Department of Electronics and Communication
J.K. Institute of Applied Physics & Technology
University of Allahabad, Allahabad

B. Tech. (CSE & ECE) Course Structure and Syllabus

B.Tech. 1st Semester (CSE & ECE)						
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BEC101	3-0-0-3	3	Engineering Mathematics - I	40	60
Paper – 2	BEC102	3-0-0-3	3	Engineering Mathematics - II	40	60
Paper – 3	BEC103	3-0-0-3	3	Engineering Physics	40	60
Paper – 4	BEC104	3-0-0-3	3	Basic Electronics	40	60
Paper – 5	BEC105	3-0-0-3	3	Computer and Programming Fundamentals	40	60
Paper - 6	BEC106	2-0-4-4	4	Communication Skill I and Communication Skill Practice I	40	60
Practicals	BEC107	0-0-8-4	4	Electronics Lab I	40	60
	BEC108	0-0-4-2	2	Computer Lab I : C Programming	40	60

B.Tech. 2nd Semester (CSE & ECE)						
Papers	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BEC201	3-0-0-3	3	Mathematics - III	40	60
Paper – 2	BEC202	3-0-0-3	3	Applied Numerical Analysis	40	60
Paper – 3	BEC203	3-0-0-3	3	Digital Electronics	40	60
Paper – 4	BEC204	3-0-0-3	3	Electronics Device & Circuits	40	60
Paper – 5	BEC205	3-0-0-3	3	Circuit Theory	40	60
Paper - 6	BEC206	3-0-0-3	2	Communication Skill II	40	60
Practicals	BEC207	0-0-12-6	6	Basic & Digital Electronics Lab	40	60
	BEC208	0-0-4-2	2	Communication Skill Practice II	40	60

B.Tech. 3rd Semester (CSE)							
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC301	3-0-0-3	3	Discrete Mathematical Structures#	40	60
Paper – 2	BC302	3-0-0-3	3	Database Systems#	40	60
Paper – 3	BC303	3-0-0-3	3	Data Structure#	40	60
Paper – 4	BEC304	3-0-0-3	3	Basic Electrical Engineering	40	60
Paper – 5	BEC305	3-0-0-3	3	Computer Organization & Architecture*	40	60
Paper - 6	BEC306	2-0-0-2	2	Industrial Management– I*	40	60
Practicals	BEC307	0-0-8-4	4	Microprocessor Lab	40	60
	BEC308	0-0-8-4	4	Engineering Drawing & Workshop	40	60

B.Tech. 4th Semester (CSE)							
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC401	3-0-0-3	3	Operating Systems #	40	60
Paper – 2	BC402	3-0-0-3	3	Theory of Computation #	40	60
Paper – 3	BC403	3-0-0-3	3	Design & Analysis of Algorithms #	40	60
Paper – 4	BEC404	3-0-0-3	3	Control Systems*#	40	60
Paper – 5	BEC405	3-0-0-3	3	Signals & Systems*	40	60
Paper - 6	BEC406	2-0-0-2	2	Industrial Management II*	40	60
Practicals	BEC407	0-0-8-4	4	Instrumentation & Control Lab	40	60
	BC408	0-0-8-4	4	Data Structure & Algorithm Lab	40	60

B.Tech. 5th Semester (CSE)						
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC501	3-0-0-3	3	Artificial Intelligence#	40	60
Paper – 2	BC502	3-0-0-3	3	Compiler Design#	40	60
Paper – 3	BC503	3-0-0-3	3	Computer Graphics#	40	60
Paper – 4	BEC504	3-0-0-3	3	Web Technology	40	60
Paper – 5	BEC505	3-0-0-3	3	Computer Networks*	40	60
Paper - 6	BEC506	3-0-0-3	3	Digital Communication I*	40	60
Practicals	BC507	0-0-10-5	5	Computer Graphics & Database Lab	40	60
	BC508	0-0-6-3	3	Design Project – Phase I	40	60

B.Tech. 6th Semester (CSE)						
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC601	3-0-0-3	3	Advanced Concepts of Programming Language#	40	60
Paper – 2	BC602	3-0-0-3	3	Operational Research#	40	60
Paper – 3	BC603	3-0-0-3	3	Advanced Computer Architecture	40	60
Paper – 4	BC604	3-0-0-3	3	Software Engineering	40	60
Paper – 5	BEC605	3-0-0-3	3	Digital Signal Processing*	40	60
Paper - 6	BEC606	3-0-0-3	3	Digital Communication II*	40	60
Practicals	BC607	0-0-10-5	5	Digital Signal Processing Lab	40	60
	BEC608	0-0-6-3	3	Design Project – Phase II	40	60

B.Tech. 7th Semester (CSE)						
Paper	Course Code	L-T-P-C	Credits	Four theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC701	3-0-0-3	3	Big Data Analysis	40	60
Paper – 2	BEC702	3-0-0-3	3	Mobile Communication*	40	60
Paper – 3	BEC703	3-0-0-3	3	Microcontroller & Microprocessor interfacing*	40	60
Paper – 4	BEC704	3-0-0-3	3	Image Processing*	40	60
Practicals	BC705	0-0-8-4	4	Project – Phase I (Dissertation & Viva Voce)	40	60
	BC706	0-0-6-3	3	Image Processing Lab	40	60
	BC707	-	1	Tour	40	60

B.Tech. 8th Semester (CSE)						
Paper	Course Code	L-T-P-C	Credits	Four theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BC801	3-0-0-3	3	Cyber Security	40	60
Paper – 2	BC802	3-0-0-3	3	Multimedia Technology	40	60
Paper – 3	BEC803	3-0-0-3	3	Elective I :	40	60
Paper – 4	BC804	3-0-0-3	3	Elective II	40	60
Practicals	BC805	0-0-12-6	6	Project - Phase II{Seminar-2 Credits & Dissertation & Viva Voce-4 Credits}	40	60
	BC806	-	1	Comprehensive Viva	40	60
	BC807	-	1	Paper Writing & Presentation	40	60

List of Electives (CSE)

1. Computer Vision

2. Natural Language Processing

3. Ubiquitous Computing

4. Fault Tolerant Computing

5. Fuzzy Systems

6. Neural Networks

7. Embedded Systems

B.Tech. 3rd Semester (ECE)						
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE309	3-0-0-3	3	Network Analysis & Synthesis	40	60
Paper – 2	BE310	3-0-0-3	3	Electronic Instrumentation & Measurement	40	60
Paper – 3	BE311	3-0-0-3	3	Analog Circuits & Systems	40	60
Paper – 4	BEC304	3-0-0-3	3	Basic Electrical Engineering*	40	60
Paper – 5	BEC305	3-0-0-3	3	Computer Architecture & Organization *	40	60
Paper - 6	BEC306	2-0-0-2	2	Industrial Management I*	40	60
Practicals	BEC307	0-0-8-4	4	Microprocessor Lab	40	60
	BEC308	0-0-8-4	4	Engineering Drawing & Workshop	40	60

B.Tech. 4th Semester (ECE)						
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE 410	3-0-0-3	3	EM Wave Theory	40	60
Paper – 2	BE 411	3-0-0-3	3	Semiconductor Device Technology	40	60
Paper – 3	BE 412	3-0-0-3	3	Electrical Engineering	40	60
Paper – 4	BEC 404	3-0-0-3	3	Control Systems*	40	60
Paper – 5	BEC 405	3-0-0-3	3	Signal & Systems*	40	60
Paper - 6	BEC 406	2-0-0-2	2	Industrial Management II*	40	60
Practicals	BEC 407	0-0-8-4	4	Instrumentation & Control Lab	40	60
	BE 413	0-0-8-4	4	Electrical Engineering Lab - II	40	60

				B.Tech. 5th Semester (ECE)		
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE 509	3-0-0-3	3	Antenna and Wave Propagation	40	60
Paper – 2	BE 510	3-0-0-3	3	Digital Telephony	40	60
Paper – 3	BE 511	3-0-0-3	3	Fiber Optic Communication I	40	60
Paper – 4	BEC 504	3-0-0-3	3	Computer Networks*	40	60
Paper – 5	BEC 505	3-0-0-3	3	Communication Systems*	40	60
Paper - 6	BEC 506	3-0-0-3	3	Digital Communication I*	40	60
Practicals	BE 512	0-0-10-5	5	Analog Communication & Fiber Optic Lab	40	60
	BE 513	0-0-6-3	3	Design Project - Phase I	40	60

				B.Tech. 6th Semester (ECE)		
Paper	Course Code	L-T-P-C	Credits	Six theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE 610	3-0-0-3	3	Micro Electronics & VLSI Design	40	60
Paper – 2	BE 611	3-0-0-3	3	Engineering Materials	40	60
Paper – 3	BE 612	3-0-0-3	3	Fiber Optic Communication II	40	60
Paper – 4	BE 613	3-0-0-3	3	Computer Networks*	40	60
Paper – 5	BEC 605	3-0-0-3	3	Digital Signal Processing*	40	60
Paper - 6	BEC 606	3-0-0-3	3	Digital Communication II*	40	60
Practicals	BEC 607	0-0-10-5	2	Digital Signal Processing Lab	40	60
	BE 615	0-0-6-3	3	Design Project - Phase II	40	60

				B.Tech. 7th Semester (ECE)		
Paper	Course Code	L-T-P-C	Credits	Four theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE 701	3-0-0-3	3	Microwave Technology	40	60
Paper – 2	BEC 702	3-0-0-3	3	Mobile Communication*	40	60
Paper – 3	BEC 703	3-0-0-3	3	Microcontroller & Microprocessor interfacing	40	60
Paper – 4	BEC 704	3-0-0-3	3	Image Processing*	40	60
Practicals	BE 709	0-0-8-4	4	Project - Phase I (Dissertation & Viva Voce)	40	60
	BE 710	0-0-6-3	3	Microwave Communication Lab	40	60
	BEC 707	-	1	Tour	40	60

B.Tech 8th semester (ECE)						
Paper	Course Code	L-T-P-C	Credits	Four theory Papers & Practical Labs	Sessional Marks	End Semester Marks
Paper – 1	BE 808	3-0-0-3	3	Satellite Communication	40	60
Paper – 2	BE 809	3-0-0-3	3	Radar Engineering & Navigational Aids	40	60
Paper – 3	BEC 803	3-0-0-3	3	Mobile Ad-hoc Network*	40	60
Paper – 4	BE 810	3-0-0-3	3	Elective	40	60
Practicals	BE 811	0-0-12-6	6	Project - Phase II {Seminar-2 Credits & Dissertation & Viva Voce-4 Credits}	40	60
	BE 812	-	1	Comprehensive Viva	40	60
	BE 813	-	1	Paper Writing & Presentation	40	60

List of Electives (ECE)

8. Advanced Fiber Optic Communication

9. Advance Antenna Theory & Techniques

10.   Internet of things (IOT)

11.   Embedded Systems

Paper I: Engineering Mathematics I

Unit 1: Linear Algebra: **08 Lectures**

Determinants, Matrices, Elementary row and column operations, Rank of matrix, Inverse of matrix, Eigen values and eigen vectors,, special types of matrices such as symmetric, skew asymmetric, Hermitian and skew hermitian matrices, Linear systems of algebraic equations, Consistency, Gauss elimination method to solve system of linear equations, Homogeneous and inhomogeneous systems of equations,, Cayley-Hamilton theorem,

Unit 2: Calculus: **08 Lectures**

Limit, Continuity & differentiability of functions of one variable, Mean-value Theorems, Rolle's Theorem, Leibnitz formula for nth derivatives of products of functions, Taylor and Maclaurin Theorems, Maxima, Minima, Theorems of integral calculus, Evaluation of definite & improper integrals, Functions of several variables: Partial differentiation, Change of variables in partial differentiation.

Unit 3: Vector Differential Calculus: **08 Lectures**

Scalar and vector fields, Directional derivatives, Differentials of functions of several variables, Change of variables, Gradient of a scalar function, Conservative fields and potential functions, Divergence and curl of vector fields, Chain rules, Applications to cylindrical and Spherical polar coordinates,

Unit 4: Vector Integral Calculus: **08 Lectures**

Multiple integrals, Evaluation of double and triple integrals, Line, Surface & Volume integrals, Volumes and Surface Areas of Solids using multiple integrals, Green's, Gauss's and Stoke's Theorem and application.

Unit 5: Fourier Series   **08 Lectures**

Introduction to Fourier series, trigonometric and exponential forms, Euler formulae for Fourier coefficients, Functions having period 2 and arbitrary period, Even & odd functions, Half range functions, Sine and cosine Fourier series, Fourier integrals,

References:

1.   Advanced Engineering Mathematics, Erwin Kreyszig
2.   Calculus: Volume I, Aposto
3.   Calculus and Analytical Geometry,   G.B. Thomas & Finney
4.   A Course in Ordinary Differential Equations, Rai, Chaudhary & Friedman
5.   Higher Engineering Mathematics, B S Grewal
6.   Mathematical Methods, Potter and Goldberg
7.   Matrix Theory, David Lewis

B.TECH FIRST SEMESTER
(Common to ECE and CSE)

Paper II: Engineering Mathematics II

Unit 1: Ordinary Linear Differential Equations of first order and first degree: **08 Lectures**

Ordinary differential equations of first order, Separable, exact & linear equations, Existence and uniqueness theorems (Statement only), Higher order linear equations, Workinsons Method of variation of parameters for particular solutions, Euler's and Cauchy's equations, Systems of first order equations with constant coefficients

Unit 2: Ordinary Linear Differential Equations (LDE) of higher order: **08 Lectures**

Definition and general form of LDE, the operator D, complete solution of LDE as a sum of complimentary function (CF) and particular integral (PI), inverse operator rule for finding CF & PI, method of variation of parameter to find PI.

Unit 3: **Complex Algebra**   **08 Lectures**

Complex numbers, Complex plane, Roots of complex numbers, Complex functions and mappings, analytical functions, Cauchy-Riemann equations, elementary complex functions such as exponential , logarithmic, trigonometric, hyperbolic functions and Inverse functions, Harmonic functions,

Unit 4: **Complex Integration**   **08 Lectures**

Complex integration, Complex integrals, Contours, the Cauchy Theorem and Contour integrals, The Cauchy integral formulas, Some properties of analytical functions, Complex integration: Line integral, Cauchy's integral theorem,

Unit 5: **Contour Integration**   **08 Lectures**

Residues and contour integration, Complex power series and Taylor Series, Laurent series and the classification of Singularities, residues and the residues theorem, Evaluation of real integrals by means of residues evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis, Conformal mapping and applications

References:

1.   Advanced Engineering Mathematics, Erwin Kreyszig
2.   Higher Engineering Mathematics, B.S. Grewal
3.   Mathematical Methods, Potter and Goldberg
4.   Mathematics for Engineers and Physicists, L.A. Pipes

B.TECH FIRST SEMESTER
(Common to ECE and CSE)

Paper III: Engineering Physics

Unit 1: Optics and Lasers: **08 Lectures**

Interference of light: Interference in thin films, Newton's rings Diffraction: Fresnel and Fraunhofer diffraction, Plane diffraction grating, Measurement of wave length, Dispersive power of grating, Resolving power, Rayleigh criterion

Unit 2: Lasers: **08 Lectures**

Basic principles of laser, spontaneous emission- stimulated emission-population inversion, spatial and temporal coherence- coherence length, optical amplification, laser rate equations, gain coefficient, threshold condition

Unit 3: Introduction to quantum theory   **08 Lectures**

Wave particle duality, matter waves, group & phase velocity, uncertainty principle, wave packets, Schrodinger equation

Unit 4: Solid State Physics   **08 Lectures**
Bonding in solids, Elastic properties of solids, Defects in crystals, Lattice vibrations and thermal properties of solids, Free electron theory, Band theory of solids, Metals, Semiconductors and insulators, Electrical conductivity of simple metals (Free Electron Theory)

Unit 5: Nano Physics: **08 Lectures**

Introduction to nanophysics, energy levels, density of states, quantum wire, single electron tunneling, quantum dot, nano-transistors and FET, NEMS and sensors.

References:
1.   Modern Physics, J.B. Rajam
2.   Solid State Physics, Charles Kittel
3.   Optics, Ajoy Ghatak
4.   Statistical Physics, Charles Kittel
5.   Modern Physics, Beiser

B.TECH FIRST SEMESTER
(Common to ECE and CSE)

Paper IV: Basic Electronics

Unit I: Semiconductors and PN Junction Diode: **10 Lectures**

Properties of semiconductors, Intrinsic and extrinsic semiconductors, P and N type of impurities and doping, Charge densities and potential barrier, Draft and diffusion currents, PN junction working and characteristics, It's applications as – Rectifier: Half wave, Full wave, Bridge Rectifier and their calculation for ripple, Efficiency and PIV; Clipper, Clamper and voltage doublers, Zener and Avalanch breakdown diodes, Tunnel diode, Varacter diode, Thermister

Unit 2: Bipolar Transistor: **08 Lectures**

Transistor action with simple bias conditions, Working and basic characteristics, CB, CE & CC configuration of transistor amplifiers, Analysis for CB and CE basic amplifiers- Determination of Q-point, dc load line and calculations for gains and impedances, Effect of load and ac load line

Unit 3:   Transistor biasing: **08 Lectures**

Biasing circuits for CB and CE configurations, Leakage currents in CB & CE and it's effect, Thermal stabilization & Stability factor, Different biasing arrangements for CE- their advantages and drawbacks, Transistor thermal power dissipation and rating

Unit 4: Equivalent Circuits of Transistor: **08 Lectures**

Transistor as four port device, Impedance, Z-parameters and circuits representation, Admittance Y parameters and circuit representation, h-parameters and circuit representation; Analysis of CB and CE circuits using h-parameters for gains and impedances

Unit 5: Field Effect Transistors: **06 Lectures**

Basic configuration of JFET, Biasing, Principle of operation and basic characteristics, Basics of MOSFET

References:

1.   Electronic Devices and Circuits, Allen Moterned
2.   Integrated Electronics, Jacob Millman
3.   Electronic Devices and Circuit Theory, L. Boylestad and Nashelsky
4.   Handbook of Electronics, Gupta and Kumar

B.TECH FIRST SEMESTER
(Common to ECE and CSE)

Paper V: Computer and Programming Fundamentals

Unit 1: Introduction to hardware   **08 Lectures**

Brief introduction of binary numbers,, Functional block diagram of a computer, Stored program machine, Generation of computers, CPU, I/O, Secondary storage, Memory and its classifications.

Unit 2: Introduction to software: **08 Lectures**

Generations of programming languages, introduction to applications and system software, File storage, DOS and windows environment.

Unit 3: Algorithms   **08 Lectures**

Flow charts, Structure and properties of algorithm, Algorithms for g.c.d., Factorial, Fibonacci series, Prime number generation. Linear and binary search, Sorting and bubble sort etc.

Unit 4: Basics of C Language   **08 Lectures**

C pre-processor, Variables, Operators, Expressions, Control flow, Data types, Arrays, Pointers, Storage classes, Scope and initialization, Input/output, String processing,

Unit 5: Pointer Based Programming   **08 Lectures**

Pointers, Dynamic data structures, Structures and unions, File handling,

References:

1.   The Design and Analysis of Computer Algorithms, A. Aho, J. Hopcraft and J. Ullman(Addison)
2.   Fundamentals of Computer Algorithms, E. Horowitz and S.Sahani   (Galgotia, New Delhi)
3.   Introd.ction to the Design and Analysis of Algorithm, S.E. Goodman et al (McGraw Hill)
4.   Algorithms, G. Brassard and P. Bratley (PHI)
5.   Programming Languages, R.Sethi (Addison-Wesley)
6.   Programming Languages Paradigm & Practice, D. Appleby and J.J. Vandekopple (McGraw Hill)
7.   The C Programming Language, B.W. Kernighan and D.M. Ritchie (PHI)
8.   Programming using the C language, R.C. Hutchinson and S.B. Just (McGraw Hill)
9.   Outline of Theory and Problems of Programming with C, B.S. Gottfried (Schaum McGraw Hill)
10.   C: The Complete Reference, H. Schildt (McGraw Hill)
11.   C Programming for Engineering & Computer Science, H.H.Tan (Tata McGraw Hill)

B.TECH FIRST SEMESTER
(Common to ECE and CSE)

Paper VI: Communication Skills I

Unit 1: Introduction to Communication: 08 Lectures

Importance of communication, Communication in primitive societies, *Ways of communication*: One way & two way, *Principles of communication:* Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, Coherency, *Level of communication*- inter and intra personal, group to person, group to group, Methods of effective oral, Written and non-verbal communication, *Process of communication (flow):* Downward, Upward and horizontal communication, Official Hierarchy

Unit 2: Speaking & Reading Skills: 08 Lectures

Verbal, non-verbal & Visual Communication, *Elementary phonetics*: speech sounds, Consonant & Vowel Sounds, Phonetic symbols, Horizons-tone, frequency, rate, volume, depth, extempore speech, Rate of speech

Unit 3: Writing Skills & Business correspondence: 08 Lectures

Comprehension of ideas in a passage, Expansion of an idea for a particular purpose, Change of words into different parts of speech, Idioms, Antonyms and synonyms, Drafting Business letters, CV & Resume, Application for jobs, Power-point presentation, Using Microsoft Office

References:

1. Essentials of Business Communication, Rajendra Pal & J S Korlahalli
2. Business Communication, Gyani
3. Effective Communication, Ludlow and Panthon
4. A Practical English Grammar, Thomson and Marlinet
5. English Conversation Practice, Grount Taylor
6. Developing Communication Skills, Krishna Mohan and Meera Banerji
7. Business Correspondence and Report Writing, R C Sharma and Krishna Mohan
8. Communication Skill, R Datta Roy and K K Dhir

B.TECH SECOND SEMESTER
(Common to ECE and CSE)

Paper 1: ENGINEERING MATHEMATICS III

Unit 1: Laplace Transform: **08 Lectures**

Definitions & existence conditions, Laplace transforms of some useful functions, Inverse Laplace Transform, Operational Properties of the Laplace Transform, Linearity, scaling, time shifting, shifting in s-domain, time differentiation and time integration, frequency differentiation & integration, convolutional property, Inversion Integral, Transforms of Periodic functions, Use of Laplace transforms in the solution of differential equations and analysis of electrical circuits.

Unit 2: Fourier Transform   **08 Lectures**

Definitions & existence conditions, Fourier transforms of some useful functions, Inverse Fourier Transform, l Properties of the Fourier Transform, Linearity, symmetry, scaling, time & frequency shifting, time differentiation and time integration, frequency differentiation & integration, convolutional property, Transforms of Periodic functions, frequency and amplitude spectra of a function, fourier cosine & sine transforms

Unit 3: Special Mathematical Functions: **08 Lectures**

Series Solutions of differential equations, Power series solutions of homogeneous equations , Singular points of linear differential equations, Gamma function ((n)) , recurrence formula for   (n) , value of   (1/2), Beta function, relationship between Gamma & Beta functions, Error functions-definitions and simple properties, complimentary error function & Q function.

Unit 4: Legendre Functions   **08 Lectures**

Legendre differential equation, Legendre polynomial, Rodrigue's formulae, generating function, Recurrence formulae, Orthogonality

Unit 5: Bessel Functions   **08 Lectures**

Bessel's differential equation, Bessel functions of first and second types,, Recurrence formulae, Generating function, Orthogonality, Modified Bessel Functions,

References:

1.   Applied Mathematics for Mathematician & Engineers: L A Pipes (TMH)
2.   Engineering Mathematics: H K Das (S Chand & Co. Ltd.)
3.   Engineering Mathematics: B.S. Grewal (Khanna Pub.)
4.   Advanced Engineering Mathematics: Wylie C R (TMH)
5.   A Course in Ordinary Differential Equations: Rai, Chaudhary & Friedman
6.   Advance Engineering Mathematics: E. Kreyszig

B.TECH SECOND SEMESTER
(Common to ECE and CSE)

Paper- II: Applied Numerical Analysis

Unit 1   **08 Lectures**

Errors: Sources and types of errors, measurements. Significant digits. Floating point representation of numbers. Roots of Non-linear Algebraic and Transcendental Functions , Bisection, Regula-Falsi, Secant and Newton-Raphson Methods, Fixed points iteration, Rate of convergence.

Unit 2   **08 Lectures**

Numerical solution of system of linear equations, Gauss elimination method, LU decomposition, ill-conditioned systems, Gauss-Seidel and Jacobi method, Rate of convergence.

Unit 3   **08 Lectures**

Polynomial interpolation: Finite differences, Newton's forward and backward differences interpolation polynomials, Newton's divided differences interpolation polynomial, Lagrange's polynomial. Curve fitting: Method of least squares.

Unit 4   **08 Lectures**

Numerical differentiation and integration, Formulae for derivatives in the case of equally spaced points, Trapezoidal and Simpson's rules, Errors in integration formulae. Monte-Carlo Method**:** Basic principles, One dimensional and Multi-dimensional integrals.

Unit 5   **08 Lectures**

Single-step and multistep methods for solving ordinary differential equations: Taylor series method, Euler's method, Modified Euler's method, Runge-Kutta methods.Adam's & Milne's method.Numerical solution for boundary value problems, Finite difference methods for solving Laplace's equation in a rectangular region. Finite Element methods and its applications.

References:

1. Numerical Methods for Science and Engg.: Ralph G. Stanton (Prentice-Hall of India)
2. Elementary Numerical Analysis An algorithmic approach: S.D Conte and Carl de Boor

B.TECH SECOND SEMESTER
(Common to ECE and CSE)

Paper III: Digital Electronics

Unit 1: Introduction to Binary systems and Boolean Algebra: **08 Lectures**

Digital systems, Number representation in different bases and their inter conversion, Compliments, Arithmetic operations on binary numbers, Binary codes; Basic theorems and properties, Switching algebra, Switching function and their representations. Canonical forms of switching functions and their transformations, operations over switching functions, Digital logic gates- symbols, logic expression and their truth tables.

Unit2I : Digital ICs & Combinational Logic Circuits: **08 Lectures**

Characteristics of digital ICs. Introduction to logic families- RTL,DTL, TTL,ECL,MOS and CMOS circuits and comparison of their performance.
Binary adder and Subtractor circuits, Magnitude comparator, Decoders, Encoders, Multiplexer and demultiplexer, Realization of switching expressions by decoders, encoders, multiplexer and Demultiplexer, Programmable logic circuits, Tri-state logic.

Unit 3: Combinational Circuit Design: **08 Lectures**

Minimization Techniques, Realization of switching expressions by Karnaugh map, VEM and Quinne-Mclusky methods, Combinational circuits and their analysis. Realization of switching expressions by two level AND, OR, NOT gates; NAND gates only; NOR gates only and Ex-OR and AND gates only; MUX based circuit design

Unit 4: Synchronous Sequential Logic Circuits: **08 Lectures**

Sequential circuits, latches and Flip Flops, Analysis of clocked sequential circuits. State reduction and assignment, design of synchronous circuits, shift registers, ripple counters, synchronous counters.

Unit 5: Asynchronous Sequential Logic: **08 Lectures**
Analysis procedure, circuits with latches, Design procedure, reduction of states and flow tables .Races and race Free State assignments, Hazards.

References:
1. Digital Design : Morris Mano (PHI)
2. Digital circuits & logic design: S.C.Lee (PHI)
3. Digital electronics (circuits, systems & ICs) : S.N.Ali (Galgotia)
4. Digital electronics: W.H.Gothmann (PHI)
5. Switching theory : A.K Gautam (Katsons)

B.TECH SECOND SEMESTE:R
(Common to ECE and CSE)

Paper-IV: Electronic Devices and Circuits

Unit 1: Transistors amplifiers: **10 Lectures**

Classification of amplifiers , Comparative study of CB,CE and CC amplifiers characteristics RC coupled amplifiers – analysis of gain in different frequency ranges and BW calculations, Multistage coupling –Cascade, cascade Darlington pair ,effect of coupling on gain & BW, Transformer coupled amplifiers, DC coupled amplifiers , Difference amplifiers .

Unit 2: Power amplifiers: **08 Lectures**

Class A, Class B, and Push-Pull amplifiers- Their working , advantages and drawbacks , comparison ; Class C, Class D amplifiers, stagger tuned amplifiers; FET amplifier configurations and analysis.

Unit 3: Feedback Amplifiers: **08 Lectures**

Types of feedback and different feedback schemes in amplifiers ; General characteristics of negative feedback amplifiers and their effect on gain impedances , distortion, and noise , Emitter follower.

Unit 4: Oscillators: **08 Lectures**

Barkhausen criterion for oscillations Tuned collector oscillator, RC phase shift and Wein bridge oscillator, Crystal oscillator, Frequency stabilization.

Unit 5: Power supplies: **06 Lectures**

Block diagram of Power Supply (PS) and it's constituent circuits , Electronics voltage stabilizer, Zenner and transistor circuits for stabilization, Constant current, and current limited PS, Basics of SMPS and UPS.

References:

1.Integrated Electronics: Jacob Millman
2.Electronics Devices and Circuits Theory: Robert L. Boylestad and Nashelsky
3.Handbook of Electronics: Gupta and Kumar

B.TECH SECOND SEMESTER
(Common to ECE and CSE)

Paper V: Circuit Theory

Unit 1: Resistive Circuit Analysis   **08 Lectures**
Circuit elements and their classification; LLFPB circuits; Nodal and Mesh analysis; Equivalence of networks; Duality; Source trans formations; T-π transformation;

Unit 2: Networks Theorems   **08 Lectures**

Superposition, Thevenin & Norton, Maximum power transfer, Reciprocity, Millman, Substitution & Tellgene's theorems and their applications

Unit 3: Transient Circuit Analysis   **08 Lectures**

Natural and forced response; Evaluation of initial conditions; Transient and steady state responses of simple RL, RC and RLC circuits to arbitrary excitations.

Unit 4: Sinusoidal Analysis   **08 Lectures**

Sinusoidal and Complex forcing functions; Phasor representation of Complex functions; sinusoidal steady-state response; Concept of Complex frequency; Damped Sinusoidal forcing function- Natural and forced response; Frequency response – parallel and series resonance. Mutual Impedance and coefficient of Coupling; Unity Coupled Coils;

Unit 5: Classical Filters   **08 Lectures**

Characterization of Two ports, z,y, h and transmission parameters, Interconnection of two ports, Analysis of common two ports.
Filter fundamentals –pass and stop bands, The Constant –K low-pass and high-pass filters; The m-derived T and π sections; Band-pass and Band-elimination filters; Impedance Matching half-π sections.

References:

1. Engineering Circuit Analysis: William H. Hayt, Jr. Jac E. Kemmerly. (TMH)
2. Electric Curcuits: David A. Bell (PHI)
3. Network Analysis :   Van Valkenburg (PHI)
4. Basic Circuit theory :   Desoer and Kuh (TMH)
5. Network & System :   D. Roy. Chandhary (New Age International)
6. Circuit theory :   Chakarbarti (Dhanpat rai & Sons)

B.TECH SECOND SEMESTER
(Common to ECE and CSE)

Paper VI: Communication Skills II

Unit 1; Advance communication   08 lectures

Objectives of communication: Information, Advice, Order, suggestion, Persuasion, Education, Warning, Raising morale, Motivation, *Audio-visual communication:* Use of audio visual aids for effective communication, Role of news papers, Radio, Cinema and TV, Barrier to communication and overcoming barriers

Unit 2; Interactive Communication Skills & Personality Development   08 lectures
Group Discussions, Debates, Facing an interview, know your body language, confidence building, e-mail etiquette, *The art of listening*: learning through listening, Hearing vs. Listening,

Unit 3: Speaking & writing Skill   08 lectures
Syllable & syllable stress, summarizing a passage for official usage, Précis writing, Report writing- importance of reports, preparing a report, technical report writing, Conversational skill, Telephonic Etiquettes

References:
1. Essentials of Business Communication, Rajendra Pal and J S Korlahalli
2. Business Communication, Gyani
3. Effective Communication, Ludlow and Panton
4. A Practical English Grammar, Thomson and Martinet
5. English Conversation Practice, Grount Taylor
6. Developing Communication Skills, Krishna Mohan and Meera Banerji
7. Business Correspondence and Report Writing, R C Sharma and Krishna Mohan
8. Communication Skill, R Datta Roy and K K Dhir

B.TECH THIRD SEMESTER
(Computer Science and Engineering)

Paper I: Discrete Mathematical Structure

Unit 1: Mathematical Logic: **08 Lectures**
Statements, Connectives, Statement formulas, Truth functional rules, Interpretation of formulas, Tautologies, Equivalence, Functionally complete set of connectives, Normal forms, Inference, Theory of statement calculus, Consistency of premises,

Unit 2: Predicate Logic   **08 Lectures**
Predicates, statement functions, Quantification, Interpretation of predicate formulas, Inference theory for predicate calculus, Informal & formal proofs

Unit 3: Set Theory: **08 Lectures**

Basics of set theory, Properties of relations, equivalence & compatibility relation, Representation of relations, Reflective, symmetric & transitive closures, Characteristic functions of a set and its properties, Principle of inclusion and exclusion, its applications

Unit 4: Graph Theory: **08 Lectures**

Definition Simple digraphs, Matrix representations, Paths, Distances, Connectedness of digraphs, Path and reachability matrices, Boolean sum and product of bit matrices, Warshall's algorithm for transitive closure of relations

Unit 5: Lattices: **08 Lectures**

Partially ordered sets, Hasse diagrams, Elements of poset, Bounds, Lattices, Joint, Meet, Different types of lattices and their examples. Distributive and Modular lattices,

References: 1   Discrete Mathematical Structures with Application to computer Science: Tremblay & Manohar
        2.   Discrete Mathematical Structures: Preparata and Yeh

B.TECH THIRD SEMESTER
(Computer Science and Engineering)

Paper II: Database Systems

Unit 1: Introduction: **12 Lectures**

Data, information and knowledge, Characteristics of database approach, Data independence, Architecture of database system, Data dictionary, Types of database language, database system life cycle, Overview of hierarchical, network and relational model.

Relations and Codd's rules, Concepts of keys, Relation Algebra – Select, Project, Joins, Set operations, Update operations – tuple relational calculus, Relational Calculus vs. relational algebra.

Data definition, data manipulation, view definition, nested queries, updation, Embedded SQL, Handling of nulls and cursors.

Unit 2: Data Models: **08 Lectures**

Conceptual, Logical and Physical design, ER models, ER diagrams, Strong and weak entity sets, Generalization, Specialization and Aggregation, Conversion of ER model into relational schemas,

Unit 3: Normalization: **10 Lectures**

Normalization concepts, Functional dependencies and dependency preservations, Normal forms – 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF, Indexing, File organization, De-normalization, Clustering of tables and indexes.

Unit 4: Transaction Handling: **05 Lectures**

Transaction recovery, System recovery, Two phase commit, concurrency problems, locking, deadlocks, security, discretionary and mandatory access control, data encryption

Unit 5: Distributed databases: **05 Lectures**

Overview of query processing, concurrency control and recovery in distributed databases, overview of client/server architecture and its relationship with distributed databases, performance benchmark and performance tuning of databases.

References:

1. Introduction to Database System – C.J. Date
2. Database Systems – Mcfadden et.al.
3. Database Concepts – Navathe et.al.
4. Database Structured Techniques for Design Performance – S. Atre

B.TECH THIRD SEMESTER
(Computer Science and Engineering)

Paper III: Data Structures

Unit 1: Introduction: **06 lectures**

Data Abstraction and Algorithm, Analysis , Data types / objects / structures, Abstract definition of data structures , Representation and implementation, Time requirements of algorithms, Space requirements of algorithms.

Unit 2: Arrays and Linked list: **10 Lectures**
Array implementation and addressing with examples Array applications and representation, Polynomials, Sparse matrices, String-pattern Matching
Singly liked lists, list heads, circular list, doubly liked lists, orthogonal lists, generalized (recursive) lists, applications.

Unit 3: Stacks and Queues: **06 Lectures**
Basic ideas, array and linked representation. Prefix/ infix / postfix expressions and their inter-conversion for evaluation, Priority, queues and simulation, Recursion

Unit 4: Trees and Graphs :   **12 Lectures**
Definition, terminologies and properties , Binary tree representation traversals and applications, Threaded binary trees, Binary Search trees ,AVL Trees
Definition ,terminologies and properties, Graph representations, Minimum spanning trees , Depth-first search , Breadth-first search , Networks

Unit 5: Sort and Search Algorithms: **06 Lectures**
Internal and External Sorting algorithms , Heap sort, Merge sort, Quick-sort , General radix sort, Symbol tables, sequential search , Binary search , Interpolation search, Tries

References:
1. Data Structures and Program Design- Robert Kruse.
2. Data Structures- Horowitz and Sahni
3. Data Structures through C- A. Tennenbaum

B.TECH THIRD SEMESTER
(Common to ECE and CSE)

Paper IV: Basic Electrical Engineering

Unit 1: D C Generators: **10 Lectures**

Principles and construction of DC machines; E.M.F Equation; Various types of losses occurring in DC Generators; its efficiency; Commutation; Armature reaction; Series , Shunt and Compound Generators; their characteristics and applications; Parallel operation of shunt generators.

Unit 2: D C Motors: 0**7 Lectures**

Types of DC Motors and their Basic characteristics; Torque Equation; Testing of DC motors; Separation of Losses; Need of starters for large motors & their working; Speed control of DC motors

Unit 3: A C Fundamentals & Poly phase Circuits: 0**7 Lectures**

Single phase alternating currents; Average R.M.S values; Form factor; Power factor; Power in AC circuits-Instantaneous power, Average power and Apparent power, Complex power- Active and Reactive power; Power factor in terms of Average & Apparent powers; Poly phase systems, Star and Delta connections, Relationship between line and phase values.

Unit 4 & 5: Electrical Measurements and Measuring Instruments: **16 Lectures**

Principles of operation and construction of moving coil, Moving iron, Dynamometer and induction types of Ammeters & Voltmeters; Extension of their ranges; Measurements of power- Three-ammeters and three voltmeters methods of measuring power in Single phase circuits; Construction of Watt meters; Induction and dynamometers types; Measurement of power in three phase circuit; Balanced and unbalanced three phase loads; Two-wattmeter method; Measurement of very high and very low resistances; measurement of energy; types of single-phase energy meters; errors and adjustments; Measurement of speed

References:

1. Basic Electrical Engineering   I J Nagrath (TMH)
2. Electrical Technology   B.L. Theraja (S. Chand)

B.TECH THIRD SEMESTER
(Common to ECE and CSE)

Paper V: Computer Architecture & Organization

Unit 1:   **08 Lectures**
Basic building blocks of digital computer- Essential and non-essential components; Basic functional block diagram of a computer; Stored Program Concepts, Generation of Computers and Programming languages. Computer memory: Types of read/write memories- Static memory, Dynamic Memory, NVRAM etc., various types of ROMs.

Unit 2: 08 Lectures

Components of CPU, Bus systems, Data path. Instruction set completeness, Instruction Formats. Control unit, Micro-programmed and hardwired controls. CISC and RISC architecture.

Unit 3:   **08 Lectures**

Memory organization, Primary and secondary storages, Cache and its mapping, Memory hierarchy. Basic I/O methods. Memory mapped and Standard Input-Output.
Memory management techniques – Relocation, Swapping, Partitioning, Paging, Segmentation, Combined Systems; Concept of virtual memory.

Unit 4:   **08 Lectures**
Microprocessor: Essential and non-essential components, Microprocessor 8085: Architecture, Instruction set, Addressing modes, Pin diagram, Timing diagram, Interrupts etc. Assembly language programs (for 8085) for simple problems such as Maximum finding, Summation, Sorting, Searching, delay routines etc.

Unit 5:   **08 Lectures**
Microprocessor 8086: Architecture, Addressing modes, Pin diagram, classification of interrupts and interrupt Vector Table. Concept of Math co-processor. Comparative study of microprocessors.

References:

1.   Digital Computer Electronics : Malvino
2.   Microprocessor Architecture Programming Applications with 8085/8080A: Brey
3.   Digital System Design and Microprocessor: Hayes, John P.
4.   Computer Architecture and Organization: Hayes, John P.
5.   Computer System Architecture: Mano, M. M.
6.   Digital Computer Fundamentals: Bartee

B.TECH Third SEMESTER
(Common to ECE and CSE)

Paper VI: Industrial Management   I

Unit 1: Engineering Economics: **08 Lectures**
Nature and scope of economics, Economic decision and Technical decision, Wants and utility, Demand and supply, Elasticity of demand and supply, Concepts of cost and revenue, Concept of equilibrium and margin, Four factors of production and their peculiarities, Money and banking –Function of money, Function of banks, Commercial and central banks, Monetary policy of the Reserve Bank of India.
National Income- Macro Economics approach, GNP, NNP, NI, DI, PI methods of calculation of national income.

Unit 2: Organization: **06 Lectures**
Concepts of organization, Characteristics of organization, Elements of organization, Organizational structure, Organization charts, Types of organization-formal line, Military or scalar organization, Matrix organization, Authority and responsibility, Span of control, Delegation of authority.

Unit 3: Personal Management: **10 Lectures**
Recruitment and training, Labour turnover, Operator training, Suggestion systems
Industrial ownership -Types of ownership-single ownership, partnership, Joint stock company, co-operative societies, public sector, private sector, scientific management-review of different schools of thoughts.
Wages and Incentives: Feature of wages, Time and piece rate, Different incentive plans, Profit sharing, Job evaluation and merit rating , Factors of comparison and point rating .
Industrial Relations- Industrial disputes, Collective bargaining, Trade unions, Workers participation in management, Labour welfare
Industrial safety- Working conditions, Environmental factors, Psychological attitude to work and working conditions, Fatigue, Accidents and Hazards.

References:
1. Industrial Organization and Management: Bethel et.al
2. Principles of Industrial Management: Kootnz & Donnel
3. Financial Management: Prasanna Chandra
4 Industrial Finance of India   S K Basu
5. Operation Management: Fabricky et al

B.TECH FOURTH SEMESTER
(Computer Science and Engineering)

Paper I: Operating Systems

Unit 1: Overview: 08 **Lectures**

Introduction to OS – its functional behavior and responsibilities, Need for some of monitor/command interpreter, Types of operating systems, System structure, Hierarchical and layered organization of OS, Review of I/O and interrupt structure.

Unit 2: Process Management: **08 Lectures**

Operating system kernel, Data structures for processes and resources, Context switching, Process control primitives, Process scheduling.

Unit 3: Memory Management: **08 Lectures**

Memory management concepts, Relocation, Linking, Multiprogramming with fixed partitions, Swapping, Variables partitions, Overlays, Virtual memory, Segmentation, Paging, Storage allocation strategies, Load control and thrashing.

Unit 4: File and I/O Management: **08 Lectures**

Organization of file and I/O subsystems, Directory management, Basic file system, file descriptors, File manipulation, File organization methods, Management of auxiliary storage space, Command language and file system utilities, I/O subsystems, Programmed I/O, DMA, Interrupt driven I/O, Recovery procedures.

Unit 5: Protection and Security: **08 Lectures**

Protection vs. Security, Safeguards, , Protection problems, Formal models of protection.

References:
1 Introduction to Operating Systems: Deitel
2 Operating System Concepts: Peterson and Silbershatz
3 Modern Operating Systems: Andrew S Tanenbaum

B.TECH FOURTH SEMESTER
(Computer Science and Engineering)

Paper II: Theory of Computation

Unit 1: Recursive functions: **06 Lectures**
Partial and Total functions, Products and generalized composition, Initial functions, Primitive recursive functions, Regularity, Minimization, Recursive & Partial recursive functions, Bounded sums and products, Bounded minimization, Ackermann's function

Unit 2: Formal Languages: **06 Lectures**
Strings, Free Semi-group, Languages, Generative grammars and their languages, Chomsky's classification of grammars and languages

Unit 3: Finite Automata: **06 Lectures**
Deterministic and Non-deterministic finite automata, Machines with move on empty strings, Regular sets, Regular expressions, Relationship with regular grammars, Pumping lemma for regular sets and its uses, Closure properties of regular sets, Minimization of finite automata

Unit 4: Context Free Grammars: **10 Lectures**
Derivation trees, Simplification of context free grammars, Chomsky normal form, Greibach normal form, Decision algorithm
Pushdown automata:
Instantaneous description, Languages accepted by finite states and empty stacks, Deterministic pushdown automata, Relationship with context free language

Unit 5: Turing Machines: **12 Lectures**
Instantaneous description, Languages, String manipulation, Turing compatibility of functions, Equivalence between Turing compatibility and partial recursiveness
Undecidability:
Recursively enumerable and recursively decidable languages, Undecidability of decision algorithm for type 0 grammars, Church-Turing Thesis, Halting problem

References:
1. Automata, Language & Computation – Hopcraft & Ullman
2. Theory of Computability – Hennie
3. Formal Languages – Revesz
4. Discrete Mathematical Structures with application to Computer Science – Tremblay & Manohar

B.TECH FOURTH SEMESTER
(Computer Science and Engineering)

Paper III: Design and Analysis of Algorithms

Unit 1: Algorithm Analysis Techniques: **10 Lectures**

Recurrences: substitution, iteration and master methods, Divide-and-conquer: general approach, binary search, merge sort, quick sort, Strassen's matrix multiplication, Greedy algorithms: general approach, activity selection, knapsack problem, minimum-spanning tree, Diskstra's algorithm, Huffman code

Unit 2: Dynamic Programming: **08 Lectures**

General approach, matrix-chain multiplication, all-pairs shortest paths, binary search tree, traveling salesperson, 0/1 knapsack problem

Unit 3: Backtracking: **06 Lectures**

N-queen problem, sum of subsets, knapsack problem, generation of all cliques, traveling salesperson problem, Graph coloring

Unit 4: Randomizing &Approximation Algorithms: **10 Lectures**

Numerical Integration, Primality testing, randomized min-cut, randomized algorithm for n-queens, quick-sort Job scheduling, Bin packing, Set cover, Max cut

Unit 5: Lower Bound Theory: **06 Lectures**

Decision tree, Reduction method, Amortized analysis. NP-completeness, Approximation algorithms

References:
1. Fundamental of Computer algorithms – Horowitz and Sahni
2. The art of Computer Programming – Donald Knuth
3. Design Methods and Analysis of Algorithms – S.K. Basu
4. The Design and Analysis of Computer Algorithms – Aho, Hopcraft and Ullaman
5. Genetic Algorithm in Search, Optimization and Machine Learning – David E. Goldberg
6. Algorithm + Data Structure = Programs – N. Wirth

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper IV: Control Systems

Unit 1: Control System Concepts: **08 Lectures**

The Control Problem; Open-loop and closed-loop control system; Basic characteristics of Feedback Control Systems –Stability, Steady-state accuracy, transient accuracy, Disturbance rejection, Insensitivity & Robustness; Basic modes of feedback control- Proportional, Integral and Derivative.

Unit 2: Mathematical modeling of Dynamic systems: 0**7 Lectures**

Differential equation modeling; Analogous systems; Transfer function modeling; Block diagrams and their reduction; Signal flow graphs and Mason's graph gain formula; Modelling in State space; state diagrams.

Unit 3: Time-domain Analysis: **10 Lectures**

Standard test signals; Steady-state error constants and system types; Response of first and second order systems to standard test signals; Time-domain performance specifications; Derivative feedback control, **Stability Analysis:** Concepts of stability; Routh-Hurwitz criterion; Stability analysis using Root-Locus plots

Unit 4: Frequency-Domain Analysis: **07 Lectures**

Frequency-response plots- Bode plots, Polar plots, log-magnitude vs phase plots; Performance specifications in frequency-domain; Evaluation of closed-loop frequency responses ; Constant M&N circles; Nichols chart; Stability analysis using Nyquist stability criterion; Relative stability phase and Gain Margins.

Unit 5: Control System Design: **08 Lectures**

Preliminary Design consideration; Compensator design using Root-Locus plots- phase-lag, phase-lead and lag-lead compensation; Minor-loop feedback compensation; Compensator design using Frequency-response plots- phase-lag, phase-lead and lag-lead compensation; Minor-loop feedback compensation

References:
1. Modern Control Engineering : Katsuhiko Ogata (Pearson)
2. Control System Engineering: Nagrath & Gopal (New Age)
3. Control System Engineering: Norman S. Nise (John Wiley & Sons Inc)
4. Design of Feedback Control Systems: Stefani , Shahian, et al (Oxford)
5. Automatic Control System: B.C.Kuo. (PHI)

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper V: Signals and Systems

Unuit 1: Representation & Specification of Signals: 08 Lectures

Continuous time signals-– Periodic Vs Aperiodic, Symmetrical Vs Asymmetrical, Continuous Vs discrete. Elementary signals and associated wave forms- The unit-step, Unit Ramp, Unit-impulse and exponential signals. Periodic signals- Sinusoidal, Square, Sawtooth and impulse train, - Energy Vs Power signals,

Unit 2: Representation of Systems: 08 Lectures

Classification of systems- Static vs dynamic, Time variant vs time-invariant, Linear vs non-linear, Casual vs non-casual and stable vs unstable. Linear time-invariant (LTI) systems- definitions and properties, impulse response and transfer function, Convolution, signal transmission through LTI systems, Filter characteristics of linear systems, Bandwidth and rise time, Spectral density, Parseval's theorem, Auto & cross-correlations

Unit 3&4: Probability & Random Variables :   16 Lectures

Random Experiments, Sample space, Events, Definitions of probability, Probability of union of events, Conditional Probability, Bayes' theorem, Independence of events,

Random Variables, Distribution functions, Probability Mass Function (PMF) of Discrete Random Variables, Probability Density Function (PDF) of continuous random variables, Mathematical expectation, Moments

Discrete uniform distributions, Bernoulli distribution, Poisson distribution, Binomial distribution, Continuous uniform distribution, Normal distribution, Exponential distribution, Rayleigh & Maxwell distributions.

Unit 5: Random Processes   08 Lectures

Classification of random processes- Stationary, Ergodic & Stochastic processes, Auto Correlation & power spectral density. Sources of noise, Thermal noise & Shot noise, PDF of envelop of narrow band noise and narrowband noise plus sinusoidal signal.,

References:
1.   Principle of Digital Communication: J. Das (Wiley)
2.   Network Analysis & Synthesis: F.F. Kuo (Wiley)
3.   Signal & Systems: Simon Haykin (Wiley)
4.   Communication Systems: Simon Haykin (Wiley)
5.   Probability Random Variable & Stochastic Process: Papoulis (TMH)
6.   Signals Systems and Communication : B.P.Lathi (Wiley)
7.   Communication Systems : B.P. Lathi (Wiley)

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper VI: Industrial Management   II

Unit 1; Marketing Management: **12 Lectures**
Concept of marketing VS sales approach , Consumer behavior and demand concept, Buying motives, Influence of income level, Product design , New product distribution , Pricing methods and tools , Break even analysis and marginal costing in pricing , Sales promotion, Marketing research, Test marketing , Marketing of services, Advertising management-types of advertising , Choice of media , Economic and Psychological factor s in advertising .

Unit 2; Finance Management: **12 Lectures**
Tasks , Evolution of corporate management , Long term financing , Equity , Preference and Debenture capitals, Term loans , Dividends and share valuation, Legal aspects of dividends , Short term financing , Working capital influencing factors , Cash budgeting , Term of liquidity , Management of receivable and inventories , Budgets and Budgetary control – objectives of budgeting , classification, ratio analysis.
Management Accounting: Fundamentals of Book-keeping, Journalizing, Ledger accounts, Subdivision of journal, Cash book, Banking transactions, Trial balance, Preparation of trading, Profit and Loss account, and Balance sheet, Adjustments

References:
1. Industrial Organization and Management: Bethel et.al
2. Principles of Industrial Management: Kootnz & Donnel
3. Financial Management: Prasanna Chandra
4 Industrial Finance of India   S K Basu
5. Operation Management: Fabricky et al

B.TECH FIFTH SEMESTER
(Computer Science and Engineering)

Paper I: Artificial Intelligence

Unit 1: Introduction: **08 Lectures**

What is AI?; Scope of AI: Games, theorem proving, Natural language processing, Vision and speech processing, Robotics & Expert systems, AI techniques, Introduction to intelligent agents.

Unit 2: Search Techniques: **08 Lectures**

State space search, control strategies: Depth first search, Breadth first search and Production systems; Use of heuristics: Hill climbing, Best first search, A* algorithm- admissibility, AND/OR graph – AO*, Constraint satisfaction; Game playing: Minimax and Alpha-Beta searching, Genetic algorithms.

Unit 3 & 4: Knowledge Representation: **16 Lectures**

Propositional logic: its syntax and semantics; Reasoning patterns in propositional logic: Resolution, forward and backward reasoning.First order logic: Syntax and semantics; Inference in first order logic: Unification, Forward & backward chaining, Resolution., Structured knowledge representation: Semantic Net, Frames, and Conceptual graphs.
Uncertain knowledge and reasoning: Introduction to probabilistic reasoning; representing vagueness- fuzzy sets and fuzzy logic.

Unit 5: Machine Learning: **08 Lectures**

Different forms of learning; Concept learning system; Inductive learning; Learning decision trees; Neural network: single layer feed forward network.

References:
1 Artificial Intelligence: Rich and Knight
2 Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig
3 Introduction to Artificial Intelligence: Partick Winston
4 Artificial Intelligence: Nilsson

B.TECH FIFTH SEMESTER
(Computer Science and Engineering)

Paper II: Compiler Design

Unit 1: Introduction: **08 Lectures**

Compilers and Translators, Overview of the Compiling Process, Syntactic and Lexical Structure of a Language.

Unit 2: Lexical Analysis   **08 Lectures**

Regular Expression, Finite Automata, Specification and Recognition of Tokens, Simple Approaches to Lexical Analyzer Design.

Unit 3: Syntactic Analysis   **08 Lectures**

Context free grammar, Syntax and Parse Trees, Derivation of parse trees, ambiguity, Top-Down and Bottom-Up Parsing, Basic parsing techniques: shift reduce, operator- precedence, predictive parsing, LR Parsers.

Unit 4: Intermediate Code: **08 Lectures**

Postfix notation, syntax trees, three address code (quadruples, triples and indirect triples), Syntax directed translation, Symbol table organization, Run time storage management, Error detection and recovery

Unit 5: Code Generation and Optimization: **08 Lectures**

Basic issues in code generation and optimization, Elementary idea about loop optimization, DAG, Global data flow analysis, Register utilization, usage count analysis, heuristic ordering algorithm for DAG and optimal ordering algorithm for trees, peephole optimization

Book Recommended:

(1) The Theory and Practice of Compiler Writing: -Trembley and Sorenson
(2) Principles of Compiler Design: -Aho and Ullman
(3) Compilers: Principles, Techniques and Tools   -Aho, Ullman and Sethi
(4) The Essence of Compilers   -Robin Hunter

B.TECH FIFTH SEMESTER
(Computer Science and Engineering)

Paper III: Computer Graphics

Unit 1: Introduction to Computer Graphics: **10 Lectures**

Introduction, Graphics display devices, Graphics Input & Output devices, Raster scan graphics, Line and Circle generation techniques, Scan conversion, Frame buffer, Filling algorithms.

Unit 2: Geometrical Transformation: **10 Lectures**

Two dimensional transformations, Clipping and windowing methods for 2D images, Three dimensional transformations, Parallel and perspective projections, Viewing transformations and viewing systems.

Unit 3: Curves   **04 Lectures**
Parametric and non-parametric curves and their representations, Cubic splines, Bezier and B-splines

Unit 4: Surfaces   **06 Lectures**

Parametric surfaces, Surfaces of revolution, Sweep surfaces, Quadric surfaces, Bilinear surfaces, B-spline and Bezier surfaces, Generalized cylinders and cones, Polygon mesh and wire-frames.

Unit 5: Realism in 3-D Graphics: **10 Lectures**

Hidden lines and hidden surfaces, Floating horizon algorithm, Roberts algorithm, Phong reflection model, Incremental shading techniques, Gouraud and Phong shading, Rendering process, z-buffer algorithm, Scan line and area coherence methods. Introduction to Ray tracing

References:
1 Computer Graphics: Principles and Practice: Foley et al.
2 Computer Graphics: Hern and Baker
3 Procedural elements in Computer Graphics: David F. Rogers
4 Computer Graphics: A. Plastock and Gordon Kelley
5 Computer Graphics for IBM PC: J. Mcgregger and Alan Watt
6 Mathematical Elements for Computer Graphics: David F. Rogers and J.A.Adams
7 Three-Dimensional Computer Graphics: Allan Watt

B.TECH FIFTH SEMESTER
(Computer Science and Engineering)
Paper IV: Web Technology

Unit I   **08 lectures**
Core Java: Introduction, Operator, Data Type, Variable, Control Statements, Methods and Classes, Inheritance, Package and Interface, Exception Handling, Multithreading programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT controls, Layout managers, Menus, Images, Graphics.

Unit II   **08 lectures**
Communication Issues, the Client, Multi-departmental & Large scale Websites, Quality Assurance and testing, Technological advances and Impact on Web Teams.
HTML: Formatting Tags, Links, List, Tables, Frames, Forms, Comments in HTML,DHTML.

Unit III   **08 lectures**
Java Script: Introduction, Documents , Forms, Statements, Functions, Objects in JavaSScript, Events and Event Handling, Arrays, Buttons, Checkboxes, Text fields and Text areas.

Unit IV   **08 lectures**
XML: Introduction, Displaying an XML Document, Data Interchange with an XML document, Document type definitions, Parsers using XML, Client-side usage, Server Side usage.

Unit V   **08 lectures**
Common Gateway Interface(CGI), PERL,RMI, COM/DCOM, VBScript, Active Server Pages(ASP).

References:
1. Burdman, "Collaboratie Web Development", Addison Wesley.
2. Sharma & Sharma, "Developing E-Commerce Sites" , Addison Wesley.
3. Ivan Bayross, "Web Technologies Part II", BPB Publications.
4. Margaret Levine Young, " The complete Reference INTERNET", TMH
5. Naughton, Schildt, "The Complete REfernce JAVA @", TMH
6. Balaguruswamy E, " Programming in JAVA"< TMH
7. ShishirGundavarma, "CGI Programming on the world Wide Web", O'Reilly & Associate.
8. DON Box, " Essential COM", Addison Wesley.
9. GergBuczek, " ASP Developer's Guide", TMH

B.TECH FIFTH SEMESTER
(Common to ECE and CSE)

Paper V: Computer Networks

Unit 1: Introduction: **08 Lectures**
History of data communication, Advantages and Disadvantages of a Computer Networks; Classification of Computer Networks; Active and Passive Components used in a network design; Importance of channel bandwidth and system noise, Protocols and their role in computer network

Unit 2: Data Transmission Basics: **08 Lectures**
Error detection and correction methods, Data compression, Protocol basic, Circuit, Message, Packet and Cell switching, Connection oriented and connectionless services, ISO-OSI model, TCP/IP model, UDP

Unit 3: Computer Network Basics: **08 Lectures**
Physical layer communication, Media, Signals and Bits, Time division and frequency division multiplexing, Encoding, Modulation, Delay, Bandwidth and noise; Comparative Study of various media used in Connection oriented networks and connection-less networks; Network and packet communication, Network topology, LAN wired/wireless, Ethernet, CSMA/CD, CSMA/ CA, Token passing rings, FDDI, Wireless networks

Unit 4: Network Devices: 0**8 Lectures**
Network Interconnections with repeaters, Switches, Bridges, Routers and gateways, DSU/CSU, XDSL and cable modems, Store and forward, Next-Hop forwarding, Wide Area Network, Router & Routing Techniques

Unit 5: Inter-networking: **08 Lectures**
IP addressing, Subnetting, CIDR, Address binding with ARP, Datagram encapsulation and fragmentation, Adaptive retransmission, ICMP and error handling; Network applications, Client-Server concepts and application, DNS, HTTP, Email and web browsing, Broadband Multi-Service networks, FDDI- II, Cell based networks, ATM LANs, ISDN; Introduction to IPV6

References:
1. Computer Networks :Tanenbum, A.S
2. Data and Computer communication :Stallings, William
3. Inter Networking With TCP/IP Vol I, II,III: Comer, D.E. and Stevens D.L.
4. Computer Network and Distributed Data Processing : Martin.J.
5. Local Networks : Stalling, William
6. Data Communication and Networking : Forouzan, B.A
7. Tele Communication Switching Systems and Networks: Viswanathan Thiagrajan

B.TECH FIFTH SEMESTER
(Common to ECE & CSE)

Paper VI: Digital Communication I

Unit 1: Basic Information Theory & Channel Capacity: **10 Lectures**

Mathematical models for information sources; Discrete memory-less source; Logarithmic measure of information; Entropy as a measure of Uncertainty; Interrelations between entropies; Conditional entropies; Average Mutual information, Properties of Mutual information; Binary Symmetric Channels, Discrete memory-less channels, Shannon- Hartley capacity theorem, Shannon's limit; Capacity of a channel of infinite Bandwidth; Equivocation and effective transmission rate.

Unit 2: Source Coding: **06 Lectures**

Coding for discrete memory-less source; Fixed length code words; Source coding theorem; Variable length code-words; Unique decodability and prefix conditions; Kraft inequality; Significance of prefix condition; Shannon-Fano coding; Huffmann Coding Technique

Unit 3 & 4: Channel Coding: **16 Lectures**

Linear block codes- Introduction to Galois field algebra; Linear block Codes- the Generator matrix & Parity check matrix; Construction of standard array; Syndrome calculation; Hamming weight and Hamming distance; Error correcting and detecting capability of linear codes; Hamming codes; Hadamard codes
Definition and algebraic structure of cyclic codes, Binary cycle properties; Encoding in Systematic forms; Circuits for dividing polynomials; Systematic encoding with an (n-k) stage shift register; Syndrome calculation and error detection with an (n-k) stage shift register.

Convolutional Codes-Convolutional encoding; Representation of convolutional Encodes; The state diagram; The tree diagram; The trellis diagram; Optimum decoding of the Convolutional codes- The Viterbi algorithm, Sequential decoding; Comparison and Limitations of Viterbi and Sequential decoding; Distance properties of convolutional codes; Error correcting capability of convolutional codes.

Unit 5: Pulse Code Modulation: **08 Lectures**

Basic elements of a PCM System, Quantization Electrical representation of binary digits, Companding, Differential PCM, Delta Modulation, Adaptive delta modulation, Comparison of ADM & DM,

References:
1.Modern Digital Communication System: B.Sklar (Addition Wesley)
2.Principle of Digital Comm: J. Das, S.K. Mullick, P.K. Chatterjee (Wiley)
3.Digital Communication: John G. Proakis (TMH)
4.An Introduction to Error Correcting Codes : S. Lin (McGraw Hill)
5.Digital Communication : S. Haykin (Wiley)
6.Digital Communication : Fundamentals & Applications : B. Sklar (Pearson)

B.TECH SIXTH SEMESTER
(Computer Science and Engineering)
Paper 1: Advanced Concepts of Programming Languages

Unit 1:   **08 Lectures**

Programming language Concepts, Paradigms and models, Typed vs. un-typed languages, Procedural languages, declarative languages, block structured languages, , object oriented languages,

Unit 2:   **08 Lectures**

Data types, Control structures, I/O statements, User-defined and built-in functions, parameter passing

Unit 3:   **08 Lectures**

Object Oriented Concepts: Data abstraction, Class, object, Polymorphism, inheritance, different types of polymorphism and inheritance, dynamic binding,   reference semantics and their implementation

Unit 4:   **08 Lectures**

Horn Clause and their execution, example programs in Prolog

Unit 5:   **08 Lectures**

Case study and Lab: Any two of JAVA/ C++/Prolog/Python/C#

B.TECH SIXTH SEMESTER
(Computer Science and Engineering)
Paper II: Operational Research

Unit 1: Network Analysis: **06 Lectures**
Terminology of network, Shortest route problem, minimal spanning tree problem, max-flow problem.

Unit 2: Project Scheduling by PERT, CPM: **08 Lectures**
Diagram, representation, critical path calculation, construction of time chart and resource labeling, probability and cost   consideration in project scheduling, project control.

Unit 3: Linear Programming: **10 Lectures**
Simplex Method, Revised simplex method, Duality in Linear   programming, Application   of   Linear Programming to Economic and Industrial Problems.

Unit 4: Nonlinear Programming: **5 Lectures**
The Kuhn-Tucker conditions, Quadratic programming, Convex programming.

Unit 5: Replacement Models & Sequencing Model: **11 Lectures**
Introduction, Replacement policies for items whose efficiency deteriorates with time, Replacement policies for items that fail   completely
Classification of self problems, processing of n jobs through   two machines, three machines, processing of two jobs through m machines

References:
1. Operations Research- Taha
2. Introduction to Operations Research- B.E. Gillet
3. Optimization Theory and   Applications- S.S.Rao
4. Linear programming- G.Hadley

B.TECH SIXTH SEMESTER
(Computer Science and Engineering)

Paper III: Advanced Computer Architecture

Unit 1: CPU architecture: **08 Lectures**

Comparative study of 32-bit processors; Comparative study of Microcontrollers; Future Trends

Unit 2: Parallel Processing Systems: **08 Lectures**

Flynn's Classification, Pipeline Processors, Instruction Pipelining, Internal Forwarding, Pipeline Hazards, Tightly & Loosely coupled systems; Job Sequencing & Collision prevention, Interleaved Memory; Amdahl's Law; Vector Processing, Design of Vectorizing compilers, Automatic detection of parallelism,

Unit 3: Case Studies of Array & Vector Processors: **08 Lectures**

Case studies of vector processors, Array processors, Network design issues, Mesh Network, Barrel Shifter, Cube, Hypercube, Parallel algorithms on hyper cubes, Multiprocessor system, Multiprocessor interfacing schemes

Unit 4: Other Architectures: **08 Lectures**

RISC; Comparison with CISC; Parameter passing in RISC, Comparison of commercial RISC systems; Systolic Architecture; Data flow architectures; Comparison with control flow systems; Template implementation; Transputer architecture; Communication channels; Occam & programming environment

Unit 5: Introduction to Parallel Algorithms: **08 Lectures**

Addition on Tree, Cube, Mesh, Linear Array, PSN, etc. Matrix multiplication on Mesh, Cube, Torus, etc.; Parallel Sorting; Associative Processing

References:
1. Computer Architecture & Parallel processing – Hwang & Briggs
2. Computer Architecture – Jean Loop Bear
3. Introduction to Distributed and Parallel computing- Crichlow
4. Designing Efficient Algorithms for parallel Computers- M.J.Quinn
5. Introduction to Parallel Algorithms- Joseph JA
6. The Design and Analysis of Parallel Algorithms- S.G.Akl

B.TECH SIXTH SEMESTER
(Computer Science and Engineering)

Paper IV: Software Engineering

Unit 1: Evolution and Scope of Software Engineering: **08 Lectures**

Introduction to Software Engineering: Definitions, Software development and life-cycle models, Introduction to SEI-CMM

Unit 2: Software Project Management: **08 Lectures**

Project Planning, Cost and Resource Estimation, Project Scheduling, Project Control, Risk Management

Unit 3: Software Requirement Analysis: **08 Lectures**

Principles, Tasks, Techniques, Software prototyping, Requirements specifications - Principles and Representation, Structured analysis

Unit 4: Software Design Process: **08 Lectures**

Fundamental principles, Design Techniques, Structured Design, User Interface Design

Unit 5: Software Testing and Debugging: **08 Lectures**

Software verification and validation fundamentals, Testing principles- White box and Black box testing, Static analysis, Symbolic execution, Testing strategies, Debugging.

References:
        1 Software Engineering: Ian Sommerville, Pearson Education
        2 Software Engineering: R. S. Pressman, McGraw Hill
        3 An Integrated Approach to Software Engineering: Pankaj Jalote

B.TECH SIXTH SEMESTER
(Computer Science and Engineering)

Paper V: Machine Learning

Unit 1:   **08 Lectures**

Machine learning problems, types of learning, designing a learning system, Introduction of inductive learning, learning semantic networks, general setting for induction

Unit 2:   **08 Lectures**

Languages for learning, version space learning, Induction of decision trees, OneR, ID3, Relational Learning and Inductive Logic Programming, Bayesian learning, Bayesian belief networks

Unit 3:   **08 Lectures**
Supervised learning setup. LMS, Logistic regression. Perceptron, Exponential family, Generative learning algorithms. Gaussian discriminant analysis. Naive Bayes, Support vector machines.

Unit 4:   **08 Lectures**

Instance-based learning, Analytical (Explanation-Based) Learning, Unsupervised learning: clustering, K-means, EM, PCA

Unit 5:   **08 Lectures**
Deep learning, neural networks and convolutional neural networks, end-to-end learning, recurrent networks, generative models, variational inference

Recommended readings

1. Bishop, Christopher - Neural Networks for Pattern Recognition
2. Duda, Richard, Peter Hart, and David Stork - Pattern Classification
3. Hastie, T., R. Tibshirani, and J. H. Friedman - The Elements of Statistical Learning: Data Mining, Inference and Prediction
4. David - Information Theory, Inference, and Learning Algorithms
5. Mitchell, Tom - Machine Learning

B.TECH SIXTH SEMESTER
(Common to ECE and CSE)

Paper VI: Digital Signal Processing

Unit 1: Discrete Time Signal and Systems: **06 Lectures**

Signal and system classifications, Time and frequency domain representation, Analysis of discrete time linear time invariant system, Discrete time system described by difference equation, Stability and Causality, Frequency domain & time domain stability criteria, frequency response of LTI system.

Unit 2: Z-Transform & Discrete Fourier Transform (DFT):   **10 Lectures**

Z – Transform and its properties, Z – Transform of simple functions, Inverse Z – Transform, Analysis of LTI system in Z – domain. Convergence of DFT, DFT of periodic signals; properties of DFT; DFT & convolution; Application of DFT to LTI system analysis, FFT algorithms and their applications

Unit 3: Realization of Digital Systems: **06 Lectures**

Recursive and non recursive structure of digital system, Direct, cascaded, parallel, ladder and lattice realization.

Unit 4 & 5: Design of Digital Filters: **18 Lectures**

IIR Digital Filter- IIR filter designs by approximation of derivatives, impulse invariant and bilinear transformation methods, Frequency transformation,

FIR digital Filter- Design of linear phase FIR filters by using windows and frequency sampling methods,

Finite Word Length Effects- Quantization errors and their effects on the performance of digital signal processors

References:

1. Digital Signal Processing: J.G. Proatais (PHI)
2. Discrete Time Signal Processing: Openheim & Shafer (PHI)
3. Signal Processing & Linear Systems: B.P. Lathi (Oxford)
4. Principles and Application of Signal Processing: Robiner Gold (PHI)

B.TECH SEVEN SEMESTER
(Computer Science and Engineering)

Paper I: Big Data Analysis

Unit 1: Introduction: **08 Lectures**
Data Science, Big Data and its importance, Prediction vs. Inference, Statistical learning, Unsupervised and Supervised learning, Drivers for Big data, Big data analytics, Big data applications, Basic R concepts, Data transformation and data visualization in R.

Unit 2: Hadoop: **08 Lectures**
Introduction to Hadoop and Hadoop Architecture, Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop, Understanding inputs and outputs of MapReduce.

Unit 3: Querying in Big Data: **08 Lectures**
HDFS Overview, Hive Architecture, Comparison with Traditional Database, HiveQL Querying Data, Sorting and Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper,HBase uses Zookeeper.

Unit 4: Data Base for the Modern Web: **08 Lectures**
Introduction to Mongo DB key features, Core Server tools, Mongo DB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents, MongoDB Query Language.

Unit 5: Big Data Security: **08 Lectures**
Big Data Privacy, Ethics and Security, Steps to secure big data, Cloud security, Hadoop Security Design, Hadoop Kerberos Security Implementation & Configuration, Audit logging in Hadoop cluster, Data security and event logging.

Recommended Readings:
1. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley
2. Chris Eaton,Dirk Derooset. al. , "Understanding Big data ", McGraw Hill
3. Kyle Banker,PiterBakkum, Shaun Verch, "MongoDB in Action", Dream tech Press
4. Tom White, "HADOOP: The definitive Guide", O Reilly
5. VigneshPrajapati, "Big Data Analyticswith R and Hadoop", Packet Publishing.

B.TECH SEVENTH SEMESTER
(Common to ECE and CSE)

Paper II: Mobile Communication

Unit1.   **08 Lectures**
Introduction, Applications, History, A Simplified Reference Model, Wireless Transmission, Frequency For Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

Unit 2   **08 Lectures**
Medium Access Control, Hidden And Exposed Terminals, Near And Far Terminals, SDMA, FDMA, TDMA, CDMA, Elements Of Cellular Radio System Design, Introduction To Cellular Mobile Systems, Why Cellular Mobile Systems, A Basic Cellular System, Elements Of Cellular Radio System Design, Concept Of Frequency Reuse Channels, Hands Off, Cell Splitting.

Unit 3:   **08 Lectures**
Mobile Network Layer, Mobile IP, IPv6, Dynamic Host Configuration Protocol, Mobile Ad-Hoc Networks, Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

Unit 4:   **08 Lectures**
Mobile Transport Layer, Traditional TCP, Congestion Control, Slow Start, Fast Retransmit/ Fast Recovery, Implication Of Mobility, Classical TCP Improvements, TCP Over 2.5/ 3G Wireless Networks, Performance Enhancing Proxies.

Unit 5:   **08 Lectures**
GSM, Mobile Services, System Architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New Data Services.

References:
1. *Mobile Cellular Telecommunication: Analog and Digital Systems by W.C.Y Lee, Mc Graw- Hill.*
2. *Mobile Communications by Jochen Schiller, Pearson Education.*

B.TECH SEVEN SEMESTER
(Common to ECE and CSE)

Paper III: Microcontroller and Microprocessor Interfacing

Unit 1:   **08 Lectures**
Princeton and Harvard Architecture, Microcontrollers, Comparison of microprocessors and microcontrollers, Microcontroller survey – microcontrollers of different word length, make and features, selection criteria for microcontroller, 8051 microcontroller hardware – pin diagram and internal architecture, Memory organization.

Unit 2:   **08 Lectures**
Special Function Registers, Interrupts, I/O port circuits, interfacing external memory and external device. Instruction set, addressing modes and assembly language programming, simple Programs.

Unit 3:   **08 Lectures**
Memory Interfacing with Microprocessor, Memory Organization and interleaving, Interfacing Read-Write memory chips and ROM/EPROM chips, e.g., IC 8155 (Static Ram with I/O Ports and Timer), 8755 (EPROM with I/O Ports) and other commonly used ICs.

Unit 4:   **08 Lectures**
Input –Output Communication. Serial and Parallel communication, Synchronous and Asynchronous Data Transfer, Strobe method, Handshaking. Interrupts, Basic Input-output methods and transfer modes. Polling, daisy chain arrangement, Bus Arbitration, Priority control.

Unit 5:   **08 Lectures**
Functions and study of 8251A (USART), 8255A(Programmable Peripheral Interface), 8257 (DMA Controller), 8259A (Programmable Interrupt Controller)

References:
[1] Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education
[2] D. V. Hall: Microprocessors and Interfacing, TMH.
[3] Ayala Kenneth:The 8051 microcontroller, Third Edition, Cengage Learning
[4] Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
[5] P.K. Ghosh and P. R. Sridhar, 0000 to 8085 Introduction to microprocessor for Engineers and Scientists, PHI, 2/e
[6] C. K. Dwivedi, Solid State circuit design with Microcontrollers.

B.TECH SEVENTH SEMESTER
(Common to ECE and CSE)

Paper IV: Image Processing

Unit 1: Introduction: **08 Lectures**

Image representation and modeling, 2-D linear system, Luminance, Contrast and Brightness, Color representation, Visibility functions, Monochrome and color vision model.

Unit 2: Image Quantization and Image Transforms: **08 Lectures**

Sampling theorem, Anti-aliasing, image quantization, Orthogonal and unitary transforms, DFT, Cosine transform, Hadamard transform, Haar transform, KL transform.

Unit 3: Image Enhancement: **08 Lectures**

Point operation, Histogram modeling, Filtering and spatial operations, Transform operations, Multispectral Image Enhancement

Unit 4: Image Restoration: **08 Lectures**

Image formation models, Noise models, Inverse and Wiener filtering, Least square filters, Recursive filters, Maximum entropy method, Blind deconvolution, Bayesian method of noise removal, Image reconstruction, Tomography, Radan transform, Back-projection, Reconstruction algorithm, Algebraic method of reconstruction, Fan-beam reconstruction.

Unit 5: Data Compression: **08 Lectures**

Data compression vs. Bandwidth, Pixel coding, Predictive coding, Transform coding, Coding of two-tone images.

References:
        1. Fundamentals of Digital Image Processing: Anil K. Jain
        2. Digital Image Processing: R. Chellappa
        3. Image Processing for Scientific Applications: Bernd Jahne
        4. Digital Image Processing: R.C. Gonzalez & R.E. Woods
        5. The Image Processing Handbook: J.C. Russ
        6. Digital Image Processing: W.K. Pratt
        7. Digital Image Restoration: Andrews & Hunt

B.TECH EIGTH SEMESTER
(Computer Science and Engineering)

Paper I: Cyber Security

Unit 1: Introduction: **08 Lectures**
Nature of cyberspace, Technical aspects of threats and vulnerabilities, Vulnerability scanning, vulnerability probe, Open VAS, Networks vulnerability scanning, Network sniffers and injection tools

Unit 2: Network Defense tools: **08 Lectures**
Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Denial of service attacks, Snort: Introduction Detection System

Unit 3: Web Security: **08 Lectures**
Basic web security model, Web application security, Session management and user authentication, HTTPS: goals and pitfalls, Content security policies, Web workers and extensions, Introduction to web application tools

Unit 4: Security in mobile platform: **08 Lectures**
Mobile platform security models, Understanding Android security, Real time privacy monitoring on smartphones, Mobile threats and malware, Mobile web app security

Unit 5: Cyber Crime and law: **08 Lectures**
Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Introduction to Incident Response, Digital Forensics, Network Language, Computers as Targets, Contaminants and Destruction of Data, Password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, SQL injection, Indian IT ACT 2000.

Recommended Readings:
1. Dieter Gollmann, "Computer Security", Wiley
2. Ross Anderson, "Security Engineering", Wiley
3. Nina Godbole and SunitBelpure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley

B.TECH EIGTH SEMESTER
(Computer Science and Engineering)

Paper II: Multimedia Technology

Unit 1: Multimedia Technology: **08 Lectures**
Elements of Multimedia; Creating multimedia applications; Multimedia file & I/O functions; Multimedia data structures; Multimedia file formats; Multimedia Protocols

Unit 2: Multimedia Audio: **08 Lectures**
Digital sound; Audio compression & decompression; Companding; ADPCM compression; MPEG audio compression; True Speech; Special effects and Digital Signal Processing; Audio synthesis; FM synthesis; Sound blaster card; Special effect processors on sound cards; Wave table synthesis; MIDI functions; Speech synthesis & Recognition

Unit 3: Multimedia Video: **08 Lectures**
Representation of Digital video; Video capture; Frame grabbing; Full motion video; Live video in a window; Video processor; Video compression & decompression; Standards for video compression & decompression; Playback acceleration methods

Unit 4: Creating Multimedia Animation: **08 Lectures**
Icon animation; Bit-map animation; Real-time vs Frame by Frame animation; Object modeling in 3D animation; Motion control in 3D animation; Transparency; Texture, Shadows, Anti-aliasing; Human modeling & Animation; Automatic motion control

Unit 5: Multimedia Authoring Tools: **08 Lectures**
Project editor; Topic editor; Hot-spot editor; Developing a multimedia title; Multimedia text authoring systems; Usage of authoring tools; Multimedia DBMS; Documents, Hypertext and MHEG; Multimedia on LAN; Video Conferencing techniques

References:
1. Multimedia: Computing, Communications & Applications – Nahrstedt & Steinmetz
2. Computer Speech Processing – Fallside F.
3. Speech Analysis, Synthesis & Perception – Flanagan,J.L.
4. Hypertext & Hypermedia- Nielsen J.
5. Digital Processing of Speech Signala- Rabiner L.R. & Schafer L.W.

B.TECH EIGHT SEMESTER
(Common to ECE and CSE)

PAPER III-A (Elective): Mobile Adhoc Networks (MANET)

Unit 1: Mobile Ad Hoc Network: **08 Lectures**
Introduction, Wireless Networks, Mobile Ad Hoc Network- Definition, History. MANET Applications and Scenarios, Ad Hoc Network Characteristics, Classification of Ad Hoc Networks.

Unit 2: MAC Layer Protocols for Ad Hoc Wireless Networks: **08 Lectures**
Introduction, Important Issues and the Need for Medium Access Control (MAC) Protocols, Classification of MAC Protocols- Contention-Based MAC Protocols, MAC Protocols Using Directional Antennas, Multiple-Channel MAC Protocols, Power-Aware or Energy-Efficient MAC Protocols.

Unit 3: Routing Protocols for Ad Hoc Wireless Networks: **08 Lectures**
Introduction, Design Issues of Routing Protocols for Ad Hoc Networks, Classification of Routing Protocols. Proactive Routing Protocols – Destination-Sequenced Distance Vector (DSDV), Optimized Link State Routing (OLSR) Protocol. Reactive Routing Protocols- Ad Hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR) Protocol. Hybrid Routing Protocols - Zone Routing Protocol (ZRP).

Unit 4: Transport Protocols for Ad Hoc Networks: **08 Lectures**
Introduction, Transmission Control Protocol's (TCP's) Challenges and Design Issues in Ad Hoc Networks, TCP Performance over That of Mobile Ad Hoc Networks (MANETs), Ad Hoc Transport Protocols, Application-Controlled Transport Protocol (ACTP).

Unit 5: Mobility Models for Ad Hoc Networks: **08 Lectures**
Introduction, Mobility Metrics, Impact of Mobility Models on MANET, Mobility Model Classifications, Random Walk Mobility, Random Way-point Mobility.

References
1. Jonathan Loo,Jaime Lloret, and Jesus Hamilton Ortiz, "Mobile Ad Hoc Networks – Current Status and Future Trends " CRC Press, Taylor & Francis Group 2012.
2. Subir Kumar Sarkar,T G Basavaraju and C Puttamadappa, "Ad Hoc Wireless Networks-Principles, Protocols and Applications" Auerbach Publications, Taylor & Francis Group, New York London, 2008.
3. Radhika Ranjan Roy "Handbook of Mobile Ad Hoc Networks for Mobility Models" Spriger 2011.

B.TECH EIGHT SEMESTER
(Common to ECE and CSE)

Paper IV-A (Elective): Embedded Systems

Unit 1: Introduction to Embedded Systems: **08 Lectures**
Embedded System Overview,Common Design metrics, General Purpose Processors and Application Specific Processors. Software and hardware combination for making an Embedded System.Concept of various types of memories for implementation of Embedded Systems.

Unit 2: Selection Criteria of Hardware for Embedded System Design: **08 Lectures**
Comparing use of Microprocessor and Microcontroller, PLDs and FPGA for developing an Embedded System. Elementary idea of commonly used microcontroller. Criteria for selection of microcontroller and other interfacing hardware.Architectural block diagram of MCS 51 microcontroller family. Memory organization. Code Memory, Data memory and special function register. Internal circuit and capabilities of various I/O ports pins.

Unit 3: Working of microcontrollers: **08 Lectures**
Clock cycles, Machine cycle and Instruction cycles and timing diagrams for various essential control signals. Division of Machine cycles in to states and phases.
Instruction length and execution time for instructions. Categorization of instruction and various addressing modes. Conditional and unconditional jump instructions.Boolean instructions. Read pin and read latch instructions.SFRs and their purpose. Control of interrupts. Timers, Power status and I/O functions by SFR's. Addressing of SFR's. Various modes of Timers and their controls.

Unit 4: Interfacing: **08 Lectures**
Block diagram for Input Output Ports internal Structures and their capabilities for 89C51 and 89C2015 Microcontrollers. Interfacing with external devices. Address for ports and pins. Interfacing with external hardware keys and displays devices. Circuits and criteria for interfacing LEDs,Seven segment display.

Unit 5: Programming: **08 Lectures**
Instruction format for instruction of MCS-51 family microcontrollers. Program and Machine control. Boolean variable manipulation. Data transfer. Arithmetic and Logic Operations. Interrupts and data polling for multiple subroutines in a program. Look up tables and use of data stored in code memory.

References:
[1] Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems.
[2] C. K. Dwivedi, Solid State circuit design with Microcontrollers.
[3] Ayala Kenneth:The 8051 microcontrollerArcitecture, Programming and Applications.
[4] Raj Kamal: Embedded Systems- Architecture, Programming and Design.
[5] Raj Kamal: Microcontrollers

B.TECH THIRD SEMESTER
(Electronics and Communication Engineering)

Paper I: Network Analysis & Synthesis

Unit 1: Network Graph Theory: 08 **Lectures**

Review of Conventional Circuit Analysis Techniques, Analysis of Electrical Circuits using Laplace Transform, Basic definitions and properties of linear graphs, Matrices of graphs, Equilibrium equations, Generalized nodal and loop analysis

Unit 2: State Variable Techniques: 06 **Lectures**

The concept of state variables of networks; Formulation of state equations and their solutions for linear time invariant networks.

Unit 3: Signal flow Graphs   0**6 Lectures**

Definition and properties of SFG; SFG models of linear circuits, Reduction of SFG, Mason's graph gain formula.

Unit 4: Network Functions: 10 **Lectures**

Driving point and Transfer functions, Poles and Zeroes of network functions; Properties of Network functions and restrictions on pole and zero locations; Plots of Network functions; Relation between pole zero locations and time domain behavior; Parts of Network functions ; Calculation of Network function from its given parts.

Unit 5: Network Synthesis: 10 **Lectures**

Positive real functions; Definition, properties and testing of positive real functions; Herwict polynomials; synthesis of Driving point functions of two-element kind one-port network.

References:

1. Network Analysis & Synthesis: F.F. Kuo (Wiley)
2. Network Synthesis: Van Valkenburg (PHI)
3. Linear Network Theory: N.Balabanian (Matrix Publisher)
4. Circuit Theory: Ronald A. Rohrer (TMH)
5. Networks, Filters…… : Ruston & Bordogna

B.TECH THIRD SEMESTER
(Electronics and Communication Engineering)

Paper II: Electronic Instrumentation & Measurement

Unit 1: Measurement Fundamentals: **07 Lectures**
Definition of measurement and instrument, Accuracy, Precision, Sensitivity, Resolution, Range, Stability, Dynamic response and repeatability of measuring instruments
Loading effect, loading effect due to shunt-connected instruments, loading effects due to series connected instruments.
Standards – International standards, Primary and secondary standards, Working or industry standards in measurements, Calibration, Calibration check and periodic calibration of instruments

Unit 2: Electronic Volt OHM Meters: **07 Lectures**
Analog type VOM – Principles of operation, working and construction; Bipolar transistor type electronic multi meter, FET bridge type multi meter ; Comparison of analog, VOM and EMM, Chopper type Electronic DC voltmeter, MOSFET electrometer, Digital Multi meter Error in DMM measurement

Unit 3: Waveform Measurement Using CRO: **08 Lectures**
Block diagram of CRO, Construction and principle of operation, sensitivity, Trigger synchronization, special features of dual trace, Double beam delayed sweep and storage oscilloscopes, Front Panel controls, oscilloscope probes, Amplitude, Frequency, time period and phase measurement, Amplitude modulation measurement.

Unit 4: Time and Frequency Measurement: **06 Lectures**
Measurement of frequency by resonance and heterodyne methods, Digital frequency counter, Measurement of frequency, time period and time interval, Errors in frequency counters.

Unit 5: Frequency Spectrum, Distortion and Wave Measurement: **12 Lectures**
Spectrum analyzer, Harmonic distortion analyzer, Inter-modulation distortion analyzer, Wave analyzer and distortion factor meter- Tuned circuit wave meter for frequency measurements.
Transducers and Sensors:
Classification, Selecting a transducer and Sensing element, Strain gauge, Displacement transducers, temperature transducer, Photosensitive transducer, Flow meter

References:
1.   Modem Electronics Instrumentation and Measurement Techniques: Helfric & Cooper. (PHI)
2.   Instrumentation, Measurement and Analysis: Natra & Choudhary (TMH)
3.   Instrumentation Devices & Systems: Rangan, Sarma & Mani (TMH)
4.   Transducers and Instrumentation: D.V.S. Moorty (PHI)

B.TECH THIRD SEMESTER
(Electronics and Communication Engineering)

Paper III: Analog Circuits & Systems

Unit 1: Linear ICs: **06 Lectures**
Linear IC design criteria, commonly used configurations and biasing techniques, current source; Current mirror; Differential amplifier circuits

Unit 2: Operational Amplifier: **08 Lectures**

Single supply and dual supply concept; Common mode input range; Output swing; Full power bandwidth; Slew rate and gain bandwidth product, Frequency compensation; Study of 741, OP-07, LM358 & LM393

Unit 3: Applications of Op-Amp: **12 Lectures**

 Linear circuit Applications- Differential DC amplifier, Differentiators and Integrators; Voltage to current converters, Nonlinear circuits- Series and shunt limiters, feedback limiters, logarithmic amplifiers, Active filter circuits- LP, BP and HP filters; Sample and Hold circuits, Sine wave, Square wave Triangular wave and saw-tooth wave generator circuits and pulse circuits and their characteristics, Instrumentation Amplifier.

Unit 4: A/D & D/A Converters: **06 Lectures**

Functions and characterization of A/D and D/A converters; Different types of A/D and D/A converters; Study of 08xx series converters and their applications

Unit 5: Voltage Regulators: **08 Lectures**

Study of Commonly used 3 Terminal regulators (78xx, 79xx;LM 317); Techniques for current limit and thermal shut down; Precision voltage regulators and their characteristics.

References:
1. Op-Amps and Linear integrated circuits : R.A. Gayakward (Pearson)
2. Pulse digital and Switching Waveforms : Millman and Taub (TMH)
3. Operational Amplifiers and Integrated Circuits : Robert F. Coughlin Frederiek F. Discroll (PHI)
4. Operational Amplifiers and Integrated Circuits : James M. Fiore (Jaico)
5. Operational Amplifiers ; Design & Applications :J.G.Graeme, G.E.Tobey et.al. (McGraw Hill)

B.TECH THIRD SEMESTER
(Common to ECE and CSE)

Paper IV: Basic Electrical Engineering

Unit 1: D C Generators: **10 Lectures**

Principles and construction of DC machines; E.M.F Equation; Various types of losses occurring in DC Generators; its efficiency; Commutation; Armature reaction; Series , Shunt and Compound Generators; their characteristics and applications; Parallel operation of shunt generators.

Unit 2: D C Motors: 0**7 Lectures**

Types of DC Motors and their Basic characteristics; Torque Equation; Testing of DC motors; Separation of Losses; Need of starters for large motors & their working; Speed control of DC motors

Unit 3: A C Fundamentals & Poly phase Circuits: 0**7 Lectures**

Single phase alternating currents; Average R.M.S values; Form factor; Power factor; Power in AC circuits-Instantaneous power, Average power and Apparent power, Complex power- Active and Reactive power; Power factor in terms of Average & Apparent powers; Poly phase systems, Star and Delta connections, Relationship between line and phase values.

Unit 4 & 5: Electrical Measurements and Measuring Instruments: **16 Lectures**

Principles of operation and construction of moving coil, Moving iron, Dynamometer and induction types of Ammeters & Voltmeters; Extension of their ranges; Measurements of power- Three-ammeters and three voltmeters methods of measuring power in Single phase circuits; Construction of Watt meters; Induction and dynamometers types; Measurement of power in three phase circuit; Balanced and unbalanced three phase loads; Two-wattmeter method; Measurement of very high and very low resistances; measurement of energy; types of single-phase energy meters; errors and adjustments; Measurement of speed

References:

1. Basic Electrical Engineering   I J Nagrath (TMH)
2. Electrical Technology   B.L. Theraja (S. Chand)

B.TECH THIRD SEMESTER
(Common to ECE and CSE)

Paper V: Computer Architecture & Organization

Unit 1:   **08 Lectures**
Basic building blocks of digital computer- Essential and non-essential components; Basic functional block diagram of a computer; Stored Program Concepts, Generation of Computers and Programming languages. Computer memory: Types of read/write memories- Static memory, Dynamic Memory, NVRAM etc., various types of ROMs.

Unit 2: 08 Lectures

Components of CPU, Bus systems, Data path. Instruction set completeness, Instruction Formats. Control unit, Micro-programmed and hardwired controls. CISC and RISC architecture.

Unit 3:   **08 Lectures**

Memory organization, Primary and secondary storages, Cache and its mapping, Memory hierarchy. Basic I/O methods. Memory mapped and Standard Input-Output.
Memory management techniques – Relocation, Swapping, Partitioning, Paging, Segmentation, Combined Systems; Concept of virtual memory.

Unit 4:   **08 Lectures**
Microprocessor: Essential and non-essential components, Microprocessor 8085: Architecture, Instruction set, Addressing modes, Pin diagram, Timing diagram, Interrupts etc. Assembly language programs (for 8085) for simple problems such as Maximum finding, Summation, Sorting, Searching, delay routines etc.

Unit 5:   **08 Lectures**
Microprocessor 8086: Architecture, Addressing modes, Pin diagram, classification of interrupts and interrupt Vector Table. Concept of Math co-processor. Comparative study of microprocessors.

References:

1.   Digital Computer Electronics : Malvino
2.   Microprocessor Architecture Programming Applications with 8085/8080A: Brey
3.   Digital System Design and Microprocessor: Hayes, John P.
4.   Computer Architecture and Organization: Hayes, John P.
5.   Computer System Architecture: Mano, M. M.
6.   Digital Computer Fundamentals: Bartee

B.TECH Third SEMESTER
(Common to ECE and CSE)
Paper VI: Industrial Management   I

Unit 1: Engineering Economics: **08 Lectures**
Nature and scope of economics, Economic decision and Technical decision, Wants and utility, Demand and supply, Elasticity of demand and supply, Concepts of cost and revenue, Concept of equilibrium and margin, Four factors of production and their peculiarities, Money and banking –Function of money, Function of banks, Commercial and central banks, Monetary policy of the Reserve Bank of India.
National Income- Macro Economics approach, GNP, NNP, NI, DI, PI methods of calculation of national income.

Unit 2: Organization: **06 Lectures**
Concepts of organization, Characteristics of organization, Elements of organization, Organizational structure, Organization charts, Types of organization-formal line, Military or scalar organization, Matrix organization, Authority and responsibility, Span of control, Delegation of authority.

Unit 3: Personal Management: **10 Lectures**
Recruitment and training, Labour turnover, Operator training, Suggestion systems
Industrial ownership -Types of ownership-single ownership, partnership, Joint stock company, co-operative societies, public sector, private sector, scientific management-review of different schools of thoughts.
Wages and Incentives: Feature of wages, Time and piece rate, Different incentive plans, Profit sharing, Job evaluation and merit rating , Factors of comparison and point rating .
Industrial Relations- Industrial disputes, Collective bargaining, Trade unions, Workers participation in management, Labour welfare
Industrial safety- Working conditions, Environmental factors, Psychological attitude to work and working conditions, Fatigue, Accidents and Hazards.

References:
1. Industrial Organization and Management: Bethel et.al
2. Principles of Industrial Management: Kootnz & Donnel
3. Financial Management: Prasanna Chandra
4 Industrial Finance of India   S K Basu
5. Operation Management: Fabricky et al

B.TECH FOURTH SEMESTER
(Electronics and Communication Engineering)

Paper I: EM Wave Theory

Unit 1: Static Electric Fields: **08 Lectures**

Electrostatics: Coulomb's law, Gauss's law, Electric field due to several charges, Potential function, Field due to continuous distribution of charge, Equi-potential surfaces, Divergence theorem, Poisson's and Laplace's equations, Capacitance, Energy stored in an Electric field

Unit 2: Magnetostatics: **08 Lectures**

Magnetic flux, Magnetic flux density Magnetic intensity, Energy stored in a magnetic field, Ampere's law for a current element, Magnetic vector potential, Magnetic vector potential of a current element, Magnetic dipole

Unit 3: Maxwell's equations: **08 Lectures**

Ampere's law, Current continuity equations, Displacement current, Faradays law, Filled equations in vector and integral forms, Boundary conditions at an interface

Unit 4: Plane EM Waves: **08 Lectures**

Solution of wave equations in rectangular, Cylindrical and spherical coordinates for Wave Equation free space, Conductors and dielectrics: Polarization, Isotropic and anisotropic media, Reflection and refraction, Skin effect and boundary, value problems, Poynting vector and power flow

Unit 5: Waveguides & Transmission Lines: **08 Lectures**

Electromagnetic wave in rectangular and cylindrical waveguides, TE and TH modes, Field and propagation characteristics, Formulation of differential equation and its solution, Wave and phase velocity, Characteristics impedance and propagation constant, Amplitude and phase distortion, Quarter wave and eighth wave impedance, Transformers, Impedance matching techniques, Single and double stub impedance matching, Smith chart.

References:

1. Electromagnetic Waves & Radiating Systems: Jordan (PHI)
2. Electromagnetic Theory: K D Prasad (Khanna Pub.)
3. Electronic Communication Systems: George Kennedy (TMH)
4. Electromagnetic Theory & Wave Propagation: S N Ghosh (Narosa)

B.TECH FOURTH SEMESTER
(Electronics and Communication Engineering)

Paper-II: Semiconductor Device Technology

Unit 1: Junctions & Contacts: 08 Lectures
Current voltage characteristics of an ideal p-n Junction under zero bias condition; current-voltage characteristics of an ideal p-n junction (the diode equation);Generation and recombination currents; Depletion capacitance; Diffusion Capacitance and Equivalent circuit of a p-n diode; Junctions Breakdowns; Impact and Avalanche Breakdown; Schottky Barriers; Current-voltage characteristics of Schottky diodes: Thermionics emission and Thermionic-Fieldemission model ; small signal circuit Schottky diode; Ohmic contact ; Tunneling and Tunnel diodes; Hetero junctions .

Unit 2: Bipolar Junction Transistors: 08 Lectures

Principle of operation; Ebers-Moll   Model ; Gummel-poon Model; Current Components and Current gain ; Base Spreading Resistance; Graded base Transistors; Output Characteristics and early effect Operating point and Small signal equivalent circuits;
Problems of BJT: Emitter current crowding.

Unit 3: Field Effect Devices: 08 Lectures

JFET concepts- Basics JFET and MESFET operation, The device characteristics- Internal pinch-off voltage , Pinch-off voltage, and Drain to source saturation voltage, Ideal DC current-voltage relationship, Non-ideal effects channel length modulation; velocity saturation effects; Sub-threshold and gate current effects, small signal equivalent circuit and frequency limitations,

Unit 4: MOSPHET   08 Lectures
Fundamentals of Metal-oxide semiconductor field effect transistor energy band diagrams, Depletion layer thickness, Work function differences , Flat band and threshold voltage , capacitance-voltage characteristics and it's comparison with ideal c-v characteristics , Frequency effects ; The Basic MOSFET operation ,Current-Voltage relationship-concepts and its mathematical derivation.

Unit 5: Organic Semiconductors: 08 Lectures

Basic Organic semiconductor   materials and their classification;   Basic concepts of OLEDs, Organic Photovoltaic devices and organic semiconductors for FET, White LED.

References:

1.   Physics of semiconductor devices: Michael Shur   (Prentice Hall of India)
2.   Semiconductor Physics & Devices: Basic Principles , Donald A. Neaman (Irwin Book Team)

B.TECH FOURTH SEMESTER
(Electronics and Communication Engineering)

Paper III: Electrical Technology

Unit 1: Transformers: **08 Lectures**

Construction and principles of working, losses in transformers, Equivalent circuit, Regulation and efficiency of Transformers, Autotransformers, Three phases transformers with different methods of connection using three single phase transformers, Scott connection and its application.

Unit 2: Alternators: **08 Lectures**

Principle of operation, Rotating field and rotating armature types, Armature reaction, Synchronous impedance method of estimating its voltage regulation, Parallel operation of Alternators.

Unit 3: Synchronous Motors: **08 Lectures**

Working principles, Starting of synchronous motors, Motor on load, Effect of increase of load on torque developed, Effect of excitation on armature current and power factor, Constant power operation, V-curves, Hunting, Damper winding.

Unit 4: Induction Motor: **10 Lectures**

General Principle and construction of three-phase induction motor; Phase wound and squirrel cage types of Induction motor; Production of rotating fields, Slip; Rotor emf and frequency; Starting and running torques; Relationship between torque and slip; Equivalent circuit; Vector diagram; No load and blocked rotor tests; Speed control and starting methods.

Unit 5: Special Purpose Motors: **06 Lectures**

Single phase induction motors, Shaded pole motors, Brushless DC motors, Stepper motors, Universal motors, AC Series motors, Reluctance motors, Servomotors and their applications.

References:

1. Basic Electrical Engineering: I J Nagrath (TMH)
2. Electrical Technology: B.L. Theraja (S. Chand)

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper IV: Control Systems

Unit 1: Control System Concepts: **08 Lectures**

The Control Problem; Open-loop and closed-loop control system; Basic characteristics of Feedback Control Systems –Stability, Steady-state accuracy, transient accuracy, Disturbance rejection, Insensitivity & Robustness; Basic modes of feedback control- Proportional, Integral and Derivative.

Unit 2: Mathematical modeling of Dynamic systems: 0**7 Lectures**

Differential equation modeling; Analogous systems; Transfer function modeling; Block diagrams and their reduction; Signal flow graphs and Mason's graph gain formula; Modelling in State space; state diagrams.

Unit 3: Time-domain Analysis: **10 Lectures**

Standard test signals; Steady-state error constants and system types; Response of first and second order systems to standard test signals; Time-domain performance specifications; Derivative feedback control, **Stability Analysis:** Concepts of stability; Routh-Hurwitz criterion; Stability analysis using Root-Locus plots

Unit 4: Frequency-Domain Analysis: **07 Lectures**

Frequency-response plots- Bode plots, Polar plots, log-magnitude vs phase plots; Performance specifications in frequency-domain; Evaluation of closed-loop frequency responses ; Constant M&N circles; Nichols chart; Stability analysis using Nyquist stability criterion; Relative stability phase and Gain Margins.

Unit 5: Control System Design: **08 Lectures**

Preliminary Design consideration; Compensator design using Root-Locus plots- phase-lag, phase-lead and lag-lead compensation; Minor-loop feedback compensation; Compensator design using Frequency-response plots- phase-lag, phase-lead and lag-lead compensation; Minor-loop feedback compensation

References:
4. Modern Control Engineering : Katsuhiko Ogata (Pearson)
5. Control System Engineering: Nagrath & Gopal (New Age)
6. Control System Engineering: Norman S. Nise (John Wiley & Sons Inc)
4. Design of Feedback Control Systems: Stefani , Shahian, et al (Oxford)
5. Automatic Control System: B.C.Kuo. (PHI)

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper V: Signals and Systems

Unuit 1: Representation & Specification of Signals: **08 Lectures**

Continuous time signals-– Periodic Vs Aperiodic, Symmetrical Vs Asymmetrical, Continuous Vs discrete. Elementary signals and associated wave forms- The unit-step, Unit Ramp, Unit-impulse and exponential signals. Periodic signals- Sinusoidal, Square, Sawtooth and impulse train, - Energy Vs Power signals,

Unit 2: Representation of Systems: **08 Lectures**

Classification of systems- Static vs dynamic, Time variant vs time-invariant, Linear vs non-linear, Casual vs non-casual and stable vs unstable. Linear time-invariant (LTI) systems- definitions and properties, impulse response and transfer function, Convolution, signal transmission through LTI systems, Filter characteristics of linear systems, Bandwidth and rise time, Spectral density, Parseval's theorem, Auto & cross-correlations

Unit 3&4: Probability & Random Variables :   **16 Lectures**

Random Experiments, Sample space, Events, Definitions of probability, Probability of union of events, Conditional Probability, Bayes' theorem, Independence of events,

Random Variables, Distribution functions, Probability Mass Function (PMF) of Discrete Random Variables, Probability Density Function (PDF) of continuous random variables, Mathematical expectation, Moments

Discrete uniform distributions, Bernoulli distribution, Poisson distribution, Binomial distribution, Continuous uniform distribution, Normal distribution, Exponential distribution, Rayleigh & Maxwell distributions.

Unit 5: Random Processes   **08 Lectures**

Classification of random processes- Stationary, Ergodic & Stochastic processes, Auto Correlation & power spectral density. Sources of noise, Thermal noise & Shot noise, PDF of envelop of narrow band noise and narrowband noise plus sinusoidal signal.,

References:
1.   Principle of Digital Communication: J. Das (Wiley)
2.   Network Analysis & Synthesis: F.F. Kuo (Wiley)
3.   Signal & Systems: Simon Haykin (Wiley)
4.   Communication Systems: Simon Haykin (Wiley)
5.   Probability Random Variable & Stochastic Process: Papoulis (TMH)
6.   Signals Systems and Communication: B.P.Lathi (Wiley)
7.   Communication Systems : B.P. Lathi (Wiley)

B.TECH FOURTH SEMESTER
(Common to ECE and CSE)

Paper VI: Industrial Management   II

Unit 1; Marketing Management: **12 Lectures**
Concept of marketing VS sales approach , Consumer behavior and demand concept, Buying motives, Influence of income level, Product design , New product distribution , Pricing methods and tools , Break even analysis and marginal costing in pricing , Sales promotion, Marketing research, Test marketing , Marketing of services, Advertising management-types of advertising , Choice of media , Economic and Psychological factor s in advertising .

Unit 2; Finance Management: **12 Lectures**
Tasks , Evolution of corporate management , Long term financing , Equity , Preference and Debenture capitals, Term loans , Dividends and share valuation, Legal aspects of dividends , Short term financing , Working capital influencing factors , Cash budgeting , Term of liquidity , Management of receivable and inventories , Budgets and Budgetary control – objectives of budgeting , classification, ratio analysis.
Management Accounting: Fundamentals of Book-keeping, Journalizing, Ledger accounts, Subdivision of journal, Cash book, Banking transactions, Trial balance, Preparation of trading, Profit and Loss account, and Balance sheet, Adjustments

References:
1. Industrial Organization and Management: Bethel et.al
2. Principles of Industrial Management: Kootnz & Donnel
3. Financial Management: Prasanna Chandra
4 Industrial Finance of India   S K Basu
5. Operation Management: Fabricky et al

B.TECH FIFTH SEMESTER
(Electronics and Communication Engineering)

Paper I: Antennas & Wave Propagation

Unit 1: Principles of Radiation: **08 Lectures**
Concept of radiation; Isotropic and Directional radiation; Basic Antenna Parameters – Radiation Pattern, Radiation Intensity, Power density, Gain, Directivity, Beam width, Polarization; Effective Height Concept.

Unit 2: Thin Wire Antennas: **08 Lectures**
Linear wire antennas- Concept of Retarded potential; Radiation from current element and small dipole; Half-wavelength dipole; Long wire Antennas; Linear elements near or on infinite perfect conductors- Image theory, Vertical and Horizontal Eclectic dipole.
Loop Antenna- Equivalence of small loop to short Magnetic Dipole; Radiation from short Magnetic Dipole and equivalent small loop; Large circular loop with uniform in-phase current; Radiation resistance & Directing of circular loop with uniform current

Unit 3: Antenna Arrays: **06 Lectures**
Point sources; Arrays of two isotopic point sources; Non-isotropic but similar point sources; Principles of Pattern Multiplication; Broadside & End-Fire Arrays; Dolph-Teheby Scheff Distribution

Unit 4: Antenna Feedings and Antenna Impedance: **10 Lectures**
Location and Methods of feeding Antenna; End fed and centre-fed systems;; Reciprocity Theorem; Arrays of Dipoles; Arrays with parasitic elements; Log-periodicdipole array antenna; Phased Arrays; Folded Dipole Antenna; Rhomhrd Antenna. Measurement of radiation pattern, Power gain, directivity.

Unit 5: Wave Propagation: **08 Lectures**
Ground wave; Surface wave and space wave propagation; Earth's atmosphere; Effective earth's radius; Tropospheric and duct propagation. Eccles Larmor theory of ionospheric wave propagation; Critical penetration frequency; Maximum usable frequency and Skip distance; Effects of earth's magnetic field on ionospheric propagation

References:
1.Antenna Theory – C.A. Balanis (Wiley)
2.Antennas – Kraus (TMH)
3.Antenna Engineering – Weeks (TMH)
4.Electromagnetic Waves & Radiating Systems – Jordon (PHI)
5.Antenna Theory & Practice – Rajeswari Chatterjee (New AGE)

B.TECH FIFTH SEMESTER
(Electronics and Communication Engineering)

Paper II: Digital Telephony

Unit 1:   **08 Lectures**

Introduction, Telecommunication and standards organization, The Analog Network Hierarchy, The Introduction of Digits, Advantages or Digital Voice Networks, Digital Signal Processing, Disadvantages of Digital voice Networks.

Unit 2:   **08 Lectures**

Voice Digitization, PAM, PCM, Speech Redundancies, DPCM, Delta Modulation, Adaptive Predictive Coding, Vocoder, Encoder/Decoder Selection Considerations, ITU-T Coding Standards.

Unit 3:   **08 Lectures**

Digital Switching, Switching Functions, Space Division Switching, Time Division Switching, Two-dimensional switching, Digital cross-connect Systems, Digital switching in an Analog Environment.

Unit4:   **08 Lectures**

Traffic Analysis, Traffic Characterization, Loss Systems, Network Blocking Probabilities, Delay Systems.

Unit 5:   **08 Lectures**

Network Synchronization, Control and Management: Timing, Timing inaccuracies, Network Synchronization, Network Control, Network Management, Routing Control, Flow Control.

References
1. Digital Technology by John C. Bellamy, Wiley.
2. Telecommunication Switching Systems and Networks by T. Vishwanathan, PHI.

B.TECH FIFTH SEMESTER
(Electronics and Communication Engineering)

Paper III: Fiber Optic Communication I

Unit 1: Basics of optical fiber communication: **08 Lectures**

Basic block diagram of an optical fiber communication. Advantages of optical fiber communication, Classifications of optical fiber. Propagation of light through multi- mode step index, multi-mode graded index fibers and single mode optical fibers. Numerical aperture for meridional and skew rays. Number of guided modes. Ray theory and mode theory analysis.

Unit 2: Transmission characteristics of optical fibers.   **08 Lectures**

Degradation of optical signal due to attenuation in the fiber. Different types of losses in the fiber. Pulse broadening due to dispersion. Different types of dispersion. Intermodal and intramodal dispersion. Material and waveguide dispersion, overall dispersion.

Unit 3: Optical Sources: **08 Lectures**

 Essential Requirements for lasing action, Direct & indirect energy gap materials, Homo and hetero junctions. Basic principles of semiconductor lasers and light emitting diodes. Different types of injection laser diodes & light emitting diodes and their characteristics. Rate equations, Internal quantum efficiency and external power efficiency.

Unit 4: **Photo-detectors:**   **08 Lectures**

 Basic principles, types of photo-detectors-PIN diode and Avalanche photo diodes, responsivity, quantum efficiency, Speed of photo diodes, Noises in detectors, signal to noise ratio, equivalent diagrams.

Unit 5: Link analysis: **08 Lectures**

Receiver structures, performance of receivers, Power budget and rise time budget equations. Splice and joint losses, mis-alignment losses. Source to fiber and fiber to detector coupling losses, Selection of wavelength, source and detectors.

B.TECH FIFTH SEMESTER
(Electronics and Communication Engineering)

Paper IV: Communication Systems

Unit 1: Amplitude Modulation and Detection: **08 Lectures**

AM equation analysis and its treatment with number of modulating signals, Square law modulator, Linear modulator schemes and circuits, DSB-SC modulators, Quadrature modulation, SSB-SC modulator, AM square law detector, Envelope detection, DSB-SC & SSB-SC detection, VSB modulation

Unit 2: Angle Modulation and Detection: **08 Lectures**

Frequency and Phase modulation equations and their spectrum; Narrow band modulation and wide band modulation and relationship with AM,FM, and PM, Direct methods of FM generation, Indirect Armstrong method of FM generation, FM slope Amplitude type of detection, Phase discriminator and Ratio detector, Pre-emphasis and De-emphasis, Comparison of AM and FM, Phase locked loops

Unit 3: AM, FM Transmitters and Receivers: **10 Lectures**

Blocks diagrams of standard AM and FM transmitters, Armstrong FM transmitter, AM and FM Radio receivers, Sensitivity, Selectivity, Fidelity, Stability, etc. TRF, receiver, Super heterodyne radio receiver- Block diagram and Principle of operation, Problems associated with it's successful operation, their solutions and analysis (selection of intermediate frequency and Local oscillator frequency, Tracking, Rejection of image signal and noise, AGC and AFC)

Unit 4: SNR Considerations in AM and FM systems: **06 Lectures**

SNR calculations in DSB, DSB-SC and SSB AM receivers,, SNR in FM receivers, Comparison of SNR.

Unit 5: Pulse Modulations: **08 Lectures**

Sampling theorem for LP and BP signals, Channel BW and for PAM signal, Natural and Flat-top sampling, Signal recovery, Pulse time modulations.

References:
1.   Principles of Communication Systems   Taub and Schilling
2.   Communication Systems   Simon Haykin
3.   Modern Analog & Digital Communications   B.P. Lathi
4.   Analog & Digital Communications   Samaugan
5.   Electronic Communication System   George Kennedy

B.TECH FIFTH SEMESTER
(Common to ECE and CSE)

Paper V: Computer Networks

Unit 1: Introduction: **08 Lectures**
History of data communication, Advantages and Disadvantages of a Computer Networks; Classification of Computer Networks; Active and Passive Components used in a network design; Importance of channel bandwidth and system noise, Protocols and their role in computer network

Unit 2: Data Transmission Basics: **08 Lectures**
Error detection and correction methods, Data compression, Protocol basic, Circuit, Message, Packet and Cell switching, Connection oriented and connectionless services, ISO-OSI model, TCP/IP model, UDP

Unit 3: Computer Network Basics: **08 Lectures**
Physical layer communication, Media, Signals and Bits, Time division and frequency division multiplexing, Encoding, Modulation, Delay, Bandwidth and noise; Comparative Study of various media used in Connection oriented networks and connection-less networks; Network and packet communication, Network topology, LAN wired/wireless, Ethernet, CSMA/CD, CSMA/ CA, Token passing rings, FDDI, Wireless networks

Unit 4: Network Devices: 0**8 Lectures**
Network Interconnections with repeaters, Switches, Bridges, Routers and gateways, DSU/CSU, XDSL and cable modems, Store and forward, Next-Hop forwarding, Wide Area Network, Router & Routing Techniques

Unit 5: Inter-networking: **08 Lectures**
IP addressing, Subnetting, CIDR, Address binding with ARP, Datagram encapsulation and fragmentation, Adaptive retransmission, ICMP and error handling; Network applications, Client-Server concepts and application, DNS, HTTP, Email and web browsing, Broadband Multi-Service networks, FDDI- II, Cell based networks, ATM LANs, ISDN; Introduction to IPV6

References:
1. Computer Networks :Tanenbum, A.S
2. Data and Computer communication :Stallings, William
3. Inter Networking With TCP/IP Vol I, II,III: Comer, D.E. and Stevens D.L.
4. Computer Network and Distributed Data Processing : Martin.J.
5. Local Networks : Stalling, William
6. Data Communication and Networking : Forouzan, B.A
7. Tele Communication Switching Systems and Networks: Viswanathan Thiagrajan

B.TECH FIFTH SEMESTER
(Common to ECE & CSE)

Paper VI: Digital Communication I

Unit 1: Basic Information Theory & Channel Capacity: **10 Lectures**

Mathematical models for information sources; Discrete memory-less source; Logarithmic measure of information; Entropy as a measure of Uncertainty; Interrelations between entropies; Conditional entropies; Average Mutual information, Properties of Mutual information; Binary Symmetric Channels, Discrete memory-less channels, Shannon- Hartley capacity theorem, Shannon's limit; Capacity of a channel of infinite Bandwidth; Equivocation and effective transmission rate.

Unit 2: Source Coding: **06 Lectures**

Coding for discrete memory-less source; Fixed length code words; Source coding theorem; Variable length code-words; Unique decodability and prefix conditions; Kraft inequality; Significance of prefix condition; Shannon-Fano coding; Huffmann Coding Technique

Unit 3 & 4: Channel Coding: **16 Lectures**

Linear block codes- Introduction to Galois field algebra; Linear block Codes- the Generator matrix & Parity check matrix; Construction of standard array; Syndrome calculation; Hamming weight and Hamming distance; Error correcting and detecting capability of linear codes; Hamming codes; Hadamard codes
Definition and algebraic structure of cyclic codes, Binary cycle properties; Encoding in Systematic forms; Circuits for dividing polynomials; Systematic encoding with an (n-k) stage shift register; Syndrome calculation and error detection with an (n-k) stage shift register.

Convolutional Codes-Convolutional encoding; Representation of convolutional Encodes; The state diagram; The tree diagram; The trellis diagram; Optimum decoding of the Convolutional codes- The Viterbi algorithm, Sequential decoding; Comparison and Limitations of Viterbi and Sequential decoding; Distance properties of convolutional codes; Error correcting capability of convolutional codes.

Unit 5: Pulse Code Modulation: **08 Lectures**

Basic elements of a PCM System, Quantization Electrical representation of binary digits, Companding, Differential PCM, Delta Modulation, Adaptive delta modulation, Comparison of ADM & DM,

References:
7.Modern Digital Communication System: B.Sklar (Addition Wesley)
8.Principle of Digital Comm: J. Das, S.K. Mullick, P.K. Chatterjee (Wiley)
9.Digital Communication: John G. Proakis (TMH)
10.   An Introduction to Error Correcting Codes : S. Lin (McGraw Hill)
11.   Digital Communication : S. Haykin (Wiley)
12.   Digital Communication : Fundamentals & Applications : B. Sklar (Pearson)

B.TECH SIXTH SEMESTER
(Electronics and Communication Engineering)

Paper I: Microelectronics & VLSI Design

Unit 1: Hybrid & Monolithic Integrated Circuits: **06 Lectures**

Outlines and properties of substrates, Design and construction of thin film based resistors, Capacitors, Inductors, Thick film elements hybrid IC layout, Monolithic ICs

Unit 2: Bipolar, MOS and BiCMOS I.C. Design Technology
Basic Processes in Integrated Circuit Fabrication: **10 Lectures**

Solid state diffusion, Oxidation, Photolithography, Etching, Epitaxial growth, Ion implantation, Chemical vapour deposition etc..

Unit 3: Components & Design: **10 Lectures**

Fundamentals characteristics, Substrates, Passive components, Resistors, Capacitors, Distributed RC networks, Active components, Integrated diodes, Schottky barrier devices, BJT, Integrated field effect transistor, Stages in monolithic IC design, Construction and design of diodes, Fabrication

Unit 4: MOS Integrated Circuit Fabrication: 0**6 Lectures**

Active devices in MOS integrated circuits, Passive components in MOS technology, Introduction to BiCMOS technology

Unit 5: Digital & Analog ICs :   **08 Lectures**

Fabrication of Logic elements, DTL, TTL, ECL, OPAMP, RAM, ROM

References:
1.   VLSI Technology : S M Sze   (McGraw Hill)
2.   VLSI Design: A. Mukherjee (PHI)
3.   VLSI Fabrication Principles: S.K. Gandhi (Wiley)
4.   Micro Electronic Processing: An Introduction to the Manufacture of Integrated Circuits: W.S.Ruska (McGraw Hill)
5.   Microelectronics: Jacob Millman

B.TECH SIXTH SEMESTER
(Electronics and Communication Engineering)

Paper II: Electronic Materials

Unit 1: Semiconducting Materials: **12 Lectures**

General properties of Semiconductors & their classifications; Hall effect; Photovoltaic effect; Photoluminescence; Cathode luminescence & Electroluminescence processes and materials; Thermistors and their uses.

Unit 2: Dielectric Materials: **08 Lectures**

Dielectric constant and Polarization; Dielectric losses; Effect of temperature and frequency, Ferroelectric materials and their classifications, Piezo-electrics, Ceramics and their uses.

Unit 3: Magnetic Materials: **08 Lectures**
Classification and elementary properties; Ferrites, soft and hard magnetic materials and their uses, Magnetic memory.

Unit 4: Superconductors: **06 Lectures**

Classification and general properties; High temperature superconductors and their uses. Josephson effect.

Unit 5: Nanomaterials: **06 Lectures**
Basic ideas of nanomaterials and their synthesis, Electrical, optical and mechanical properties; Carbon nano tubes and nanophosphors.

References:
1. Materials Science & Engineering : Raghvan
2. Electrical Engineering Materials : K.M. Conpha
3. Solid State Physics : S.G.Prakash

B.TECH SIXTH SEMESTER
(Electronics and Communication Engineering)

Paper III: Fiber Optic Communication II

Unit 1: Advanced Fiber-0ptic Devices: **08 Lectures**

Advanced lasers and **a**dvanced fibers, birefringence and polarization maintaining fibers, Special types of fibers, fibers. Optical Modulators: Types and principles of optical modulation techniques, Modulation bandwidth and limitations,, internal and external modulation techniques.

Unit 2: Optical Fiber Measurements: **08 Lectures**

Attenuation measurement, Dispersion measurement, Index profile measurement, Cut-off wavelength measurement, Numerical aperture measurement, OTDR

Unit 3: Optical Fiber Couplers: **08 Lectures**

 Fiber couplers- three port & four port couplers, Star couplers, their characteristics and description, Wavelength division multiplexing and couplers for it, Tunable sources, Fiber optic fixed wavelength and tunable filters

Unit 4: Coherent Optical Fiber Systems: **08 Lectures**

Basic system configuration, Practical constraints, Modulation formats, Detection Principle and demodulation schemes, Receiver sensitivities and their comparison, Dual-detectors receivers.

Unit 5: Applications: **08 Lectures**

Fiber optic sensors- Classification of fiber sensors, Intrinsic and extrinsic fiber sensors, Microbend sensors; Application of sensors;, Applications of optical fiber in defence, medical and industries.

References:

1.   Optical Fiber Communication: Gerd Keiser
2.   Optical Fiber Communication: John M. Senior
3.   Handbook of Fiber Optics: Chal Yen
4.   Optical Fiber Telecommunication IIIA: Ivon P. Kaminow & Kock

B.TECH SIXTH SEMESTER
(Electronics and Communication Engineering)

Paper IV: Power Electronics

Unit 1: Power Devices: **10 Lectures**

Basic Characteristics and methods of specifications for various power electronics devices-diodes, transistors, MOSFET, IGBT, Thyristor and GTO; Thermal considerations, Second break down in power devices, dv/dt and di/dt protection circuits, Series and parallel operation, relative merits and demerits, Power devices for converter and inverter applications; Control signal requirement of various power electronics devices; Use of pulse transformers, Optical couplers

Unit 2: Controlled Rectifiers: **08 Lectures**

Principle of phase controlled converter operation; Single phase half wave, Full wave and semi-converters; Three phase half wave , Full wave and semi-converters and inverters; Dual converters, Power factor improvement; Symmetrical angle control, Pulse width modulation control, Effect of load and source inductance; Design of converter circuits, Regulated DC power supplies.

Unit 3: Inverter Circuits: **08 Lectures**

Principles of operation of voltage source inverter; Single phase and three phase inverters; Voltage control using PWM technique, Forced commutated thyristor inverters; Current source inverters, Inverter circuit design

Unit 4: Switched Mode Power Supplies: **08 Lectures**

Buck-Boost regulators, PWM Techniques for voltage and current regulations

Unit 5: Power Protection Circuits and Earthing: **06 Lectures**

Over current protection; Instantaneous and IDMT relays and their solid state versions, Necessity of earthing for prevention of noise and shock hazards.

References:
1. Power Electronics : PC Sen (TMH)
2. Power System Protection & Switch gear: Bardri Ram, D.N. Vishwakarma (TMH)

B.TECH SIXTH SEMESTER
(Electronics and Communication Engineering)

PAPER V: Digital Communication II

Unit 1: Multiplexing of PCM signals   08 Lectures

Multiplexing of PCM signals, Digital Hierarchy (American & European), Pulse stuffing, Power density of digital data, Ortho-normal functions, Representation of signals in terms of ortho-normal functions Gram Schmidt procedure

Unit 2: Digital Modulation Schemes: 08 Lectures

BPSK, OOK, BFSK, DPSK, Quadrature phase shift keying, CPFSK and minimum shift keying, M-ary ASK, PSK and FSK schemes, QAM scheme

Unit 3: Binary Decision Criteria: 06 Lectures
        Maximum likelihood, Neymann Pearson, Probability of error (MAP-criterian), Bayes risk (cost) and Min-Max decision criterions.

Unit 4 & 5: Demodulation in Presence of Additive White Gaussian Noise :   18 Lectures

Different representation of narrow band signals and systems A baseband receiver, optimum filter, matched filter & cross-correlator receivers, , Spectrum of digital modulated signals, Calculation of probability of error for binary & M-ary signals, digital signaling schemes for coherent and non-coherent demodulation. Comparison of different modulation schemes, Symbol synchronization and carrier recovery circuits.

References:

1. Principles of Communication: Taub & Schilling (TMH)
2. Digital Communication : J.G. Proakis (TMH)
3. Digital Communication : S.Haykin (Wiley)

B.TECH SIXTH SEMESTER
(Common to ECE and CSE)

Paper VI: Digital Signal Processing

Unit 1: Discrete Time Signal and Systems: **06 Lectures**

Signal and system classifications, Time and frequency domain representation, Analysis of discrete time linear time invariant system, Discrete time system described by difference equation, Stability and Causality, Frequency domain & time domain stability criteria, frequency response of LTI system.

Unit 2: Z-Transform & Discrete Fourier Transform (DFT): **10 Lectures**

Z – Transform and its properties, Z – Transform of simple functions, Inverse Z – Transform, Analysis of LTI system in Z – domain. Convergence of DFT, DFT of periodic signals; properties of DFT; DFT & convolution; Application of DFT to LTI system analysis, FFT algorithms and their applications

Unit 3: Realization of Digital Systems: **06 Lectures**

Recursive and non recursive structure of digital system, Direct, cascaded, parallel, ladder and lattice realization.

Unit 4 & 5: Design of Digital Filters: **18 Lectures**

IIR Digital Filter- IIR filter designs by approximation of derivatives, impulse invariant and bilinear transformation methods, Frequency transformation,

FIR digital Filter- Design of linear phase FIR filters by using windows and frequency sampling methods,

Finite Word Length Effects- Quantization errors and their effects on the performance of digital signal processors

References:

5. Digital Signal Processing: J.G. Proatais (PHI)
6. Discrete Time Signal Processing: Openheim & Shafer (PHI)
7. Signal Processing & Linear Systems: B.P. Lathi (Oxford)
8. Principles and Application of Signal Processing: Robiner Gold (PHI)

B.TECH SEVENTH SEMESTER
(Electronics and Communication Engineering)

Paper I: Microwave Technology

Unit 1 & 2: Microwave Sources: **16 Lectures**

Microwave Tubes: High frequency effects in vacuum tubes, Velocity modulation; Two and multi-cavity klystrons; Reflex Klystrons, Magnetrons Traveling wave tubes Backward wave oscillator
Microwave Semiconductor Devices: Microwave transistor, Microwave oscillators using tunnel diode, Gunn diodes, IMPATT and TRAPATT, Parametric amplifiers masers, Microwave integrated circuits

Unit 3: Microwave Passive Devices: **08 Lectures**

Microwave transmission structures, Coaxial line, Strip-line, micro-strip and slotted line, Design procedures and design curves, Impedance transformation and matching
Terminations: Matched loads, Transition units, Attenuation, Phase shifters; Directional couplers, Hybrid junction, Microwave propagation in ferrites, Isolators and circulators

Unit 4: Microwave Circuits: **08 Lectures**

Equivalent voltage and currents, Importance of waveguide elements and circuits, N-port circuits, Scattering and Transmission matrices, Microwave cavities, Rectangular and cylindrical cavity resonators equivalent circuit Q and method of coupling resonators, Aperture coupled resonator, Co-axial resonator, Simple microwave filters

Unit 5: Microwave Measurements: **08 Lectures**

Components of a typical test bench, Measurement of VSWR and guide wavelength, Measurement of impedance using slotted line and network analyzer, Measurement of power bolometric and calorimetric power meters, Measurement of frequency- wavemeter and heterodyne frequency meter, Measurement of scattering parameters using reflectometer and network analyzer, Spectrum analysis at UHF and microwave frequencies using spectrum analyzers

References:
1.   Microwave Devices & Circuits: Samuel Y. Liao (PHI)
2.   Microwave Theory & Techniques: H J Reich (East West Press Ltd.)
3.   Microwave Devices: J T Coleman (Reston)
4.   Microwave Engineering: D.M Pozar
5.   Elements of Microwave Engineering: R Chatterjee (East West Press Ltd.)

Paper II: Mobile Communication

Unit1.   **08 Lectures**
Introduction, Applications, History, A Simplified Reference Model, Wireless Transmission, Frequency For Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

Unit 2   **08 Lectures**
Medium Access Control, Hidden And Exposed Terminals, Near And Far Terminals, SDMA, FDMA, TDMA, CDMA, Elements Of Cellular Radio System Design, Introduction To Cellular Mobile Systems, Why Cellular Mobile Systems, A Basic Cellular System, Elements Of Cellular Radio System Design, Concept Of Frequency Reuse Channels, Hands Off, Cell Splitting.

Unit 3:   **08 Lectures**
Mobile Network Layer, Mobile IP, IPv6, Dynamic Host Configuration Protocol, Mobile Ad-Hoc Networks, Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

Unit 4:   **08 Lectures**
Mobile Transport Layer, Traditional TCP, Congestion Control, Slow Start, Fast Retransmit/ Fast Recovery, Implication Of Mobility, Classical TCP Improvements, TCP Over 2.5/ 3G Wireless Networks, Performance Enhancing Proxies.

Unit 5:   **08 Lectures**
GSM, Mobile Services, System Architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New Data Services.

References:
3. *Mobile Cellular Telecommunication: Analog and Digital Systems by W.C.Y Lee, Mc Graw- Hill.*
4. *Mobile Communications by Jochen Schiller, Pearson Education.*

B.TECH SEVEN SEMESTER
(Common to ECE and CSE)

Paper III: Microcontroller and Microprocessor Interfacing

Unit 1:   **08 Lectures**
Princeton and Harvard Architecture, Microcontrollers, Comparison of microprocessors and microcontrollers, Microcontroller survey – microcontrollers of different word length, make and features, selection criteria for microcontroller, 8051 microcontroller hardware – pin diagram and internal architecture, Memory organization.

Unit 2:   **08 Lectures**
Special Function Registers, Interrupts, I/O port circuits, interfacing external memory and external device. Instruction set, addressing modes and assembly language programming, simple Programs.

Unit 3:   **08 Lectures**
Memory Interfacing with Microprocessor, Memory Organization and interleaving, Interfacing Read-Write memory chips and ROM/EPROM chips, e.g., IC 8155 (Static Ram with I/O Ports and Timer), 8755 (EPROM with I/O Ports) and other commonly used ICs.

Unit 4:   **08 Lectures**
Input –Output Communication. Serial and Parallel communication, Synchronous and Asynchronous Data Transfer, Strobe method, Handshaking. Interrupts, Basic Input-output methods and transfer modes. Polling, daisy chain arrangement, Bus Arbitration, Priority control.

Unit 5:   **08 Lectures**
Functions and study of 8251A (USART), 8255A(Programmable Peripheral Interface), 8257 (DMA Controller), 8259A (Programmable Interrupt Controller)

References:
[1] Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education
[2] D. V. Hall: Microprocessors and Interfacing, TMH.
[3] Ayala Kenneth:The 8051 microcontroller, Third Edition, Cengage Learning
[4] Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
[5] P.K. Ghosh and P. R. Sridhar, 0000 to 8085 Introduction to microprocessor for Engineers and Scientists, PHI, 2/e
[6] C. K. Dwivedi, Solid State circuit design with Microcontrollers.

B.TECH SEVENTH SEMESTER
(Common to ECE and CSE)

Paper IV: Image Processing

Unit 1: Introduction: **08 Lectures**

Image representation and modeling, 2-D linear system, Luminance, Contrast and Brightness, Color representation, Visibility functions, Monochrome and color vision model.

Unit 2: Image Quantization and Image Transforms: **08 Lectures**

Sampling theorem, Anti-aliasing, image quantization, Orthogonal and unitary transforms, DFT, Cosine transform, Hadamard transform, Haar transform, KL transform.

Unit 3: Image Enhancement: **08 Lectures**

Point operation, Histogram modeling, Filtering and spatial operations, Transform operations, Multispectral Image Enhancement

Unit 4: Image Restoration: **08 Lectures**

Image formation models, Noise models, Inverse and Wiener filtering, Least square filters, Recursive filters, Maximum entropy method, Blind deconvolution, Bayesian method of noise removal, Image reconstruction, Tomography, Radan transform, Back-projection, Reconstruction algorithm, Algebraic method of reconstruction, Fan-beam reconstruction.

Unit 5: Data Compression: **08 Lectures**

Data compression vs. Bandwidth, Pixel coding, Predictive coding, Transform coding, Coding of two-tone images.

References:
1. Fundamentals of Digital Image Processing: Anil K. Jain
2. Digital Image Processing: R. Chellappa
3. Image Processing for Scientific Applications: Bernd Jahne
4. Digital Image Processing: R.C. Gonzalez & R.E. Woods
5. The Image Processing Handbook: J.C. Russ
6. Digital Image Processing: W.K. Pratt
7. Digital Image Restoration: Andrews & Hunt

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)

Paper I: Satellite Communications

Unit 1: Elements of Satellite Communication: **06 Lectures**

Satellite frequency bands, Satellite systems, Transmission and multiplexing, Modulation, Multiple Access, Advantages of digital satellite communication

Unit 2: Orbits of Satellites   **08 Lectures**

Orbital period and velocity; Effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Eclipse, Placement of a satellite in geostationary orbit, Low, medium and polar orbits, Satellite description

Unit 3: Satellite Links   **10 Lectures**

Earth station Antenna-Antenna gain and pointing less, Effective isotropic radiated power antenna, Gain to noise temperature ratio, G/T measurement, Basic link analysis, Carrier to noise plus interference ration

Unit 4: Frequency Division Multiple Access: **06 Lectures**

Multiple Access- FDM- FM- FDMA; Single Channel per carrier, FM-FDMA Television, Inter-modulation Products

Unit 5: Time Division Multiple Access   **10 Lectures**

TDMA Frame Structure, Reference burst, Traffic burst and guard time, TDMA burst structure, Carrier and lock recovery sequences, Unique word, Signalling channel, Traffic data, TDMA frame efficiency, TDMA super frame structure, Frame acquisition and synchronization, Satellite position determination, Single station ranging, Three station ranging, Errors in transmit frame delay, Burst time plan, Control and co-ordination by the reference station TDMA timing, Slip rate in digital terrestrial network, Advanced TDMA satellite systems

References:
1.   Digital Satellite Communication: Tri. T. Ha (T.M.H.)
2.   Satellite Communication: Pratt (Wiley)

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)

Paper II: Radar Engineering & Navigational Aids

Unit 1: Radar Principles: 08 Lectures

Pulsed Radar- Components of radar set, Basic principles, Classification of radars, Radar frequencies, Derivation and significance of radar range equation, Minimum detectable signal, Limitations of pulse radar, Modulator; Duplexers; Displays, Radar antennas, Noise chutter.

Unit 2: CW and FM Radar
Doppler effect, simple CW radar, FMCW radar, Multiple frequency CW radar, Radio altimeter.

Unit 3: MTI and Tracking Radar: 08 Lectures

MTI Radar, Delay lines and cancellers, MTI using range gates and filters, Pulse Doppler radar, Non coherent MTI, MTI from a moving platform.
Tracking with radar, Sequential lobing, Conical scan, Mono pulse radar, Tracking in range and Doppler effect, Electronic scanning radar, Satellite tracking.

Unit 4: Radar Signal Processing: 08 Lectures

Evolution of radar signal processing, Detection of radar signal in noise, Pulse compression fundamentals, Matched filter pulse compression system, Matched filter receiver, Extraction of information from radar signal.

Unit 5: Navigational and Surveillance aids: 08 Lectures

Introduction, Types of navigation, Classification of radio navigational aids, Non directional beacon (NBD), VHF Direction Finder, Very High Frequency Omni range, Doppler VOR, Distance Measuring Equipments, Application of DME, Instrument Lending system, Microwave Landing System; Application of Radar.

Reference:

1.   Introduction to Radar Systems :   M.I. Skolnik   (PHI)
2.   Radar Signals :   Berkowitz   (R.L.Sevies)
3.   Principles of Radar :   MIT Staff   (Mc Graw Hil)

B.TECH EIGHT SEMESTER
(Common to ECE and CSE)

PAPER III (Elective): Mobile Adhoc Networks (MANET)

Unit 1: Mobile Ad Hoc Network: **08 Lectures**
Introduction, Wireless Networks, Mobile Ad Hoc Network- Definition, History. MANET Applications and Scenarios, Ad Hoc Network Characteristics, Classification of Ad Hoc Networks.

Unit 2: MAC Layer Protocols for Ad Hoc Wireless Networks: **08 Lectures**
Introduction, Important Issues and the Need for Medium Access Control (MAC) Protocols, Classification of MAC Protocols- Contention-Based MAC Protocols, MAC Protocols Using Directional Antennas, Multiple-Channel MAC Protocols, Power-Aware or Energy-Efficient MAC Protocols.

Unit 3: Routing Protocols for Ad Hoc Wireless Networks: **08 Lectures**
Introduction, Design Issues of Routing Protocols for Ad Hoc Networks, Classification of Routing Protocols. Proactive Routing Protocols – Destination-Sequenced Distance Vector (DSDV), Optimized Link State Routing (OLSR) Protocol. Reactive Routing Protocols- Ad Hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR) Protocol. Hybrid Routing Protocols - Zone Routing Protocol (ZRP).

Unit 4: Transport Protocols for Ad Hoc Networks: **08 Lectures**
Introduction, Transmission Control Protocol's (TCP's) Challenges and Design Issues in Ad Hoc Networks, TCP Performance over That of Mobile Ad Hoc Networks (MANETs), Ad Hoc Transport Protocols, Application-Controlled Transport Protocol (ACTP).

Unit 5: Mobility Models for Ad Hoc Networks: **08 Lectures**
Introduction, Mobility Metrics, Impact of Mobility Models on MANET, Mobility Model Classifications, Random Walk Mobility, Random Way-point Mobility.

References
1. Jonathan Loo,Jaime Lloret, and Jesus Hamilton Ortiz, "Mobile Ad Hoc Networks – Current Status and Future Trends " CRC Press, Taylor & Francis Group 2012.
2. Subir Kumar Sarkar,T G Basavaraju and C Puttamadappa, "Ad Hoc Wireless Networks-Principles, Protocols and Applications" Auerbach Publications, Taylor & Francis Group, New York London, 2008.
3. Radhika Ranjan Roy "Handbook of Mobile Ad Hoc Networks for Mobility Models" Spriger 2011.

B.TECH EIGHT SEMESTER
(Common to ECE and CSE)

Paper IV (Elective): Embedded Systems

Unit 1: Introduction to Embedded Systems: **08 Lectures**
Embedded System Overview,Common Design metrics, General Purpose Processors and Application Specific Processors. Software and hardware combination for making an Embedded System.Concept of various types of memories for implementation of Embedded Systems.

Unit 2: Selection Criteria of Hardware for Embedded System Design: **08 Lectures**
Comparing use of Microprocessor and Microcontroller, PLDs and FPGA for developing an Embedded System. Elementary idea of commonly used microcontroller. Criteria for selection of microcontroller and other interfacing hardware.Architectural block diagram of MCS 51 microcontroller family. Memory organization. Code Memory, Data memory and special function register. Internal circuit and capabilities of various I/O ports pins.

Unit 3: Working of microcontrollers: **08 Lectures**
Clock cycles, Machine cycle and Instruction cycles and timing diagrams for various essential control signals. Division of Machine cycles in to states and phases.
Instruction length and execution time for instructions. Categorization of instruction and various addressing modes. Conditional and unconditional jump instructions.Boolean instructions. Read pin and read latch instructions.SFRs and their purpose. Control of interrupts. Timers, Power status and I/O functions by SFR's. Addressing of SFR's. Various modes of Timers and their controls.

Unit 4: Interfacing: **08 Lectures**
Block diagram for Input Output Ports internal Structures and their capabilities for 89C51 and 89C2015 Microcontrollers. Interfacing with external devices. Address for ports and pins. Interfacing with external hardware keys and displays devices. Circuits and criteria for interfacing LEDs,Seven segment display.

Unit 5: Programming: **08 Lectures**
Instruction format for instruction of MCS-51 family microcontrollers. Program and Machine control. Boolean variable manipulation. Data transfer. Arithmetic and Logic Operations. Interrupts and data polling for multiple subroutines in a program. Look up tables and use of data stored in code memory.

References:
[1] Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems.
[2] C. K. Dwivedi, Solid State circuit design with Microcontrollers.
[3] Ayala Kenneth:The 8051 microcontrollerArcitecture, Programming and Applications.
[4] Raj Kamal: Embedded Systems- Architecture, Programming and Design.
[5] Raj Kamal: Microcontrollers

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)

Paper IV (Elective): Advanced Fiber Optic Systems

Unit 1: Review   **08 Lectures**

Propagation of optical signal through different types of fibers; different types of attenuation and dispersions, receiver operations and SNR.

Unit 2: Link analysis: **08 Lectures**

Receiver structures, performance of receivers, Power budget and rise time budget equations. Splice and joint losses, mis-alignment losses. Source to fiber and fiber to detector coupling losses, Selection of wavelength, source and detectors.

Unit 3: Nonlinear Effects in Optical Fibers and Optical Amplifiers: **08 Lectures**

Different types of non-linear effects; self phase modulation, four photon mixing and solitcons, Effects of nonlinear effects on the performance of fiber optic systems. Different types of optical fibers, EDFA, Raman and fiber amplifiers.

Unit 4: Wavelength Division Multiplexing   **08 Lectures**

WDM concept, architectures and networks, Different components used in WDM, Multiplexers, demultiplexers, couplers, tunable filters etc., DWDM, Crosstalk in DWM systems.

Unit 5: Coherent Optical Fiber Systems: **08 Lectures**

Basic system configuration, Practical constraints, Modulation formats, Detection Principle and demodulation schemes, Receiver sensitivities and their comparison, Dual-detectors receivers.

References:
1.   Optical Fiber Communication: Gerd Keiser
2.   Optical Fiber Communication: John M. Senior
3.   Optical Fiber Telecommunication III B: Ivon P Kaminow & Kock
4.   Fundamentals of Fiber Optics in Telecommunication and Sensors System: B P Pal
5.   Optical Communication Receiver Design- B: Stephen Alexander

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)
Paper IV (Elective): Television & Video Systems

Unit 1: The Basic Television System and Scanning Principles: **10 Lectures**

Fundamentals of sound and picture transmission; Scanning process; Aspects ratio and rectangular scanning; Vertical and horizontal resolution; Interlaced scanning; Video bandwidth .

Video signal components; Vertical and horizontal sync and blanking standards; Video modulation; Vestigial sideband signal and its advantages; Sound modulation; Standard for Indian TV channels.

Unit 2: Television Pickup Devices: **08 Lectures**

Introduction to early camera tubes and storage principles; Vidicon & Image Orthicon Tubes; CCD Image Sensors; Comparison of TV Camera pick up devices; Video processing of camera pickup signals.

Unit 3: Colour Television Signals and Systems: **08 Lectures**

Colour fundamentals; Mixing of colours & colour perception; Chromaticity diagram; Colour Television camera; Standards used in colour television; Colour TV signals and their transmission for PAL systems.

Unit 4: Television Transmission and Reception: **08 Lectures**

Requirements of TV Broadcast transmission; Design principles and block diagram of transmitters- Block schematic and functional diagrams of B/W and colour TV receivers; Commonly used TV antennas & their characteristics.

Unit 5: Recording & Reproduction of Video Signals: **06 Lectures**

Omega and Alfa Wrap techniques for tape transport, Type of modulations and bandwidth of recorded signals, Compact Disk recoding; Video on demand, DTH,IP TV System

References:
1. Television and Video Engineering: A.M. Dhake (T.M.H)
2. Television Simplified M.S. Kiver and Milton Kaufman (East-West Press)
3. Monochrome & Colour Television systems: R.R. Gulati (New Age Pub.)
4. Television: V.K. Zworykin (Wiley)

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)

Paper IV (Elective): Advanced Antenna Theory & Techniques

Unit 1: Wire Antennas: **08 Lectures**
Review of antenna basics, Vector Potentials and their applications in field calculation, radiation characteristics of Loop antenna and Helical antenna and their applications.

Unit 2: Aperture type Antennas: **06 Lectures**

Babinet's Principle and complementary antennas, Radiation characteristics Slot and Horn Antennas and their applications, Design of pyramidal and conical horns.

Unit 3: Reflectors and lens Antenna: **10 Lectures**

Study of different types of reflectors, Focussing characteristics, Analysis and design of a Parabolic reflector antenna, Feeding techniques of Parabolic refector, Cassegrain and Gregorian antenna, Dielectric lens antenna, E-plane and H-plane metal lenses, Luneburg lens antenna.

Unit 4: Microstrip Antenna: **10 Lectures**
                                                        Introduction, radiation mechanism and special features of microstrip patch antenna, Advantages and limitations, Application, Feeding techniques- Contactual & noncontactual, Overview and comparison of analytical models for microstrip patch antenna, Analysis and Design of rectangular microstrip patch antenna, Bandwidth enhancement techniques, Comparison of slot antenna with microstrip antenna, Different types of substrate materials used for design of microstrip antenna.

Unit 5: Antenna for Special Applications: **06 Lectures**

Ground plane Antenna, Sleeve Antenna, Turnstile Antenna, Superturnstile antenna, Antenna design consideration for satellite communication.

References:

1. Antennas and Wave Propagation   John D Kraus[et.al] [TMH]
2.Antenna Theory: Analysis and Design   C.A. Balanis [John Wiley & Sons]
3.Antennas for All Applications   J.D. Kraus &R.J.Marhefka[McGraw Hill Inc]
4.Microstrip Antenna Design Hand Book   R. Garg, Prakash Bhatia, InderBahl [Artech House Publisher]
5.Broadband planner Antennas: Design and Applications   Z.N. Chen & MYW Chia [John Wiley & Sons]
6.Microstrip Patch Antenna   Kai Fong Lee &Kwai Man Luk [Imperial College Press]
7.Wideband CDMA for "Third Generation Mobile Communication"   Ojanpera T. & R. Prasad [Artech House]

B.TECH EIGHTH SEMESTER
(Electronics and Communication Engineering)
Paper IV (Elective): INTERNET OF THINGS

UNIT 1: INTRODUCTION TO THE INTERNET OF THINGS   08 Lectures

Introduction, History of IoT, About objects/things in the IoT, The identifier in the IoT, Enabling technologies of IoT, About the Internet in IoT.

UNIT 2: RADIO FREQUENCY IDENTIFICATION TECHNOLOGY (RFID)   08 Lectures

 Introduction, Principle of RFID, RFID reader, RFID tag, RFID middleware, RFID applications, Logistics and supply chain, Production, Monitoring and Maintenance, Product Safety, Quality and Information, Access Control and Tracking and Tracing of Individuals, Loyalty, Membership and Payment, Household, Other Applications.

UNIT 3: RFID DEPLOYMENT FOR LOCATION AND MOBILITY MANAGEMENT 08 Lectures

Introduction, Background and related work, Localization and handover management relying on RFID, Conceptual Framework, Technology considerations, Path loss model, Antenna radiation pattern, Multiple tags-to-reader collisions, Multiple readers-to-tag collisions, Reader-to-reader interference, Interference from specific materials, Performance evaluation.

UNIT 4 : Power Line Communication Technology (PLC)   08 Lectures

Introduction, Overview of existing PLC technologies and standards, History of PLC technologies, Different types of in-home PLC technologies, Security, Performances of PLC technologies, Standards and normalization, Architectures for home network applications, Architecture for a high bit-rate home network application, Architecture for low bit-rate home network application, Internet of things using PLC technology, Connecting objects in the indoor environment, Interoperability of connecting objects in the home environment

UNIT 5: INTERNET OF THINGS –STANDARDS AND GOVERNANCE   08 Lectures

Introduction, Standardizing the IoT, Exploiting the potential of RFID, Identification in the IoT, Promoting ubiquitous networking: anywhere, any when, any what, Safeguarding data and consumer privacy, Bodies subject to governing principles, Substantive principles for IoT governance, IoT infrastructure governance, Further governance issues.

 REFERENCES:
1. The Internet ofThings:Connecting Objects to the Web – Hakima Chaouchi -   Wiley.
2. RFID Handbook – Klaus Finkenzeller, Wiley.
3. Architecting the Internet of Things - Dieter Uckelmann, Mark Harrison; Florian Michahelles - (Eds.) – Springer 2011.
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press – 2010.
5. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick   - Wiley -2012.
6. Olivier Hersent, David Boswarthick,   Omar Elloumi, "The Internet of Things-Key applications and Protocols", Wiley, 2012.