approximations for Discrete Distributions, The t and F Distributions.

MODULE – VII

Estimation & Tests of Statistical Hypotheses: Point Estimation, Confidence Intervals for Means, Confidence Intervals for Difference of Two Means, Sample Size, Tests About Proportions, Tests of the Equality of Two Normal Distributions, Chi-Square Goodness of Fit Tests, Contingency Tables, Tests of the Equality of Several Means.

Text Books:

1. Jain, M.K., et al: Numerical Methods for Scientific and Engineering Computation, 3rd Ed. New Age Publication, New Delhi, 1999
2. Hogg, R.V. & Tanis E. A.: Probability and Statistical Inference, 6th Edn., Pearson Education, New Delhi, 2004.

Reference Books:

1. Sastry, S.S. – Introductory Methods of Numerical Analysis, 4th Edn., PHI, New Delhi, 2005
2. Hines, W.W. et al – Probability and Statistics in Engineering, 4th edn., John Wiley, Singapore (Indian Reprint), 2003
3. Veerarajan, T. – Probability, Statistics and Random Processes, 2nd Edn., TMH, New Delhi, 2003

MODULE – I

Network Theorem: Substitution theorem, Tellegen's theorem, Reciprocity theorem

(3)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – II

Network Topology: Definition and properties, Matrices of Graph, Network Equations & Solutions: Node and Mesh transformation, Generalized element, Source transformation, Formulation of network equations, Network with controlled sources, Transform networks, Properties of network matrices, Solution of equations. Linear time-invariant networks, Evaluation of initial conditions, Frequency and impedance scaling.

(10)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – III

Multi-terminal Networks: Natural frequency, Network functions, Two-port parameters, Equivalent networks.

(6)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – IV

Elements of Network Synthesis: Positive real function, Reactance functions, RC functions, RL Network, Two-port functions, Minimum phase networks.

(7)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – V

Approximation: Filter specifications, Butterworth approximation, Chebyshev approximation, Comparison between Butterworth and chebyshev transfer functions.

(6)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – VI

Bandpass filter approximation, Frequency transformation, Insertion Loss Synthesis: Co-efficient matching technique, Darlington's method.

(6)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

MODULE – VII

Active networks and filters: Active elements, Single amplifier filters, State variable realization, All pass and notch filter, Higher order filter.

(7)

Text Book:

1. "Network Theory & Filter Design", V.K. Aatre

Reference Books:

1. "Introduction to Modern Network Synthesis" ,M.E. Van Valkenberg,
2. "Electric Network Theory" Balabanian, N. and T.A. Bickart, "Electric Network Theory", John Wiley & Sons, New York, 1969.
3. Network Analysis and Synthesis, "C. L. Wadhwa,"

FIFTH SEMESTER

EC 5101

MICROPROCESSOR AND INTERFACING

1.0

MODULE- I

Revision of logic circuits with emphasis on control lines, SAP concepts with stress on timing diagrams, Microinstructions, Microprogramming, Variable machine cycle, Architecture of 8085 Processor, Functions of all signals, Bus concepts, Multiplexed and De-multiplexed Bus, Minimum system.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

MODULE- II

Instruction set, Addressing modes, Stack operation, Timing diagrams, Programming examples like Time delay, Looping, Sorting, Code conversions like BCD to Binary, Binary to BCD, HEX to ASCII, ASCII to HEX, BCD Arithmetic etc.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

MODULE- III

8085 based Microcomputer system, Memory Organization, Memory Interfacing, Memory Mapped I/O, I/O Mapped I/O, Interrupts, Hardware and Software Interrupts, Interrupt instructions, Programmed I/O, Interrupt driven I/O, DMA.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

MODULE- IV

Architecture of 8255 I/O peripheral chip, Modes of operation, Hand shake mode operation, BSR mode, ADC 0801 and ADC 0808 Interfacing with microprocessor, Analogue multiplexed ADC, DAC 0808 specifications, DAC Interfacing, Programming examples for Generation of square wave, positive and negatives ramps, triangular and sine waves, Sample and Hold circuit, LF 398 and its applications in Data Acquisition.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085". by R. S. Gaonkar.
3. "Microprocessor and Interfacing, Programming of Hardware" by Douglas Hall.
4. "Microprocessor and Peripherals" by S. P. Chowdhury and Sunetra Chowdhury.

MODULE- V

8253 timer, Modes of operation, Applications, 8279 Keyboard/Display Interface, Different modes of operation, Interfacing, Programming examples, 8237 DMA Controller.

Text Books:

1. "Microprocessor and Interfacing, Programming of Hardware" by Douglas Hall.
2. "Microprocessor and Peripherals" by S. P. Chowdhury and Sunetra Chowdhury.
3. "The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing", 3/e. by Bhupendra Singh Chhabra.

MODULE- VI

Evolution of Microprocessors, Introduction (Architecture and Instruction set only) of 8086 and 8088, Evolutionary steps and Additional features of 80186, 80286, 80386, 80486 and Pentium Processors, Concept of CISC and RISC processors.

Text Books:

1. "Microprocessor, Microcomputer and their Applications", 2/e. by A, K. Mukhopadhyay.
2. "Advanced Microprocessor" by Y. Rajasree.
3. "The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing", 3/e. by Bhupendra Singh Chhabra.

MODULE- VII

Introduction to Microcontrollers, 8051 Microcontroller, Memory Organization, Programming techniques, Addressing modes, Instruction set, Interrupt structure, Port structure, Different modes of operation, Programming examples.

Text Books:

1. "Advanced Microprocessors and Microcontrollers" by S. K. Venkata Ram.
2. "Microprocessor, Microcomputer and their Applications", 2/e. by A, K. Mukhopadhyay.
3. "Advanced Microprocessors" by Y. Rajasree.
4. "Microprocessor and Peripherals" by S. P. Chowdhury and Sunetra Chowdhury.

MODULE- I

Time varying fields and Maxwell's Equations: Lorentz conditions, Faraday's Law, Maxwell's Equation, Retarded Potentials, Vector Potential function.

Text Books:

1. "Field and Wave Electromagnetics", D. K. Cheng, 2/e, Addison Wesley, 1999
2. "Engineering Electromagnetics", William H. Hayt Jr. and John A. Buck, 7/e, Tata McGraw-Hill.

MODULE- II

Electromagnetic Boundary Conditions, Wave equations and their solutions, Time harmonic fields, Source free fields in simple media, Loss tangent.

Text Books:

1. "Field and Wave Electromagnetics", D. K. Cheng, 2/e, Addison Wesley, 1999
2. "Engineering Electromagnetics", William H. Hayt Jr. and John A. Buck, 7/e, Tata McGraw-Hill.

MODULE- III

Plane Electromagnetic Waves: Plane Waves in Lossless and lossy media, Skin depth, Group and phase velocities, Poynting vector and Power considerations.

Text Books:

1. "Electromagnetic Waves and Radiating Systems", 2/e, E. C. Jordan and K. G. Balmain, PHI.
2. "Field and Wave Electro magnetics", D. K. Cheng, 2/e, Addison Wesley, 1999

MODULE- IV

Polarization of Electromagnetic waves, Normal and Oblique incidences of Electromagnetic waves at plane perfect conducting and dielectric boundaries, Brewster's Angle.

Text Book:

1. "Electromagnetic Waves and Radiating Systems", 2/e, E. C. Jordan and K. G. Balmain, PHI.

MODULE- V

Theory and Applications of Transmission Lines (Part- 1): Transverse electromagnetic wave along a parallel plate transmission line, lossy parallel plate transmission lines, Microstrip Line, General transmission-line equations, Wave characteristics on an infinite transmission line, Transmission line parameters, Attenuation constant from power relations.

Text Book:

1. "Field and Wave Electromagnetics", D. K. Cheng, 2/e, Addison Wesley, 1999.

MODULE- VI

Theory and Applications of Transmission Lines (Part- 2): Wave characteristics on finite transmission lines, Transmission lines as circuit elements, Transmission lines with resistive termination and arbitrary termination, Transmission line circuits, The Smith chart, Transmission line impedance matching by quarter wave transformer, Single stub and Double stub matching.

Text Book:

1. "Field and Wave Electromagnetics", D. K. Cheng, 2/e, Addison Wesley, 1999.

MODULE- VII

Waveguides and Cavity Resonators: Transverse Electric and Transverse Magnetic wave propagation in Rectangular and Circular Waveguides, Rectangular Cavity Resonator, Circular Cavity Resonator, Quality factor of the rectangular Cavity Resonator.

Text Book:

1. "Field and Wave Electromagnetics", D. K. Cheng, 2/e, Addison Wesley, 1999.

MODULE- I

Random Signal Theory: Probability, Mutually Exclusive events, Joint Probability, Statistical independence, Random variables, Cumulative Distribution function, Probability Density function, Mean and variance of random variables, Error function, Rayleigh Probability Density, Gaussian Probability Density.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND

MODULE- II

Random Process: Stationary and Ergodic Process, Autocorrelation, Power Spectral Density of digital data.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND

MODULE- III

Sampling theory and Pulse Modulation Systems

Sampling Theorem, Quantization of Signals, Quantization Error, Companding, PCM, PCM system, DPCM, DM, ADM.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

MODULE- IV

Base band Data Transmission: Base band Signal receiver, Probability of error, Optimum filter, Matched filter, Coherent reception.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.

MODULE- V

Digital Modulation Techniques:

BPSK, DPSK, QPSK, M-ary PSK, BFSK, M-ary FSK, MSK.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

MODULE- VI

Element of Information Theory: Entropy, Information rate, Shannon's theorem, Channel capacity, Capacity of Gaussian Channel, Bandwidth-S/N Trade off.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.

MODULE- VII

Spread Spectrum Modulation: Introduction, Direct sequence spread spectrum, PN Sequence, CDMA, Frequency hop Spread spectrum, Time hop-spread spectrum.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

SIXTH SEMESTER

EC 6101

INDUSTRIAL ELECTRONICS

1.0

MODULE- I

Introduction: Silicon Controlled Rectifier (SCR), SCR construction, Two transistor analogy, Characteristics, Gate characteristics, Different types of SCR. Construction and characteristics of DIAC and TRIAC.

Text Book:

1. Power Electronics by P.C. Sen., Tata McGraw Hill

MODULE- II

Triggering Schemes: dv/dt , Thermal, Light and Gate Triggering, Gate triggering using R and RC firing circuits. Firing circuit using UJT and 555 Timer, SCR protection.

Text Book:

1. Power Electronics by P.C. Sen., Tata McGraw Hill

MODULE- III

Controlled Rectifiers: Analysis of single phase Half Wave and Full Wave controlled rectifiers with resistive load and RL load, Flywheel diode, Circuit operation of Half controlled and fully controlled Bridge Rectifiers with Resistive and RL load. Three phase controlled Rectifiers; Circuit operation of three phase Half Wave and Full Wave controlled Rectifier circuits. DC and AC Voltage Regulators, SMPS.

Text Books:

1. Power Electronics by P.C. Sen., Tata McGraw Hill
2. Power Electronics Circuits, Devices and Application, by Muhammad H. Rashid

MODULE- IV

Commutation: Natural and Forced Commutation, Self Commutation, Impulse Commutation, Resonant Pulse Commutation, Complementary Commutation, Load Side Commutation, Line Side Commutation.

Text Books:

1. Power Electronics Circuits, Devices and Application, by Muhammad H. Rashid

MODULE- V

Inverters: Principle and operation, Inverter classification, Voltage and Current driven Inverters, Single phase Inverters, Inverter circuits with Mc-Murray Commutation and Mc-Murray Bedford Commutation.

Text Book:

1. Power Electronics by P.C. Sen., Tata McGraw Hill

MODULE- VI

Choppers: Basic Chopper Circuit, Types of Choppers, Step up and step down choppers, Type A Chopper, Type B Chopper, Type C Chopper.

Text Book:

1. Power Electronics by P.C. Sen., Tata McGraw Hill

MODULE- VII

DC and AC Motor Control: DC Motor, One Quadrant and Two Quadrant Single Phase SCR Drive for DC Motor, AC Motor, Speed Control Methods for Induction Motor, Cycloconverters. Non Motor Industrial Applications; Resistance Welding, Induction Heating, Dielectric Heating.

Text Books:

1. Power Electronics by P.C. Sen., Tata McGraw Hill
2. Power Electronics Circuits, Devices and Application, by Muhammad H. Rashid

MODULE- I

Local Area Networks: Background, Topologies and Transmission Media, LAN standards IEEE 802 reference Model, Logical Link Control, Medium Access Control, IEEE 802.3 Medium Access Control, Ethernet, Fast Ethernet, Gigabit Ethernet, Token Ring and FDDI, Medium Access Control, IEEE 802.5 Transmission Medium Options. Fibre Channel Elements, Fibre Channel Protocol Architecture, Fibre Channel Physical Media and Topologies.

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- II

Connecting devices and Backbone Networks: Bridges, Functions of a Bridge, Bridge Protocol Architecture, Fixed routing, Spanning tree approach, Connecting devices like Repeaters, Hubs, Bridges, Two-layer switches, Routers and Three layer switches, Backbone Networks, Bus Backbone, Star Backbone, Connecting remote LANs, Wireless LANs, Applications, Architecture, IEEE 802.11, Architecture and Services, Medium Access Control, Physical layer.

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- III

Internetworking: Principles of Internetworking, Requirements, Architectural approaches, Connectionless Internetworking, Addressing, Routing techniques, Static versus Dynamic Routing, Internet Protocol (IP), Internet Control Message Protocol (ICMP), IPv₆ Structure, Header, Address and Header Formats, ICMPV₆.

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- IV

Internet work Operations: Unicast and Multicast routing, Autonomous Systems, Unicast routing protocol OSPF, Internet Group Management Protocol (IGMP), Border Gateway Protocol, Multicast Trees, Integrated Service Architecture, ISA Approach, Components, Services, Queuing Discipline, Resource Reservation Protocol (RSVP), Differentiated Services (DS).

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- V

Transport Protocols: Connection Oriented Transport Protocol Mechanisms, Reliable Sequencing networks services, Unreliable network services, TCP Services, TCP Header Format,

TCP Mechanisms, TCP Implementation policy options, TCP Congestion Control, Retransmission Timer Management, Window Management, Quality of Service, User Datagram Protocol (UDP).

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- VI

Network Security: Passive and Active Attacks, Symmetric Encryption, Encryption Algorithms, Key Distribution, Traffic Padding, Message Authentication, Hash function, Secure Hash function, Public-key Encryption, Digital Signature, RSA Public Key Encryption algorithm, Key Management, Secure Socket layer and Transport layer Security, SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol, IP level security IPSEC, Application layer security PGP, Firewall, Virtual Private Networks.

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- VII

Distributed Applications: Electronic Mail, Simple Mail Transfer Protocol (SMTP), Multipurpose Internal Mail Extension (MIME), Client Server Model, Socket Interface, Socket Programming, File Transfer, Simple Network Management Protocol (SNMP) SNMP V₂ and SNMP V₃, Hypertext Transfer Protocol (HTTP) Overview Message Entities, World Wide Web (WWW), HTML, Common Gateway Interface (CGI).

Text Books:

1. "Data and Computer Communication", 7/e. by William Stallings.
2. "Data Communication and Networking", 3/e. by Behrouz A. Forouzan.

MODULE- I

Introduction: Generations of optical communication, Advantages. Elements of an optical fiber transmission link.

(2)

Text Book:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.

MODULE- II

Optical Fiber: Classification of Fibers, Fiber materials and fabrication methods, Ray optics representation & Wave optics representation for step Index and Graded Index fibers, Modes, Phase & Group velocity, Goos-Hanchen Shift, Power flow in Step Index Fibers.

(10)

Text Book:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.

MODULE- III

Attenuation and Dispersion in optical fiber: Signal attenuation and distortion in optical fibers, Dispersion effects in optical fibers.

(5)

Text Book:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.

MODULE- IV

Optical Sources: Structure and materials of LED and LD sources operating characteristics and modulation capabilities of the LED and LD sources.

(9)

Source to Fiber Power launching and coupling, Lensing schemes for coupling improvement, Fiber to fiber couplings and alignment methods, Splicing techniques, Fiber Connectors.

(3)

Text Book:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.

MODULE- V

Optical Receiver: Optical receiver configuration and performance, Pre-amplifier design for optical receiver, analog and Digital receiver.

(3)

Point to point transmission links, Wavelength division multiplexing, Optical data buses, Link power and rise time budget, Optical Amplifier.

(5)

Text Books:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.

MODULE- VI

Optical Networking: Fiber optics in LAN, MAN, SAN, WAN, FDDI architecture, SONET/ SDH architecture, SONET/ SDH network elements

(5)

Text Book:

1. "Optical Networking and WDM", Walter Goralski, Tata McGraw-Hill.

MODULE- VII

Potential applications and future prospects of optical fibers, multimode intensity sensors and single mode, Interferometric sensors.

(3)

Text Book:

1. "Fundamentals of Fiber optics in telecommunication and sensor systems", B.P.Pal, New Age International (P) Ltd. Publishers, 2001

Text Books:

1. G. Keiser, "Optical Fiber Communication", McGraw Hill, 3rd Ed.
2. J. M. Senior, "Optical Fiber Communications", PHI, 2nd Ed.
3. Ghatak & Thyagarajan, "Introduction to fiber Optics", Cambridge University press.
4. J.H.Franz & V.K.Jain, "Optical Communications", Narosa Publishing House.
5. Harold Kolimberis, "Fibre Optics Communication", Pearson Education.

MODULE- I

Circuits and System Representation: Behavioural, structural and physical representation, Example of a triangular waveform generator and its behavioural, Structural and physical description.

(6)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 1 (1.6-1.7)

MODULE- II

Basic CMOS Technology: Basic n-well CMOS Process, P-well process, Twin-tub process, Silicon on insulator, CMOS process enhancements, Metal interconnect, Polysilicon/ refractory metal interconnect, Local interconnect, Circuit elements like resistors, Capacitors, EAROM, Bipolar transistors and thin film transistor.

(7)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 3 (3.2-3.3)

MODULE-III

Layout Design Rules: Layer representations, CMOS n-well rules, Design rule background, Layer assignment, Latch-up problem, Latch-up triggering, Internal latch-up prevention techniques, Resistance estimation, and Capacitance estimation.

(6)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 3 (3.4-3.5.4); Chapter 4 (4.2-4.3.2)

MODULE- IV

Basic Physical Design of Simple Logic Gates: Invertor, NAND and NOR gates, Complex logic gates layout, CMOS standard cell design, Gate array layout, Sea-of-gates layout, General CMOS logic gate layout guidelines, Layout optimisation for performance, Transmission gate layout consideration, 2-input multiplexers, I/O structures, V_{DD} and V_{SS} pads, Output & input pads, Tri-state and bi-directional pads, Miscellaneous pads.

(7)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 5 (5.3.1-5.3.10; 5.6.1-5.6.7)

MODULE- V

CMOS Analogue Design Method: Op amp design, OP amp as a comparator, Sample and hold, Analogue layout considerations, Transistor layouts, Centroid design, Capacitor matching, Resistor layout, Noise consideration.

(6)

Text Book:

1. "Analogue Integrated Circuits Design", Johns D and Martin K, John Wiley & Sons, 1997. Chapters 2.4; 5.1; 7.1-7.2; 8.1-8.2

MODULE- VI

CMOS Digital Design Methods: Structured design strategies, Hierarchy, Regularity, Modularity, Locality, Design options like PL, Re-programmable gate arrays, Standard Cell design, Behavioural synthesis, RTL synthesis, Logic optimisation, Structural to layout synthesis, Placement, Routing

(7)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 6 (6.2; 6.3.1; 6.3.4; 6.3.6; 6.4)

MODULE- VII

CMOS Subsystem Design: Single bit address, Bit parallel adder, Transmission gate adder, Asynchronous counter, Synchronous counter, RAM, Finite state machines, Multilevel logic.

(6)

Text Book:

1. "Principle of CMOS VLSI Design A System Perspective", Weste Neil H E & Eshraghian K, Pearson Education, 1993 Chapter 8 (8.2.1; 8.2.5; 8.3; 8.4.1)

MODULE- I

Introduction: What is an Operating System? Simple Monitor, Performance, Multiprogramming, time-sharing, Real Time systems, Protection.

(5)

File Systems: File Concept and support, Access and allocation methods, directory systems, File protection.

(3)

MODULE- II

CPU Scheduling: Scheduling concepts and algorithms, Algorithms evaluation, and Multiple processor scheduling.

(6)

MODULE- III

Memory Management: Preliminaries, Bare Machine, Resident Monitor, Swapping, Multiple partitions, Paging, Segmentation, Combined systems.

(8)

MODULE- IV

Virtual Memory: Overlays, Demand paging, Performance of demand paging, Page replacement, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, and Thrashing.

(8)

MODULE- V

Disk Scheduling: Physical characterization, Disk Management, Swap-Space Management, RAID structure, FCFS scheduling and Shortest-Seek-Time-First.

(6)

MODULE- VI

Deadlocks: The deadlock problem, Deadlock characterization, Deadlock prevention, Deadlock avoidance; Deadlock detection, Recovery from deadlock, and Combined approach to deadlock handling.

(4)

MODULE- VII

Process Synchronization: Semaphors, OS Synchronization, Atomic Transaction.

Security: The Security Problem, User Authentication, Cryptography.

Text Book:

1. Silver Schatz, A and Galvin, P.B. 'Operating System Concepts', 5th Edn. John Wiley, New Yark, 2000

Reference Books:

1. Deitel H.M., 'An Introduction to Operating System', Addison Wesley, Inc., London, 1995
2. Mandinck S.E., 'Operating System' McGraw Hill., London, 1993

MODULE- I

Introduction: Discrete-Time Signals, Shannon's sampling theorem, Difference equation description, characteristics of digital filters and time domain analysis, properties of discrete time system (linearity, time-variance, convolution), BIBO stability, Z-transformation and their application in solving difference equations, Relationship between Laplace and Z-transforms.

(7)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Marmalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schaffer, PHI, India.

MODULE- II

Frequency domain analysis: Discrete Time Fourier Transform (DTFT) and Discrete Fourier Transform (DFT), Periodic convolution, Direct evaluation of DFT, FFT algorithms- decimation in time and frequency, Relationship between Fourier and Z-transforms

(8)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Marmalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schaffer, PHI, India.

MODULE- III

Digital Filter Structures: Direct form I&II, cascade, parallel and ladder realizations.

(5)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Marmalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schaffer, PHI, India.

MODULE- IV

Filter Function Approximations and Transformations: Review of approximations of ideal analog filter response, Butterworth filter, Chebyshev Type I & II.

(6)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Marmalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schaffer, PHI, India.

MODULE- V

Frequency Transformations: Frequency transformation in analog domain, frequency transformation in digital domain.

(4)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Mamalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schafer, PHI, India.

MODULE- VI

Design of IIR Filter: Design based on analog filter approximations, Impulse invariance method, Matched Z-transformation, Bilinear transformation.

(7)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Mamalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schafer, PHI, India.

MODULE- VII

Design of FIR filters: Symmetric and antisymmetric FIR filters, design of linear phase FIR filters using windows and frequency– sampling methods, design of optimum equiripple linear phase FIR filters, comparison of FIR and IIR filters.

(8)

Text Books:

1. "Digital Signal Processing, Principles, Algorithms and Applications" ,John G. Proakis, Dimitris G. Mamalakis,
2. "Digital Signal Processing", Alan V. Oppenheim Ronald W. Schafer, PHI, India.

Reference Book:

1. "Digital Filter Design", Antonious, Mc-Graw-Hill International Editions.

SEVENTH SEMESTER

EC 7101

TELECOMMUNICATION SWITCHING CIRCUITS & NETWORKS

1.0

MODULE- I

Switching in Telecommunication Systems: Evolution of Telecommunications, General principle of switching, Classification of Switching Systems, Elements of Switching System, Signalling tones, DTMF, Common Control and Direct Control.

Text Book:

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001

MODULE- II

Electronic Space Division Switching: Stored Program Control (SPC), Centralised SPC, Distributed SPC, Enhanced Services, Two-Stage Networks, Three-Stage Networks.

Text Book:

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001 (Ch- 4)

MODULE- III

Time Division Switching: Basic Time Division Space Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-stage Combination Switching.

Text Book

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001. (Ch- 6)

MODULE- IV

Traffic Engineering: Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modelling Switching systems, Blocking Models & Loss Estimates, Delay Systems.

Text Book:

1. "Telecommunication Switching Systems", by T. Viswanathan, PHI, 2001. (Ch- 8)

MODULE- V

ISDN and its Motivation, New Services, Network and Protocol Architecture, Transmission Channels, Internetworking, BISDN.

Text Book:

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001. (Ch- 11)

MODULE- VI

Network Subscriber Loop Systems, Switching Hierarchy & Routing, Transmission Plan, Numbering Plan, National Schemes, International numbering.

Text Books:

1. "Telecommunication Switching Systems & Networks", T. Viswanathan, PHI, 2001. (Ch- 9)
2. "Telecommunications Switching, Traffic and Networks", J. E. Flood, (Ch- 10), Pearson Education Asia, 2004.

MODULE- VII

Introduction to Asynchronous Transfer Mode (ATM), Protocol, Architecture, ATM Logical Connection, ATM Cells, Transmission of ATM Cells, ATM Adaptation Layer, Traffic and congestion control

Text Book:

1. "Data & Computer Communications by William Stallings", 7/e, PHI. (Ch– 11 & 12)

MODULE- I

Radiation and Basic Antennas Concepts: Retarded Potential, Radiation from an oscillating electric dipole, Quarter-wave monopole and half-wave dipole.

Basic antenna parameters, Radiation patterns, Directivity, Gain, Effective length, Effective aperture, Wave polarization, FRISS transmission formula, Source of radiation, Antenna field zones, Antenna Noise temperature, Reciprocity theorem and other theorems and their applications.

Text Book:

1. "Antennas", J. D. Kraus, McGraw Hill, New York.

MODULE- II

Antenna Arrays: Uniform n-element linear array, The principle of pattern multiplication, Linear arrays with binomial and triangular distributions, Design of linear array using Tchebyscheff distribution, Phased array.

Text Book:

1. "Electromagnetic Waves and Radiating Systems", E. C. Jordan & K. G. Balmain, PHI.

MODULE- III

Biconical Antenna: Characteristic impedance and input impedance of infinite and finite Biconical Antennas.

Reflector Antennas: Parabolic Reflector antenna, Spill over loss, Aperture efficiency, Basic characteristics of Cassegrain Reflector Antenna.

Text Book:

1. "Antennas ", J. D. Kraus, McGraw Hill, New York.

MODULE- IV

Slot, Horn and Complementary Antennas: Slot antenna feedings and radiation pattern of slot antennas, Babinet's principle and Complementary antennas. The impedance of Complementary screens and slot antennas, Types of Horn antennas, Radiation from rectangular horn antenna.

Text Book:

1. "Antennas", J. D. Kraus, McGraw Hill, New York.

MODULE- V

Broad-band and Frequency independent Antennas: Broadband antennas, Rumsey's Principle, Frequency-independent planar Log-Spiral antenna, Log-periodic antenna array, Yagi Uda array.

Text Book:

1. 'Antennas", J. D. Kraus, McGraw Hill, New York.

MODULE- VI

Microstrip Antennas: Microstrip antenna analysis using transmission line model and cavity model, Broadband Techniques.

Text Book:

1. "Antenna Theory Analysis and Design", C. A. Balanis, John Wiley & Sons, Inc.

MODULE- VII

Radio Wave Propagation: Surface Wave, Space wave, Tropospheric wave propagation, Ducting, Ionosphere Layers, Ionosphere Wave Propagation, MUF, Skip distance, Fading, Effect of the Earth's magnetic field.

LOS communication, Radio Horizon, Microwave Frequency bands, Microwave link.

Text Books:

1. "Electromagnetic Waves and Radiating Systems", E. C. Jordan & K. G. Balmain, PHI.
2. "Antennas and Radio Wave Propagation", R. E. Collin, McGraw Hill.

MODULE- I

Microwave Vacuum Type Amplifiers and Sources: Klystron Amplifiers, Reflex Klystron Oscillator, Travelling Wave Tube, Backward Wave Oscillator, Magnetron Oscillator.

(10)

Text Books:

1. "Microwave Devices & Circuits" by S. Y. Liao, PHI
2. "Foundations of Microwave Engineering" by R. E. Collin, McGraw Hill, ISE

MODULE- II

Microwave Solid State Devices & Sources: TED, RWH Theory, Gunn effect, Gunn Oscillation modes, READ Diode, IMPATT Diode, TRAPATT and BARITT Diodes.

(6)

Text Books:

1. "Microwave Devices & Circuits" by S. Y. Liao, PHI
2. "Foundations of Microwave Engineering" by R. E. Collin, McGraw Hill, ISE

MODULE- III

Microwave Components: Scattering Matrix Representation, Variable and precision Rotary Attenuators, Linear and Rotary Phase Shifters, E-plane, H-Plane and Magic Tees, Two-hole and Bethe hole Directional Couplers, Slotted Section, Crystal Detector.

(6)

Text Books:

1. "Microwave Devices & Circuits" by S. Y. Liao, PHI
2. "Microwave: Introduction to Circuits, Devices and Antennas" by M. L. Sisodia and V. L. Gupta, New Age International.

MODULE- IV

Microwave Ferrite Devices: Faraday rotation in Ferrites, Faraday Rotation Isolator, Faraday Rotation 3-port and 4-port circulators.

(4)

Text Books:

1. "Microwaves" by K. C. Gupta, Wiley Eastern Limited.
2. "Microwaves: Introduction to Circuits, Devices and Antennas" by M. L. Sisodia and V. L. Gupta, New Age International.

MODULE- V

Microwave Integrated Circuits: Introduction to Microwave Integrated Circuits, Strip line, Microstripline, Slotline, CPW, Coupled Microstrip line.

(4)

Text Book:

1. "Microwaves" by K. C. Gupta, Wiley Eastern Limited.

MODULE- VI

Microwave Measurements: Power, Frequency and Impedance measurements, Gain and Radiation pattern measurement of Horn Antenna.

(4)

Text Books:

1. "Microwaves" by K. C. Gupta, Wiley Eastern Limited.
2. "Handbook of Microwave Testing" by T. S. Laverghetta, Artech House.

MODULE- VII

Radar: Radar fundamentals, Radar range equation, CW Radar, Pulse Radar, MTI Radar, SAR.

(6)

Text Books:

1. "Introduction to Radar Systems", M. I. Skolnik, , McGraw Hill.
2. "Radar Systems and Radio Aids to Navigation" by A. K. Sen and A. B. Bhattacharya.

MODULE- I

Wireless Communication Systems & Standards: Evolution of Mobile Radio Communications, Different generations (1G to 4G) of Cellular Networks, GSM, UMTS, GPRS, EDGE, Cellular telephone systems, WLAN, WLL, Bluetooth, PAN.

(5)

Text Books:

1. "Wireless Communications: Principles and Practice" by T. S. Rappaport, Prentice Hall.
2. "Wireless Communication Technology" by Roy Blake, Thomson – Delmar.

MODULE- II

Propagation & Fading: Propagation path loss, Free-space propagation model, Outdoor propagation models (Okumura model & Hata model), Indoor propagation models (Partition Losses in the same floor and between floors), Multipath fading, time dispersive and frequency dispersive channels, delay spread and coherence bandwidth, LCR and ADF.

(8)

Text Books:

1. "Wireless Communication: Principles & Practice" by T.S. Rappaport, Prentice Hall.
2. "Mobile Cellular Telecommunications Systems" by W. C. Y. Lee.

MODULE- III

Diversity & Combining Techniques: Diversity Schemes (Space, frequency, field and polarization diversities) and combining techniques.

(4)

Text Book:

1. "Wireless Communications: Principles and Practice" by T.S. Rappaport, Prentice Hall.

MODULE- IV

Mobile Radio Interferences & System Capacity: Co-channel Interference and System Capacity, Channel planning for Wireless Systems, Adjacent channel interferences, Power control for reducing interference, Near-end-to-far-end interference, Inter-symbol and Simulcast interference, False alarm rate and word error rate.

(6)

Text Books:

1. "Wireless Communication: Principles & Practice" by T. S. Rappaport, Prentice Hall.
2. "Mobile Cellular Telecommunications Systems" by W. C. Y. Lee.

MODULE- V

The Cellular Concept: Frequency Assignment and Channel Assignment, Frequency Reuse, Handoff, Sectoring, Repeaters for range extension, Microcell zone, Spectral efficiency, DS-SS, FH-SS

(6)

Text Books:

1. "Wireless Communication: Principles & Practice" by T. S. Rappaport, Prentice Hall.
2. "Mobile Cellular Telecommunications Systems" by W. C. Y. Lee.

MODULE- VI

Antenna Design Parameters: Antennas used for Mobile Communications, Radiation patterns, Smart antenna (basic concept), Antenna location, Spacing and height in the base station and at the mobile unit.

(4)

Text Books:

1. "Wireless Communication Technology" by Roy Blake, Thomson-Delmar
2. "Mobile Cellular Telecommunications Systems" by W. C. Y. Lee.

MODULE- VII

Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, OFDM, DS-CDMA, FH-CDMA, TH-CDMA, Capacity of Cellular Systems, Capacity of Cellular CDMA, WCDMA.

(7)

Text Books:

1. "Wireless Communication: Principles & Practice" by T. S. Rappaport, Prentice Hall.
2. "Mobile Cellular Telecommunications Systems" by W. C. Y. Lee.

MODULE- I

Introduction to Embedded Systems: Embedded system overview, Design challenge, Common design metrics, Time-to-market design metric, NRE and unit cost design metrics, Performance design metric, Processor technology, General purpose processors– software and hardware, Application specific processors, IC technology, Semi-custom ASIC.

(7)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 1 (1.1-1.4)

MODULE- II

Embedded System Processors: Combinational logic and transistors, RT-level combinational and sequential components, Custom single purpose processor design. RT-level custom single-purpose processor design, Optimisation, Optimisation of FSM, Optimisation of data path.

(7)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 2 (2.1-2.6)

MODULE- III

Embedded System Software: Basic architecture, Data path, Control units memory, Operation, Pipelining, programme and data memory space, Registers, I/O, Interrupt, Design flow and tools, Microcontroller.

(6)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 3 (3.1-3.6)

MODULE- IV

Embedded System Peripherals: Timers, Counters, Watch-dog timers, Example of reaction timer, Watchdog timer, UART, PWM, Controlling a dc motor using a PWM

(6)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 4 (4.1-4.4)

MODULE- V

Memory in Embedded System: Memory write ability and storage performance, Write ability, Storage permanence, Common memory types, Flash memory, SRAM, DRAM, PSRAM, NVRAM, Composing memory, Memory hierarchy and cache, Cache-mapping techniques

(6)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 5 (5.1-5.5)

MODULE- VI

Interfacing: Communication basics, Basic protocol concepts, ISA bus protocol, Microprocessor interfacing, I/O addressing, Interrupts, Example of DMA I/O and ISA Bus protocol, Arbitration, Priority arbiter, Daisy-chain arbiter, Parallel communication, Serial communication, Wireless communication

(7)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 6 (6.1-6.8)

MODULE- VII

Digital Camera Example: Simple digital camera, User's perspective, Designer's perspective, Requirement specification, Design, Microcontroller alone, Microcontroller and CCDPP

(6)

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid Gfrank and Givargis Tony, John Wiley & Sons, 2002. Ch- 7 (7.1-7.4)

ELECTIVE

EC 7109

BIOELECTRONICS INSTRUMENTATION

1.0

MODULE- I

Introduction: Medical instrumentation system, Man instrumentation system, Brief idea of cardiovascular, Nervous & respiratory system.

(6)

Text Books:

1. "Biomedical Instrumentation & Measurements" by Cromwell.
2. "Biomedical instrumentation" by Dr. M. Arumugham
3. "Medical electronics & Biomedical instrumentation" by Rajarao & Guha.

MODULE- II

Resting & action potential, Polarization & depolarization, Propagation & action potential, Bioelectronic potential.

(7)

Text Books:

1. "Biomedical Instrumentation & Measurements" by Cromwell.
2. "Biomedical instrumentation" by Dr. M. Arumugham
3. "Medical electronics & Biomedical instrumentation" by Rajarao & Guha.

MODULE- III

Biopotential electrode, Active & passive transducers, Biochemical transducers.

(6)

Text Books:

1. "Biomedical Instrumentation & Measurements" by Cromwell.
2. "Biomedical instrumentation" by Dr. M. Arumugham
3. "Medical electronics & Biomedical instrumentation" by Rajarao & Guha.

MODULE- IV

ECG electrodes & leads, Measurement of blood pressure, blood flow & heart sounds.

(6)

Text Book:

1. "Biomedical Instrumentation & Measurements" by Cromwell.
2. "Biomedical instrumentation" by Dr. M. Arumugham
3. "Medical electronics & Biomedical instrumentation" by Rajarao & Guha.

MODULE- V

Non- invasive instrumentation, Patient monitoring system, Electrical safety of patients in hospital, Defibrillator, Pace maker.

(6)

Text Books:

1. "Biomedical Instrumentation & Measurements" by Cromwell.
2. "Biomedical instrumentation" by Dr. M. Arumugham

MODULE- VI

Amplifiers & recorders, Diathermy (Microwave) structure & ultrasonic, Imaging system (X-ray, MRI & ultrasonic), Lasers in medicine.

(8)

Text Books:

1. "Handbook for Biomedical instrumentation" by Khandpur.
2. 'Medical instrumentation' by Rajarao.
3. 'Medical instrumentation (application & design)' by Webster.
4. "Medical instrumentation' by Carr & Brown

MODULE- VII

Antennas for biomedical application & Applicator, Biomedical DSP (elementary idea).
Biomedical microelectromechanical system (introductory idea)

(6)

Text Books:

1. Antenna Theory & practice by R. Chatterjee
2. Biomedical digital signal processing by Wills J. Tompkin.

ELECTIVE

BT 8004

INTRODUCTION TO BIOINFORMATICS

1.0

MODULE- I

History of Bioinformatics, Biological information resources and retrieval system, Knowledge Discovery and data mining, data characteristics and presentation.

MODULE- II

Molecular databases (Sequence and structural), database searching (keyword and sequence homology searching using BLAST and FASTA), sequence alignment (pair wise and multiple)

MODULE- III

Computational Methods: Gene identification methods, data mining (Genome databases) and phylogenetic analysis, Predictive methods using nucleic acids and protein sequences.

MODULE- IV

Bioinformatics Software, Molecular structure drawing tool (Chemdraw), VMD/Rasmol/Insight-II, Clustal X1.8; OLIGO, Molecular modelling/ Docking(CAChe)

MODULE- V

Gene identification methods, Genomics and Human genome project, Strategy of genome sequencing.

MODULE- VI

Biological Data bases and their management, Introduction to SQL (Sequence Query Language) Concept on data base in Protein and nucleic acids, Various programmes for sequence comparison and analysis.

MODULE- VII

Genome projects (human, Rice), Molecular modelling and structure function relationship, Proteomics, Molecular Dynamics. Current trends and future prospects of bioinformatics

Text Books:

1. Gibas C, Jambeck P; "Developing Bioinformatics Computer Skills".
2. Baxevanis AD, Ouellette BFF (eds): "Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins"
3. Higgins D, Taylor W (eds): "Bioinformatics: Sequence, Structure and Databanks".

MODULE- I

The concept of Amount of Information, Average Information, Entropy, Information rate, Shannon's Theorem, Channel Capacity, Capacity of a Gaussian Channel, Bandwidth- S/N Trade-off.

Text Books:

1. "Principles of Communication System", 2/e, TMH.
2. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part I, 2002, New Delhi.

MODULE- II

Channel Capacity & Coding: Introduction to Channel Capacity & Coding, Channel Models, Channel Capacity Theorem, Shannon Limit.

Text Books:

1. "Principles of Communication System", 2/e, TMH.
2. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part I, 2002, New Delhi.

MODULE- III

Error Control Coding: Introduction, Forward & Backward error Correction, Hamming Weight and Hamming Distance, Linear Block Codes, Encoding and decoding of Linear Block-codes, Parity Check Matrix, Syndrome Decoding, Hamming Codes.

Text Book:

1. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part I, 2002, New Delhi.

MODULE- IV

Cyclic Codes: Introduction, Method for generating Cyclic Codes, Matrix description of Cyclic codes, Burst error correction, Cyclic redundancy check (CRC) codes, Circuit implementation of cyclic codes.

Text Books:

1. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part II, 2001, New Delhi.
2. "Communication Systems", 4/e, by S. Haykin, Ch- 10, 2004.

MODULE- V

Convolutional Codes: Introduction, Polynomial description of Convolutional Codes, Generating function, Matrix description of Convolutional Codes, Viterbi Decoding of Convolutional codes.

Text Books:

1. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part II, 2001, New Delhi.
2. "Communication Systems", 4/e, Chapter 10, by S. Haykin, John Wiley & Sons, 2004.

MODULE- VI

Coding for Secure Communications: Introduction to Cryptography, Overview of Encryption Techniques, Secret-Key Cryptography, Data Encryption, Standard (DES), Public-Key Cryptography, RSA algorithm, Digital signature, One- way Hashing.

Text Books:

1. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part III, 2001, New Delhi.
2. "Communication Systems", 4/e, by S. Haykin, pp. (742-760).

MODULE- VII

Data Compression Techniques: Lempel-Ziv Algorithm, Introduction to Image Compression, The JPEG standard for lossless and Lossy Image Compression & Decompression.

Text Books:

1. "Information Theory, Coding & Cryptography", TMH, by Ranjan Bose, Part- I, 2001, New Delhi.
2. "Communication Systems's", 4/e, by S. Haykin, 2004, Articles 9.4, 9.14, 9.15.

MODULE- I

MOS Transistor Theory: NMOS enhancement transistor, PMOS enhancement transistor, Threshold voltage, Body effect, MOS device design equations, Channel length modulation, Second order effects and velocity saturation, Subthreshold region.

(7)

Text Book:

1. "Analogue Integrated Circuits Design", Johns. D. and Martin. K, John Wiley & Sons, 1997. Ch- 1

MODULE- II

MOS Analogue Circuit Design: Basic current mirror bipolar and CMOS, Cascode current mirror, Wilson's current mirror, MOS gain stages, Cascode gain stages, MOS differential pair and gain stages, Bipolar gain stages.

(7)

Text Book:

1. "Analogue Integrated Circuits Design", Johns. D. and Martin.K, John Wiley & Sons, 1997. Ch- 3

MODULE- III

CMOS Digital Logic Design: CMOS logic gate design, Typical CMOS NAND & NOR delays, CMOS complementary logic, Bi CMOS logic, Pseudo nMOS logic, Dynamic CMOS logic, C²MOS logic, PTL, Transmission gates, CMOS domino logic, Zipper CMOS, CVSL, SFPL.

(7)

Text Book:

1. "Principles of CMOS VLSI Design– A System Perspective", Weste Nell HE & Eshraghian K, Pearson Education, 1993. Ch- 5 (5.3.1-5.3.2; 5.4.1-5.4.11)

MODULE- IV

Noise in Microelectronics: Statistical characteristics of noise, Noise spectrum, Amplitude distribution, Time and frequency domain analysis, Noise models for circuit elements– resistors diode, BJT, MOS, Op amps.

(6)

Text Book:

1. "Analogue Integrated Circuits Design", Johns. D. and Martin. K, John Wiley & Sons, 1997. Ch- 4

MODULE- V

Crystal Growth and Processing: Electronic grade silicon, Czochralski crystal growing, Silicon shaping, Etching, polishing, Chemical cleaning, Gettering treatment, Thermal stress factors.

(6)

Text Book:

1. "VLSI Technology", Sze S.M., McGraw Hill I.E., 1988. Ch- 1

MODULE- VI

Integrated Circuit Technology: Basic process in IC fabrication, Solid state diffusion, Electrical properties of diffused layers, Photolithography, Epitaxial growth, Ion implantation, Local oxidation, Polysilicon deposition, Metallisation.

(6)

Text Book:

1. "Analogue Integrated Circuits Design", Johns. D. and Martin K, John Wiley & Sons, 1997. Ch- 1

MODULE- VII

Introduction to Different IC Technologies: Monolithic IC, Hybrid IC, Thin film IC, Bipolar and CMOS IC fabrication and active and passive components in IC.

(6)

Text Book:

1. "VLSI Technology", Sze S.M., McGraw Hill I.E., 1988. Ch- 11 (11.1-11.6)

Overview of Artificial Intelligence: Definition & Importance of Artificial Intelligence.

Knowledge: General Concepts: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems, Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition of Knowledge.

LISP and Other AI Programming Languages: Introduction to LISP, Syntax and Numeric Function, Basic List Manipulation Functions in LISP, Functions, Predicates and Conditionals, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, PROLOG and Other AI Programming Languages.

Knowledge Representation: Introduction, Syntax and Semantics for Propositional logic, Syntax and Semantics for FOPL, Properties of Wffs, Conversion to Clausal Form, Inference Rules, The Resolution Principle, No deductive Inference Methods, Representations Using Rules.

Dealing with Inconsistencies and Uncertainties: Introduction, Truth Maintenance Systems, Default Reasoning and the Closed World Assumption, Predicate Completion and Circumscription, Modal and Temporal Logics.

Probabilistic Reasoning: Introduction, Bayesian Probabilistic Inference, Possible World Representations, Dumpster-Shafer Theory, Ad-Hoc Methods.

Structured Knowledge: Graphs, Frames and Related Structures: Introduction, Associative Networks, Frame Structures, Conceptual Dependencies and Scripts.

Object-Oriented Representations: Introduction, Overview of Objects, Classes, Messages and Methods, Simulation Example using an OOS Program

Search and Control Strategies: Introduction, Preliminary Concepts, Examples of Search Problems, Uninformed or Blind Search, Informed Search, Searching And Or Graphs.

Matching Techniques: Introduction, Structures Used in Matching, Measures for Matching, Matching Like Patterns, Partial Matching.

Knowledge Organization and Management: Introduction, Indexing and Retrieval Techniques, Integrating Knowledge in Memory, Memory Organization Systems.

Expert Systems Architectures: Introduction, Rule Based System Architecture, Non-Production System Architecture, Dealing with uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools.

Text Book:

1. Dan W. Patterson., "Introduction to Artificial Intelligence and Expert Systems", PHI, New Delhi, 2001.

Reference Books:

1. E. Rich & K. Knight "Artificial Intelligence". , 2nd Ed. TMH, New Delhi
2. P. H. Winston, "Artificial Intelligence", 3rd Ed. Addison Wesley, New Delhi
3. D. W. Rolston, "Principles of AI & Expert System Development", TMH., New Delhi.

MODULE- I

Random variables, Distribution and density functions, Expectation, Characteristic functions, Conditional probability, Conditional expectation. Sequences of Random Variables, Convergence concepts, Laws of large numbers, Central limit theorem.

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals” – K. Sam Shanmugan & A. M. Breipohi.

(8)

MODULE- II

Random Vectors and Estimation: Random Vectors, Covariance characterization, Jointly Gaussian random variables.

(6)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- III

Representations of Random Processes: Sampling theorem, Karhunen-Leeve expansion, Orthogonal increment processes, White noise integrals, Spectral representation.

(6)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- IV

Concept of stochastic Processes, Classification, ensemble, Time averaging and Ergodicity. Methods of description, Stationarity, Covariance and Correlation coefficient, Auto correction and Cross Correlation functions, Power spectral densities.

(7)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- V

Special Processes: Markov processes and queuing theory, Wiener process, Poisson processes, Gaussian Process. Shot noise, Thermal noise.

(6)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- VI

Linear filtering of Stochastic Processes, AR, MA and ARMA Processes, Detection of known Signals.

(6)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- VII

Mean Square Error Filtering/ Estimation, Optimal Filters, Weiner Filter and Kalman Filter, Spectral Estimation, Estimating a random variable with a constant, stored data wiener filter, Real Time wiener filter.

(6)

Text Books:

1. Probability, Random variables and stochastic processes- A. Papoulis & S.U. Pillai
Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MODULE- I

Introduction to 16-bit processors, Intel 8086 and 8088, Architecture, Bus Interface Unit and Execution Unit, Data and Address Bus Configuration, Memory Segmentation, Memory Address generation, I/O Port addressing, Functions of all signals, Interrupt processing, Hardware and Software interrupts, Internal interrupts, Minimum and Maximum Mode.

Text Books:

1. Microprocessor and Interfacing, Programming & Hardware by Douglas Hall.
2. The INTEL 8086/8088, Microprocessor Architecture, Programming, Design & Interfacing, 3/e. by Bhupendra Singh Chhabra.
3. Advanced Microprocessor and Microcontrollers by S. K. Venkata Ram.
4. iA Px 86, 88, 186 and 188 User's Manual (Intel).

MODULE- II

Addressing Modes, Instruction Set in detail, Assembler directives, Assembly Language Programming Tools, Programming examples, Macros, DOS functions.

Text Books:

1. Microprocessor and Interfacing, Programming & Hardware by Douglas Hall.
2. The INTEL 8086/8088, Microprocessor Architecture, Programming, Design & Interfacing, 3/e. by Bhupendra Singh Chhabra.
3. Advanced Microprocessor and Microcontrollers by S. K. Venkata Ram.
4. iA Px 86, 88, 186 and 188 User's Manual (Intel).

MODULE- III

Peripheral chips like 8255 I/O chip, 8254 Timer, Interfacing of 8086 with Memory, 8255 and 8254. Interfacing with ADC and DAC chips. Industrial Applications, Programming examples.

Text Books:

1. Microprocessor and Interfacing, Programming & Hardware by Douglas Hall.
2. The INTEL 8086/8088, Microprocessor Architecture, Programming, Design & Interfacing, 3/e. by Bhupendra Singh Chhabra.

MODULE- IV

Peripheral chips like 8251 (USART) and 8259 (Priority Interrupt Controller), Interfacing of 825 and 8259 and with 8086, Programming examples, 8087 Numeric Co-processor Architecture, Processor Interface, Instruction set, Protected Mode operation, Segmentation, Virtual memory, Multitasking and Task switching.

Text Books:

1. Microprocessor and Interfacing, Programming & Hardware by Douglas Hall.
2. The INTEL 8086/8088, Microprocessor Architecture, Programming, Design & Interfacing, 3/e. by Bhupendra Singh Chhabra.
3. Advanced Microprocessor and Microcontrollers by S. K. Venkata Ram.
4. iA Px 86, 88, 186 and 188 User's Manual (Intel).

MODULE- V

Architecture of 68000 Motorola Processor, Addressing Modes, Instruction Set in Detail.

Text Books:

1. 68000 Assembly Language Programming by Lance. A. Leventhal
2. Some Real Microprocessors, Osborn Series– Vol. 1 and II.

MODULE- VI

68000 Programming examples, Exception processing, General, Reset, Interrupt, Bus Error and Address Error Exception processing, Short and Long frames, Read, Write, Read-modify, Write and Interrupt Timing diagrams.

Text Books:

1. 68000 Assembly Language Programming by Lance. A. Leventhal
2. Some Real Microprocessors Osborn Series – Vol. 1 and II.

MODULE- VII

Architecture of Peripheral devices like 6820/6821, Parallel Interface Adaptor, and 6850 Asynchronous Communication Serial Interface, Interfacing 68000 with 6820 and 6850, Programming examples.

Text Books:

1. 68000 Assembly Language Programming by Lance. A. Leventhal Some Real Microprocessors Osborn Series – Vol. 1

1. FUZZY LOGIC**Fuzzy Set Theory:**

Basic Definition and Terminology, Set Theoretic Operations, MF Formulation and Parameterization, MF of two dimension, Fuzzy Union, Intersection and Complement.

2. FUZZY RULES AND FUZZY REASONING

Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Fuzzy Reasoning

(a) Fuzzy Inference System:

Introduction, Mamdani Fuzzy Models, Other Variants, Sugeno Fuzzy Models, Takamoto Fuzzy Models

(B) Genetic Algorithms:

Simulated Annealing, Gradient Free Optimization.

(C) Artificial Neural Networks

Introduction, Architecture, Back Propagation and feed Forward Networks, Offline Learning, Online Learning.

Supervised Learning of Neural Networks: Introduction, Perceptrons, Adline, Back Propagation Multilayer Perceptrons, Back Propagation Learning Rules, Methods of Speeding.

Radical Basis Function Networks, Functional Expansional Networks.

Unsupervised Learning: Competitive Learning Networks, Kohonen self-organising networks, Hebbian Learning, The Hopfield Network

3. NEURO-FUZZY MODELLING

Introduction, Adaptive Neuro-Fuzzy Inference Systems (ANFIS), Architecture and Learning Algorithm, Simulation examples: Modelling of a 2 input Sinc function, Online identification of control systems, Introduction to Neuro Fuzzy Control.

Text Book:

1. J.S.R. Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing" PHI, New Delhi.

MODULE- I

Introduction- Brain & Machine, Biological Neurons & its mathematical model, Artificial Neural Networks, Benefits and Applications, Architectures, Learning Process (paradigms & algorithms), Correlation Matrix Memory, Adaptation.

(6)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- II**Supervised Learning- I**

Pattern space and Weight space, Linearly & non Linearly separable classes, Decision Boundary, Hebbian learning & limitation, Perceptron, Perceptron convergence theorem, Logic Functions implementations.

(6)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- III

LMS Algorithm: Wiener-Hopf equations, Steepest Descent Search method, LMS algorithm, Convergence consideration in mean & mean square, Adaline, Learning curve, Learning rate annealing schedules.

(7)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- IV**Supervised Learning- II**

Multilayer Perceptrons, Backpropagation algorithm, XOR Problem, Training modes, Optimum learning, Local minima, Network Pruning techniques

(7)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- V

Unsupervised Learning: Clustering, Hamming Networks, Maxnet, Simple competitive learning, Winner-Take-All Networks, Learning Vector Quantizers, Counterpropagation Networks, Self Organising Maps (Kohonen Networks), Adaptive Resonance Theory.

(6)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- VI

Associative Models: Hopfield Networks (Discrete and continuous), Storage capacity, Energy Function & minimization, Brain-State-in-a-Box Neural Network.

(6)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

MODULE- VII

Applications of ANN & Matlab Simulation: Character Recognition, Control Applications, Data compression, Self organizing semantic Maps.

(7)

Text Books:

1. "Neural Networks: A Comprehensive Foundation" Siman Haykin. (Pearson Education)
2. "Elements of Artificial Neural Networks" Kishan Mehrotra, Chilukuri K. Mohan, Sanjay Ranka. (Penram International Publishing, India)

Reference Book:

1. "Neural Networks: A Classroom Approach" – Satish Kumar, Tata McGraw Hill)

EIGHTH SEMESTER

EC8101

INTELLIGENT INSTRUMENTATION

1.0

MODULE - I

Review of Transducers, Principles of operations and its classification, Characteristics, Technological trends in making transducers, Silicon sensors for the measurement of pressure, Level, Flow and Temperature, Bio-sensors ,types and its Application .

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
3. "Sensors and Transducers", 2/e by D. Patranabis

MODULE - II

Radiation Sensors, X -ray and Nuclear radiation sensors, Fiber optic sensors for Temperature, Liquid level, Fluid- flow measurement, Electro-analytical sensors: Electrochemical cell, Standard Hydrogen Electrode (SHE), Smart sensors.

Text Books:

1. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
2. "Sensors and Transducers", 2/e by D. Patranabis

MODULE - III

Introduction about Instrumentation systems, Types of Instrumentation systems, Data acquisition system and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger.

Text Books:

1. "Process Control Instrumentation Technology" 6/e, by Curtis D Johnson, Pearson Ed.
2. "Electrical and Electronics Measurement and Instrumentation" by A. K. Swahney.
3. "Electronics instrumentation" by H. S. Kalsi [TMH]

MODULE - IV

Introduction about Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system i.e., DAS, DOS, Converter (I to P) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

MODULE - V

Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

MODULE - VI

Introduction to Distributed Digital Control, Functional requirements of process control system, System architecture, Distributed Control systems, Configuration, Some popular Distributed Control Systems, Industrial control applications like cement plant, thermal power plant.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

MODULE - VII

Introduction to Intelligent Controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Instrumentation ", by Kirk and Rimboi.

MODULE - I

Elements Of A Television System: Picture & Sound Transmission, Picture & Sound Reception, Scanning, Persistence of Vision and Flicker, Horizontal and Vertical resolution, Kell factor, CCIR-B standards.

Text Books:

1. "Monochrome and Colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

MODULE - II

Compositive Video Signal: Video signal Dimensions, Horizontal and Vertical Synchronization details, Scanning sequence details of 625 line TV systems. Channel band width, Vestigial Side Band transmission and reception, Channel band width for B & W and colour transmission.

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

MODULE - III

TV Cameras And TV Picture Tube (B/W): Camera tube characteristics, Vidicon, Plumbicon, Silicon diode Array, Solid State Image Scanners.

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake.

MODULE - IV

TV Transmitters & TV Receivers: Transmitter requirements, High level and IF modulated transmitters, Visual and Aural exciters, Diplexers. Block schematic & functional requirements of T.V. receiver, IF response.

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake.

MODULE - V

Colour Signal Transmission And Reception: Colour sync, colour burst signal, Composite colour signal, Colour TV Camera, Colour picture tube, NTSC coder, PAL Coder and decoder, SECAM coder and decoders, PAL colour TV receiver.

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

MODULE - VI

Contemporary Video Coding Scheme: User requirement from video, segmentation-based coding, Model based coding, sub-band coding. Codebook vector based coding, Block-based DCT transform video coding (MPEG-1, MPEG-2, H.261, and H.263).

Text Books:

- 1) "Compressed Video Communication " by A.H.Sadka (Wiley publication)

MODULE - VI

Object-based video coding: VOP(video object plane) encoder, Shape coding, Motion estimation and compensation , Padding techniques, Basic Motion techniques, Texture coding , MPEG-4 VOP decoders, Layered video coding. Real -time video transmission over Mobile IP Network

Text Book:

- 1) "Compressed Video Communication " by A.H.Sadka (Wiley publication)

MODULE - I

An overview of satellite communication, Satellite orbits, Kepler's law, Orbital Elements, Eclipse effect, Sun transit outage, Placement of a satellite in a geostationary orbit, Station keeping and Stabilization.

Text Books:

1. "Satellite Communication". Pratt & C. W. Bostian
2. "Satellite communication", Dennis, Roddy, McGraw Hill.

MODULE - II

Satellite Link Design: Basic transmission theory, Friss transmission equation, EIRP, Completion Link design, System noise temperature G/T ratio, Noise figure and Noise temperature.

Text Books:

1. "Satellite Communication", Pratt & C. W. Bostian,
2. "Digital Satellite Communication", Tri T. Ha, McGraw Hill.

MODULE - III

Communication Satellite Subsystems: Space Platform (Bus) and Communication Subsystem (Payload), Satellite Antennas, Frequency reuse Antennas.

Text Book:

1. "Satellite Communication", T. Pratt & C. W. Bostian,

MODULE - IV

Earth Stations: Earth station antennas, Tracking, Equipment for earth stations, Equipment Reliability and Space qualification.

Text Book:

1. "Satellite Communication", T. Pratt & C. W. Bostian

MODULE - V

Analogue Satellite Communication Vs Digital Satellite Communication, Multiple Access Techniques : FDMA Concept, MCPC & SCPC, TDMA frame efficiency and super frame structure, Frame Acquisition and Synchronisation, CDMA concept, PN system, Spread spectrum, DSSS, DS CDMA, FHSS, FH CDMA.

Text Books:

1. "Satellite Communication", T. Pratt & C. W. Bostian.
2. "Digital Satellite communication", Tri T. Ha, McGraw Hill.
3. "Satellite Communication", Dennis Roddy, McGraw Hill

MODULE - VI

Efficient Techniques: Demand Assignment Multiple Access, Digital Speech Interpolation and SPADE.

Text Books:

1. "Satellite Communication", T. Pratt & C. W. Bostian.
2. "Digital Satellite communication", Tri T. Ha, McGraw Hill.

MODULE - VII

Special Purpose Satellite: INTELSAT, INMARSAT, DBS, VSAT, MSAT and GPS.

Text Book:

1. "Satellite Communication", Dennis Roddy, McGraw Hill.

MODULE - I

Concept of Management: Definition, Nature, and scope, and overall view of Management, Relation with other social sciences and industry.

(4)

Evolution of Management thought:

(A) Classical theory of Management

(A1) Bureaucracy - Introduced by Max Weber.

(A2) Scientific Management - F.W. Taylor and his followers.

(A3) Process Management - Introduced B.H. Fayol and others.

(B) Neo-classical theory of Management;

(B1) Human Relations - B.E. Mayo and Roethlisberger.

(B2) Behavioural Science approach - By McGregor, Maslow & others

(C) Modern Management theories: Peter Drucker.

(8)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel

2. " Management Theory and Practice", Theo Haiman

MODULE - II

Management Functions: Planning, Organising, Staffing, Directing, and Controlling.

(2)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel

2. " Management Theory and Practice", Theo Haiman

MODULE - III

Executive Functions: Production, Marketing, Finance, Personnel.

(2)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel

2. " Management Theory and Practice", Theo Haiman

MODULE - III

Planning: Concept, Nature, Importance, Objectives, Policies, Procedure, Strategies, and Method of Decision Making.

(6)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel

2. " Management Theory and Practice", Theo Haiman

MODULE - IV

Organisation: Definition, Theories of Organisation, Forms of organisation, Formal and Informal Organisation, Types of Formal Organisations, Departmentation, Line and Staff Relationship, Span of Management, Authority, Responsibility, Delegation, Centralisation, Decentralisation, Committees.

(8)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel
2. " Management Theory and Practice", Theo Haiman

MODULE - V

Staffing: Selection, Recruitment, Training, Development and Welfare.

(3)

Text Books:

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel
2. " Management Theory and Practice", Theo Haiman

MODULE - VI

Directing: Leadership and Supervision, Motivation and Communication.

(8)

Controlling: The Elements, Process and style of Control, Techniques of control.

(2)

Social Responsibility of business.

(2)

Text Books :

1. "Principles of Management, Essentials of Management", Koontz and O'Donnel
2. " Management Theory and Practice", Theo Haiman

Reference Books:

1. D.F. Drucker - Management - Task and Responsibility.
2. P.F. Drucker - The Practice of Management.
3. Newman and Warren - Process of Management.
4. E.F.L. Beach - The Principles and Practical Management.
5. H.F. Merrill - Classics in Management - Preface.
6. Mee J.E. - Management Thought in a Dynamic Economy.
7. Daniel A. Wren - The Evolution of Management - Thought.
8. S. N. Banerjee - Principles of Management.

MODULE - I

Introduction to Radar: Basic Radar, Simple form of Radar equation, Radar Block diagram, Radar frequencies, Applications of Radar, Origin of Radar.

(6)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - II

The Radar Equation: Introduction, Detection of signals in noise, Receiver noise and signal to noise ratio, Integration of Radar pulses, Radar Cross Section of Targets, Pulse repetition frequency.

(6)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - III

MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay line Cancellers, Digital MTI processing, Moving target Detector, Pulse Doppler Radar, Non Coherent MTI.

(7)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - IV

Tracking Radar: Tracking with Radar, Monopulse tracking, Conical Scan and sequential lobbing, tracking in Range.

(6)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - V

Radar Clutter: Introduction to Radar Clutter, Surface Clutter radar equation, Land Clutter, Sea Clutter.

(5)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - VI

Radar Antennas: Functions of Radar Antennas, Antenna parameters, Antenna radiation pattern and Aperture illumination, Reflector antennas, Electronically steered phase array Antennas.

(5)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - VII

Radar Receivers: The Radar receiver, Receiver Noise Figure, Superheterodyne receiver, Duplexers and Receiver protectors, Radar Displays.

(6)

Text Book:

1. "Introduction to Radar Systems", M I Skolnik, 3/e, Tata McGraw Hill, New Delhi, 2001

MODULE - I

Optical Network Elements-I: Passive Components, 2x2 fiber couplers, Scattering Matrix representation, Star Couplers, Mach-Zehnder multiplexers, Fiber Grating, Phase-array-based WDM devices, Tunable Sources, Tunable filters, Circulators, Isolators.

(8)

Text Book:

1. "Optical Fiber Communications", G.Keiser, 3/e, McGraw Hill.

MODULE - II

Optical Network Elements-II: Wave length Converters, Switching Elements, Nonreconfigurable and Reconfigurable wavelength Router.

(4)

Text Book:

1. "Optical Communication Networks", B. Mukherjee, McGraw Hill.

MODULE - III

Optical Amplifiers: Types, Semiconductor Optical Amplifiers, Erbium doped fiber amplifier, Amplification mechanism, Conv. Efficiency, Gain, Noise, Applications, Power amplifiers, In-line amplifiers, Preamplifiers, Application to Optical Video distribution, Long Span Transmission, Repeater less Transmission, Under Sea Transmission system.

(12)

Text Book:

1. "Optical Fiber Communications", G.Keiser, 3/e, McGraw Hill.

MODULE - IV

Optical Networks: Topological performance, SONET/SDH, Broadcast and select WDM networks, Signal-Hop networks, Multi-Hop Networks, Testbeds.

(6)

Text Book:

1. "Optical Fiber Communications", G.Keiser, 3/e, McGraw Hill.

MODULE - V

Wavelength Routed networks, Wavelength Routing Testbeds, Nonlinear Effects on network performances, SRS, SBS, SPM, XPM, FWM, Dispersion Management, Optical CDMA networks.

(6)

Text Book:

1. "Optical Fiber Communications", G.Keiser, 3/e, McGraw Hill.

MODULE - VI

Optical Switching: Photonic packet switching, Bit interleaving, Packet interleaving, Optical AND gates, NOLM, OTDM Testbeds.

(4)

Text Book:

"Optical Networks: A Practical Perspective", R. Ramaswami and K.N. Sivarajan, Morgan Kaufmann.

MODULE - VII

Soliton Communication: Solitons, Soliton Pulses, Soliton parameters, Transmission for ultrafast (UF) OTDM signal using Soliton.

(5)

Text Book:

"Optical Fiber Communications", G.Keiser, 3/e, McGraw Hill.

Ref. Books:

1. "Optical Communications", J.H.Franz &V.K.Jain , Narosa Publishing House.
2. "Fiber Optic Communication Systems", G. P. Agrawal, John Wily& Sons.
3. "Optical Networking and WDM", Walter Goralski, Tata McGraw-Hill.

MODULE - I

Introduction: System design with uses, History of VHDL, Simulation fundamentals, Modelling hardware, Language basics, Building blocks in VHDL, Design units and library.

(5)

Text Book:

"VHDL" by Douglas Perry, TMH, 1999. Chapter 1 & 2

MODULE - II

Sequential Processing: Process statement, Signal Vs variable assignment, Sequential statements, For loop, While loop, Condition statements, Examples of half adder and full adder, Test bench.

(6)

Text Books:

"VHDL" by Douglas Perry, TMH, 1999. Chapter 3

MODULE - III

Object and Data Types: Data types, Scalar, Composite, Access type, File type; Arrays; Objects, Signal variables, Constants and files, Association lists, Interface lists, Structural description, Examples.

(6)

Text Book:

"VHDL" by Douglas Perry, TMH, 1999. Chapter 4

MODULE – IV

Subprograms and Packages: Subprogram, Functions, Conversion function, Resolution functions, Procedures, Packages, Package declaration, Deferred constants, Subprogram declaration.

(6)

Text Book:

"VHDL", by Douglas Perry, TMH, 1999. Chapter 5

MODULE – V

VHDL Synthesis: Simple gate - concurrent assignment, IF control flow statement, Case control flow statement, Simple sequential statements, Asynchronous reset, Asynchronous preset and clear, Complex sequential statements.

(6)

Text Book:

"VHDL", by Douglas Perry, TMH, 1999. Chapter 10

MODULE – VI

ASIC High Level Design Flow: RTL simulation, VHDL synthesis, Functional gate level verification, Place and route, Post layout timing simulation, Static timing.

(5)

Text Book:

"VHDL", by Douglas Perry, TMH, 1999. Chapter 10

MODULE – VII

ASIC Tools: Introduction to Cadence, Analogue design environment, DC analysis, Transient analysis, Frequency domain analysis, Noise analysis, Layout tools, Design rule check, Layout vs schematic.

(6)

Text Book:

1. "Cadence Design Systems, Cadence Tutorial: 2003

MODULE – I

Introduction of Human Speech production mechanism, Classification of speech sounds, Nature of speech signal, Model of speech production, Purpose of speech signal processing, Digital models for speech signal, Digital processing of speech signals, Normalisation requirement for speech signal.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – II

Time domain analysis of speech processing: Time domain parameters of speech, Methods for extracting the parameters with zero crossing, Auto correlation function, Pitch estimation.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – III

Frequency domain analysis of speech processing: Short-time Fourier analysis, Filter-bank analysis, Spectrographic analysis, Formant extraction, Pitch extraction analysis, Synthesis Systems. Mel-frequency spectrum analysis.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – IV

Coding of Speech Signals: Introduction, Quantisation, Speech Redundancies and Quality measures, Time-Adaptive Waveform Coding, Exploiting properties of the Spectral envelope, Exploiting the periodicity of Voiced speech, Exploiting Auditory Limitations, Spectral Coders, Vocoder, Vector Quantization.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – V

Linear Predictive Coding Techniques for Speech: Formulation of linear prediction problem in time domain solution of normal equation, Interpretation of linear prediction in auto correlation and spectral domains.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – VI

Speech Synthesis: Principles of Speech Synthesis, Synthesizer operation, Speech Synthesis in other Languages and Hardware required for it.

Speech Recognition: Introduction, Basic pattern, Recognition approach, Parametric representation, Similarity and Distance measures, Segmentation, Dynamic Time Warping (DTW), Search Reduction and Networks for Speech Recognition.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

MODULE – VII

Speaker Recognition: Introduction, Recognition techniques, Features that distinguish speakers, System design, Speaker recognition by humans.

Text Books:

1. "Digital processing speech signals", by L. R. Rabiner and R. E. Schafer, Pearson Education.
2. "Speech Analysis, Synthesis Recognition", by N. Rox Dixon, Thomas B. Martin.

Ref. Books:

1. "Speech and Language Processing-An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition". By-J. Urafsky & Martin, Pearson Ed. Pub.
2. "Speech Communication Human and Machine", By-Douglas O'Shaughnessy, Addison Wesley Pub.

MODULE – I

Introduction to Programmable DSPs: Multiplier and Multiplier Accumulator, Modified Bus structure and Memory Access Schemes, Multiple Access Memory, Multiported Memory, VLIW Architecture, Pipelining, Special Addressing Modes, On-chip peripherals.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – II

Architecture of TMS320C5X: Bus structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory Mapped Registers, Program Controller, Flags in the Status Registers, On-chip memory.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – III

TMS320C5X Assembly Language Instructions and Programming: Assembly Language Syntax, Addressing Modes, Load/Store Instructions, Addition, Subtraction, Move, Multiplication Instructions, NORM Instruction, Program Control Instructions, Peripheral Control, Pipeline structure, Pipeline Operation, Normal Pipeline Operation, DSP Starter kit, Sample Programming examples.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – IV

Overview of TMS320C3X: Architecture, Addressing modes, Assembly Language Instructions, Application programs.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – V

Overview of TMS320C54X: Introduction, Architecture, 54X Buses, Barrel Shifter, Exponent Encoder, The C54X Pipeline, External Bus Interface, Data Address Generation Logic, Program Address Generation Logic.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – VI

TMS300C54X Assembly Language Instructions: Instruction Set, Application Programs in C54X, Pipeline Operation, Code Composer Studio.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

MODULE – VII

Overview of TMS320C6X and Motorola DSP563XX Processors: Features of TMS320C62X Processors, Architecture, Addressing modes, Peripherals, Program Development, Motorola DSP563XX Processors, Multiplier Accumulator, Address Generation Unit, Program Control Unit, JTAG TAP and OnCE Module, Internal Buses, Direct Addressing Mode, Comparison of DSP56300 Family Processors, Recent trends in DSP System Design, Application notes on DSP Systems, FPGA-based DSP System Design.

Text Book:

“Digital Signal Processors”, by B. Venkataramani & M. Bhaskar, TMH Edition.

Reference Books:

1. “Architecture for Digital Signal Processing” by Peter-Pirsch-John Wiley, 1998.
2. TMS320C 5X-User Manual.
3. TM5320C 3X/C4X – User Manual.

MODULE – I

Introduction to Microcontrollers, Microprocessors vs Microcontrollers, History and Applications of Microcontrollers, Commercial Microcontrollers, Different types of Microcontrollers, Processor Architecture like Princeton and Harvard Architectures. CISC vs RISC Architecture, Characteristics of RISC, Comparison between RISC and CISC.

Text Books:

1. "Programming and Customising the 8051 Microcontroller", by Myke Predko
2. "Advanced Microprocessor and Microcontrollers", by S.K. Venkata Ram.

MODULE – II

8051 Architecture, Introduction, Features, Pin details, Internal Memory organization, General purpose RAM, Bit addressable RAM, Register banks, CPU, ALU, Special function Registers like Program Status Word, B-Register, Stack Pointer, Data Pointer, Port Registers, Timer Registers, Serial Port Registers, Interrupt Register, Power Control Registers.

Text Books:

1. "Microprocessor and Peripherals" by S. P. Chowdhury.
2. "Advanced Microprocessor and Microcontrollers" by S.K. Venkata Ram.

MODULE – III

Microcontroller features like Clocking, I/O Pins, Interrupts, Timers, Peripherals, Microcontroller Memory Types and Memory Organization, Program Memory, Data Memory, Accessing internal Memory, I/O Ports, Reset, System clock, Parallel I/O.

Text Books:

1. "Programming and Customising the 8051 Microcontroller" by Myke Predko
2. "Advanced Microprocessor and Microcontrollers" by S.K. Venkata Ram.

MODULE – IV

8051 Addressing Modes, Boolean Processor, External Memory Addressing, Interrupt Structure and priorities, 8051 Instruction types like Data movement, Logic, Arithmetic, Control transfer and Program Control Instructions, Instruction Set in detail.

Text Books:

1. "Programming and Customising the 8051 Microcontroller" by Myke Predko
2. "Advanced Microprocessor and Microcontrollers" by S.K. Venkata Ram.

MODULE – V

8051 Programming examples like Arithmetic and Logic operation, Branching, Looping, Stack Operations, Subroutines, Parameter passing, A few Industrial examples, Software and Hardware Development tools, Environments, Assembly Language, Interpreters, Debugging hints.

Text Books:

1. "Programming and Customising the 8051 Microcontroller" by Myke Predko
2. "Advanced Microprocessor and Microcontrollers" by S.K. Venkata Ram.

MODULE – VI

Comparison of 8051 with 8031 and 8751, Enhanced 8051 features, MCS-151/251, Scratchpad RAM Enhancements, Serial I/O, Analogue I/O, Introduction to RISC Micro-controllers, Study of Architecture of Microchip PIC. 17CXXX, Bus Architecture. Port Architecture, Introduction (only) to RISC Instruction Set, Control applications, Use of front end and slave Processors in Process Control applications, RFID tags.

Text Books:

1. "Microprocessor, Microcomputer and their Applications", 2/e. by A.K. Mukhopadhyay.
2. "Programming and Customising the 8051 Microcontroller" by Myke Predko.
3. "Microchip – PIC Microchip Data Book".
4. "Microchip – RFID Data Book".

MODULE – VII

Introduction to Embedded Microcontrollers, 68 HC11 and 68 HC12 Microcontrollers, Software and Hardware development, I/O Resources, CPU12 Programming model, Basic Assembly Programming techniques, Introduction to Real time I/O and Multitasking.

Text Book:

1. "Embedded Microcontrollers" by Todd. D. Morton.

MODULE – I

Services, Mechanisms and Attacks, The OSI Security Architecture, A Model for Network Security. Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.

MODULE – II

Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

MODULE – III

Groups, Rings, and Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields of the Form $GF(p)$, Polynomial arithmetic, Finite Fields of the Form $GF(2^n)$, Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation,

MODULE – IV

Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Principles of Public-Key Cryptosystems, The RSA Algorithm, Prime Numbers, Fermat's and Euler's Theorems.

MODULE – V

Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs.

MODULE – VI

Pretty Good Privacy, S/MIME, Kerberos, X.509 Authentication Service.

MODULE – VII

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management. Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Text Book:

W.Stallings : Cryptography and Network Security : Principles and Practice, 3rd ed.

– Pearson Education, New Delhi, 2005

MODULE – I**Introduction:**

Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System.

MODULE – II**Digital Image Fundamentals:**

Elements of Visual Perception, Light and Electromagnetic Spectrum, Image Sensing and Image Acquisition, Sampling and Quantization, Some Basic Relationships between Pixels

MODULE – III**Image Enhancement in the Spatial Domain:**

Background, Basic Gray Level Transform, Histogram, Processing, Use of Arithmetic/ Logic Operations, Basics of Spatial filtering, Smoothing spatial filters, Sharpening Spastics filters

MODULE – IV**Image Enhancement in the Frequency Domain:**

Background, Introduction to the Fourier Transform and the Frequency Domain Smoothing Frequency Domain Filter, Sharpening Frequency Domain Filters, Homomorphic filter Implementation

MODULE – V

Image Restoration, Model of the Image Degradation/ Restoration, process, Noise Models, Restoration in Presence of Noise only- Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Positions, Invariant degradation, Estimating the Degradation, Function, Inverse filtering, Minimal mean Square Error Filters, Construction Least mean Square Filters

MODULE – VI**Image Compression:**

Fundamentals Image Compression model, Elements of Information Theory Error-Free Compression, Lossy Compression, Image Compression standards

Text Book:

1. Rafael. C. Gonzalez, Richard E.Woods., "Digital Image Processing", 2/e Pearson Education New Delhi, India.

Reference Books:

1. W.K.Pratt., "Digital Image Processing", 3rd Edn., John Wiley & sons, Inc. 2001
2. A.K.Jain., "Fundamentals of Digital Image Processing", PHI, New Delhi, 1995.
3. E.R. Dougherty & C.R. Giardina – Matrix Structured Image Processing Prentice Hall, Inc. New Jersey, 1987.

MODULE – I**Introduction:**

Machine Perception and Pattern Recognition Systems, the Design Cycle, Learning and Adaptation

Bayesian Decision Theory:

Introduction, Bayesian Decision Theory- Continuous Features Minimum-Error Rate Classification, Classifiers, Discriminate Functions, and Decision Surfaces, The Normal Density, Discriminant Functions for normal Density, Bays Decision Theory –Discrete Features,

[1, Ch8, 1 &2]

MODULE – II**Maximum Likelihood and Bayesian Parameter Estimation:**

Introduction, Maximum - Likelihood Estimation and Bayesian Estimation, Bayesian Parameter Estimation - Gossoon case and General Theory, Problem of Dimensionality, Hidden Marks Models

[1, Ch3]

MODULE – III**Nonparametric Techniques:**

Introduction, Density Estimation, Parzen Windows, Nearest Neighbor Estimation, The Nearest-Neighbor rule, Metrics and Nearest- Neighbor Classification

[1, Ch4]

MODULE – IV**Linear Discriminate Functions**

Introduction, Linear Discriminate Functions and Decision Surface, Generalized Linear Discrimination Functions , The two Category Linearly Saparable Course, Minimizing the Perceptron Criterion Function , Relaxation procedures, Nonseparable Behavior, Minimum Squared-Error procedures

[1, Ch5]

MODULE – V**Multilayer Nural networks:**

Introduction, Feed found operation and classification, back propagation algorithm, Error surfaces, , back propagation and feature mapping, , back propagation, Bays Theory and probability , Practical trainings for improving back propagation

[1, Ch6]

MODULE – VI

Unsupervised Learning and Clustering, Introduction, Mixture Densities and Identifiable maximum likelihood Estimates, Application to normal mixtures, (excluding fuzzy K-ary Clustering) Unsupervised bayesian learning Data Description and Clustering, Criterion function for clustering

[1, Ch10]

MODULE – VII**Syntactic Pattern recognition**

Overview, Quantifying Structure in Pattern Description and Recognitions, Grammar Based Approach and Application, String Generation as Pattern Description, Recognition by Syntactic Descriptions and Parsing, The Cocke-Younger Kasami (C.Y.K.) parsing algorithm.

Higher Dimentional Grammars, Stochastic Grammers and application learning grammers, Problem Formulation, Grammatical Interface Approaches

[2, Ch 6,7,9]

Text Book :

1. R. G. Duta, P. E. Hart and D. G. Stork – Pattern Classification, 2/e, John Wiley & sons, New York
2. Robort Schalkoff : “Pattern Recognition, Statistical, Structural and Neural Approach”, John Wisely and Sons. Inc.