ANNA UNIVERSITY : : CHENNAI – 600 025

UNIVERSITY DEPARTMENTS

REGULATIONS - 2008

CURRICULUM FROM III TO VIII SEMESTERS FOR

B.E.ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER III

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9211	Mathematics III	3	1	0	4
EE9215	Electrical Engineering	3	0	0	3
EC9201	Electromagnetic Fields and Waves	3	0	0	3
EC9202	Electronic Circuits- I	3	0	0	3
CS9211	Data Structures and Object Oriented Programming in C++	3	0	0	3
EC9203	Signals and Systems	3	1	0	4
PRACTICAL					
EE9218	Electrical Machines Lab	0	0	3	2
EC9204	Electronic Circuits-I Lab	0	0	3	2
CS9212	Data Structures and Object Oriented Programming Lab	0	0	3	2
	TOTAL	**18**	**2**	**9**	**26**

SEMESTER IV

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9263	Probability and Random Processes	3	1	0	4
EC9251	Digital Electronics and System Design	3	1	0	4
EC9252	Electronic Circuits- II	3	1	0	4
EC9253	Communication Systems	3	0	0	3
EC9254	Control Systems	3	1	0	4
EC9255	Computer Architecture and organization	3	0	0	3
PRACTICAL					
EC9256	Electronics Circuits- II Lab	0	0	3	2
EC9257	Digital System Lab	0	0	3	2
GE9371	Communication Skills and Soft Skills lab	0	0	2	1
	TOTAL	**18**	**4**	**8**	**27**

SEMESTER V

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
EC9301	Digital Communication Techniques	3	0	0	3
EC9302	Linear Integrated Circuits	3	0	0	3
EC9303	Microprocessors and Microcontrollers	3	0	0	3
EC9304	Digital Signal Processing	3	1	0	4
EC9305	Transmission Lines and Wave Guides	3	0	0	3
EC9306	Measurements and Instrumentation	3	0	0	3
PRACTICAL					
EC9307	Microprocessor and Microcontroller Lab	0	0	3	2
EC9308	Digital Signal Processing Lab	0	0	3	2
EC9309	Communication System Lab	0	0	3	2
	TOTAL	**18**	**1**	**9**	**25**

SEMESTER VI

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
EC9351	Medical Electronics	3	0	0	3
EC9352	Wireless Communication	3	0	0	3
EC9353	Communication Networks	3	0	0	3
EC9354	Antenna and Wave Propagation	3	0	0	3
EC9355	Digital VLSI	3	0	0	3
	Elective I	3	0	0	3
PRACTICAL					
EC9356	Electronic System Design Lab	0	0	3	2
EC9357	Medical Electronics Lab	0	0	3	2
EC9358	Networking Lab	0	0	3	2
	TOTAL	**18**	**0**	**9**	**24**

SEMESTER VII

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MG9401	Principles of Management	3	0	0	3
EC9401	RF and Microwave Engineering	3	0	0	3
EC9402	Optical Communication	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
	Elective IV	3	0	0	3
PRACTICAL					
EC9403	VLSI Design Lab	0	0	3	2
EC9404	Microwave and Optical communication Lab	0	0	3	2
EC9405	Mini Project	0	0	3	2
	TOTAL	**18**	**0**	**9**	**24**

SEMESTER VIII

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
	Elective V	3	0	0	3
	Elective VI	3	0	0	3
PRACTICAL					
EC9451	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

ELECTIVE LIST FOR B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER VI

CODE NO	COURSE TITLE	L	T	P	C
EC9032	Digital Switching and Transmission	3	0	0	3
EC9033	Telecommunication System modeling and simulation	3	0	0	3
EC9034	Multimedia Compression and Communication	3	0	0	3
EC9039	Digital Control Engineering	3	0	0	3
EC9041	Speech Processing	3	0	0	3
EC9077	Operating Systems	3	0	0	3
EC9078	Embedded and Real-time Systems	3	0	0	3
EC9080	Advanced Microprocessors	3	0	0	3

SEMESTER VII

CODE NO	COURSE TITLE	L	T	P	C
EC9021	Radar and Navigational Aids	3	0	0	3
EC9022	Television and Video Engineering	3	0	0	3
EC9023	Mobile Adhoc networks	3	0	0	3
EC9024	Wireless Networks	3	0	0	3
EC9026	Space - Time Communication	3	0	0	3
EC9027	Information Theory	3	0	0	3
EC9029	EMI/EMC	3	0	0	3
EC9036	Digital Image Processing	3	0	0	3
EC9037	Advanced DSP	3	0	0	3
EC9040	Robotics	3	0	0	3
EC9042	Avionics	3	0	0	3
EC9047	Power Electronics	3	0	0	3
EC9049	Anatomy and Physiology	3	0	0	3
EC9050	Radiological Equipments	3	0	0	3
EC9071	Hospital Management	3	0	0	3
EC9072	Medical Informatics	3	0	0	3
EC9073	Bio Informatics	3	0	0	3
EC9075	CMOS Analog IC Design I: Building Blocks	3	0	0	3
CS9078	Soft Computing	3	0	0	3
EC9081	Microcontroller Engineering	3	0	0	3
EC9084	Numerical Methods and Linear Algebra	3	0	0	3
EC9086	Web technology	3	0	0	3
EC9087	Internet and Java	3	0	0	3
GE9021	Professional Ethics in Engineering	3	0	0	3
GE9022	Total Quality Management	3	0	0	3

SEMESTER VIII

CODE NO	COURSE TITLE	L	T	P	C
EC9025	Wireless Sensor Networks	3	0	0	3
EC9028	Cryptography and Network Security	3	0	0	3
EC9030	Communication Network Design	3	0	0	3
EC9031	Satellite Communication	3	0	0	3
EC9035	Optical Networks	3	0	0	3
EC9038	VLSI Signal Processing	3	0	0	3
EC9043	Foundations for Nano-Electronics	3	0	0	3
EC9044	RF Microelectronics	3	0	0	3
EC9045	CAD for VLSI	3	0	0	3
EC9046	Optoelectronic Devices	3	0	0	3
EC9048	MEMS	3	0	0	3
EC9074	Biosignal Processing	3	0	0	3
EC9076	CMOS Analog IC Design II : Functional Blocks	3	0	0	3
EC9079	Parallel and Distributed processing	3	0	0	3
EC9083	Reliability Engineering	3	0	0	3
EC9085	Natural Language Processing	3	0	0	3

MA 9211 MATHEMATICS III L T P C
(Common to all branches of BE / B.Tech Programmes) 3 1 0 4

AIM

To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM 9+3

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT VI Z – TRANSFORM AND DIFFERENCE EQUATIONS 9+3

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

L: 45, T: 15, TOTAL : 60 PERIODS

TEXT BOOKS

1. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publications (2007)

REFERENCES

1. Glyn James, "Advanced Modern Engineering Mathematics, Pearson Education (2007)
2. Ramana, B.V. "Higher Engineering Mathematics" Tata McGraw Hill (2007).
3. Bali, N.P. and Manish Goyal, "A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

EE9215 **ELECTRICAL ENGINEERING** **L T P C**
3 0 0 3

AIM

To provide knowledge in the basic concepts of three phase circuits, electrical machines and power system.

PREREQUISTE

Electric circuit analysis

OBJECTIVE

To impart knowledge on

- Three phase circuits
- Principles of Electrical Machines
- Various components of power system

UNIT I DC MACHINES 9

Construction of DC machines – theory of operation of DC generators – characteristics of DC generators. Operating principle of DC motors – types of DC motors and their characteristics – speed control of DC motors.

UNIT II TRANSFORMERS AND THREE PHASE CIRCUITS 9

Introduction – transformer principle of operation – transformer no–load phasor diagram – EMF equation of a transformer – transformer on–load phasor diagram – transformer construction – equivalent circuit of a transformer – regulation of a transformer – transformer losses and efficiency –auto transformers. Three-phase supply – star connection – Delta connection – power in three-phase systems – measurement of power in three-phase systems – comparison of star and delta - advantages

UNIT III INDUCTION MACHINES 9

Construction of single-phase motors – types of single phase motors – double revolving field theory – starting methods – capacitor start capacitor run motors – shaded pole – repulsion type. Principle of operation of three-phase induction motors – construction – types – equivalent circuit – starting and speed control.

UNIT IV SYNCHRONOUS MACHINES 9

Principles of alternator – construction details – types – equation of induced EMF – voltage regulation. Methods of starting of synchronous motors – torque equation – V curves – synchronous condensers .

UNIT V INTRODUCTION OF POWER SYSTEMS 9

Structure of electrical Power system –typical AC power supply scheme –types of power plants –Variable load on Power plants-Interconnected grid system-transmission & distribution of electrical energy –over head Vs Underground system –Protection of power system –substation –types of tariff –power factor improvement

TOTAL: 45 PERIODS

TEXT BOOKS

1. I.J Nagarath and Kothari DP ‘Electrical Machines ’ Tata McGraw Hill ,1997
2. Del Toro ‘Electrical Engineering Fundamentals’ Pearson Education, New Delhi, 2007.
3. John Bird ‘Electrical Circuit theory and technology’ Elsevier, First Indian Edition, 2006.

REFERENCES

1. Rajendra Prasad 'Fundamentals of Electrical engineering' Prentice Hall of India, 2006.
2. Thereja .B.L 'Fundamentals of Electrical Engineering and Electronics' S chand & Co Ltd, 2008
3. V.K Mehta and Rohit Mehta ' Principle of Electrical Engineering' S Chand & Company,2008

EC 9201 ELECTROMAGNETIC FIELDS AND WAVES L T P C
3 0 0 3

UNIT I STATIC ELECTRIC FIELD 9

Introduction to co-ordinate systems , Gradient , Divergence , Curl , Divergence theorem, Stokes theorem , Coulombs law , Electric field intensity , Principle of superposition , Electric scalar potential , Electric flux density. Gauss's law and its application, Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength ,Energy and Energy density, Poisson and Laplace equation and their application, Numerical problems

UNIT II STATIC MAGNETIC FIELD 9

Magnetic field of a current carrying element ,Amperes law , The Biot – Savart law , Magnetic flux Density and Field intensity , Gauss law for magnetic fields , Torque, Magnetic moment ,Magneto motive force , Permeability , Vector potential , Field computation. Inductance, Energy in an Inductor and Energy density, Boundary relation, Hysterisis, Reluctance and Permeance. Numerical problems

UNIT III TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faradays law , Transformer and Mutual induction ,Maxwell's equation , Self and Mutual inductance ,Displacement current , Amperes law and its inconsistency for time varying fields , Boundary relation , Poynting vector , Comparison of field and circuit theory , Numerical problems.

UNIT IV PLANE EM WAVES IN ISOTROPIC MEDIA 9

Wave equation from Maxwell's Equation, Uniform plane waves in perfect dielectric and conductors, Polarization, Reflection and Refraction of plane waves at different boundaries, Surface impedance, Numerical problems

UNIT V APPLICATION OF STATIC FIELDS AND COMPUTATIONAL METHODS 9

Deflection of a charged particle, CRO, Ink Jet Printer, Electro static generator, Magnetic Separator, Cyclotron, Velocity selector and Mass Spectrometer, Electromagnetic pump, Introduction to field computation methods-FDM,FEM,MOM , Numerical problems

TOTAL: 45 PERIODS

TEXT BOOK

1. David .K.Cheng, "Field and wave Electromagnetics" , 2nd edition, Pearson education, 2004.
2. Mathew.N.O.Sadiku, "Elements of Electromagnetics", Oxford University Press,2006

REFERENCES

1. Karl E.Longman and Sava V.Savov, "Fundamentals of Electro-Magnetics", Prentice Hall of India, 2006
2. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005
3. W.H.Hayt and A.Buck,"Engineering ElectroMagnetics" , 7th Edition, Mcgraw Hill,2006
4. Ashutosh Pramanik," ElectroMagnetism" ,Prentice Hall of India, 2006
5. Nannapaneni Narayana Rao," Elements of Engineering ElectroMagnetics", 6th edition, Prentice Hall of India, 2006

EC 9202 ELECTRONIC CIRCUITS - I L T P C
3 0 0 3

UNIT I BIASING OF DISCRETE BJT AND MOSFET 9

DC Load line , operating point, Various biasing methods for BJT-Design-Stability-Bias compensation, Thermal stability, Design of biasing for MOSFET and JFET **-**

UNIT II BJT AMPLIFIERS 9

Small signal Analysis of Common Emitter-AC Loadline, Voltage swing limitations, Common collector and common base amplifiers – JFET amplifiers - Differential amplifiers- CMRR- Darlington Amplifier-Bootstrap technique - Cascaded stages - Cascode Amplifier

UNIT III MOSFET AMPLIFIERS 9

Small signal Analysis of Common source, Source follower and Common Gate amplifiers -CMOS Inverters –DC Analysis of CMOS Inverters – Voltage transfer curve – BiMOS Cascode - Design of NMOS inverter using resistive load – Noise Margin – VTC.

UNIT IV IC MOSFET AMPLIFERS 9

Single stage IC MOS amplifiers – Active Loads – Depletion MOS, Enhancement MOS, MOS in Triode region, NMOS current source and PMOS Current source, their equivalent circuits and load line on the VI characteristics– Current steering circuit using MOSFET –– CMOS common source amplifier and CMOS Common source follower – CMOS differential amplifier - CMRR

UNIT V HIGH FREQUENCY ANALYSIS AND LARGE SIGNAL AMPLIFIERS 9

Short circuit current gain , cut off frequency – f_α and f_β unity gain and bandwidth - Miller effect–frequency Analysis of CS and CE Amplifiers-Determinations of BW of Single stage and Multistage Amplifier- Analysis of Class A, Class B, Class AB with darlington output stage and with output stage utilizing MOSFETs – Class C, Class D, Class E power amplifiers.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 5th Edition, Oxford University Press, 2004.
2. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2007.

REFERENCES

1. Behzad Razavi, " Design of Analog CMOS Integrated Circuits", Tata McGraw Hill, 2007.
2. Paul Gray, Hurst, Lewis, Meyer "Analysis and Design of Analog Integrated Circuits", 4th Edition , John Willey & Sons 2005
3. Millman .J. and Halkias C.C, "Integrated Electronics", McGraw Hill, 2001.
4. D.Schilling and C.Belove, "Electronic Circuits", 3rd edition, McGraw Hill, 1989.

CS 9211	DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++	L T P C 3 0 0 3

AIM

To provide an in-depth knowledge in problem solving techniques and data structures.

OBJECTIVES

- To learn the systematic way of solving problems
- To understand the different methods of organizing large amounts of data
- To learn to program in C++
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Introduction- Tokens-Expressions-contour Structures –Functions in C++, classes and objects, constructors and destructors ,operators overloading and type conversions .

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File Handling Templates ,Exception handling, Manipulating strings.

UNIT III DATA STRUCTURES & ALGORITHMS 9

Algorithm, Analysis, Lists, Stacks and queues, Priority queues-Binary Heap-Application, Heaps, skew heaps, Binomial –hashing-hash tables without linked lists

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees-Binary trees, search tree ADT, AVL trees splay Trees, Graph Algorithms-Topological sort, shortest path algorithm network flow problems-minimum spanning tree applications of depth-first-search-Introduction to NP - completeness.

UNIT V SORTING AND SEARCHING 9

Sorting – Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Indirect sorting, Bucket sort, Introduction to Algorithm Design Techniques –Greedy algorithm, Divide and Conquer, Dynamic Programming.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 3rd ed, Pearson Education Asia, 2007.
2. E. Balagurusamy, "Object Oriented Programming with C++", McGraw Hill Company Ltd., 2007.

REFERENCES

1. Michael T. Goodrich, "Data Structures and Algorithm Analysis in C++", Wiley student edition, 2007.
2. Sahni, "Data Structures Using C++", The McGraw-Hill, 2006.
3. Seymour, "Data Structures", The McGraw-Hill, 2007.
4. Jean – Paul Tremblay & Paul G.Sorenson, An Introduction to data structures with applications, Tata McGraw Hill edition, II Edition, 2002.
5. John R.Hubbard, Schaum's outline of theory and problem of data structure with C++, McGraw-Hill, New Delhi, 2000.
6. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 2000
7. Robert Lafore, Object oriented programming in C++, Galgotia Publication

EC 9203 SIGNALS AND SYSTEMS L T P C
3 1 0 4

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals)- Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential, classification of CT and DT signals –periodic and aperiodic signals, random signals, Energy & Power signals - CT systems and DT systems, Classification of systems.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series analysis- spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in Signal Analysis.

UNIT III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS 9

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis- State variable equations and matrix representation of systems.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

Baseband Sampling of CT signals- Aliasing, DTFT and properties, Z-transform & properties.

UNIT V LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS 9

Difference Equations-Block diagram representation-Impulse response-Convolution sum- DTFT and Z Transform analysis of Recursive & Non-Recursive systems- State variable equations and matrix representation of systems.

L:45 + T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, Signals and Systems, Pearson, Indian Reprint, 2007.
2. Simon Haykins and Barry Van Veen, Signals and Systems John Wiley & sons, Inc. 2004.

REFERENCES

1. H P Hsu, Rakesh Ranjan" Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint ,2007
2. Edward W. Kamen, Bonnie S. Heck, Fundamentals of Signals and Systems Using the Web and MATLAB, Pearson, Indian Reprint, 2007
3. John Alan Stuller, An Introduction to Signals and Systems, Thomson, 2007
4. M.J.Roberts, Signals & Systems, Analysis using Transform methods & MATLAB, Tata McGraw Hill (India), 2007.
5. Robert A. Gabel and Richard A.Roberts, Signals & Linear Systems, John Wiley, III edition, 1987.

EE9218 ELECTRICAL MACHINES LABORATORY L T P C
0 0 3 2

1. Study of DC & AC Starters
2. Study of Transducers
3. Wheatstone Bridge and Schering Bridge
4. ADC and DAC Converters
5. Speed Control of DC Shunt Motor
6. Load Test on DC Shunt Motor
7. OCC & Load Characteristics of DC Shunt Generator
8. Load Test on Single-Phase Transformer
9. Load Test on Three-Phase Induction Motor
10. Load Test on Single-Phase Induction Motor.

TOTAL: 45 PERIODS

EC 9204 ELECTRONIC CIRCUITS - I LAB L T P C
0 0 3 2

1. Frequency Response of CE amplifier
2. Frequency response of CB amplifier
3. CC Amplifier - buffer
4. Frequency response of CS Amplifiers
5. Class A and Class B power amplifiers.
6. Differential Amplifiers- Transfer characterisitic.
7. CMRR Measurment
8. Cascode amplifier
9. Cascade amplifier

TOTAL: 45 PERIODS

CS 9212 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LAB L T P C
0 0 3 2

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations
   The next two exercises are to be done by implementing the following source files
   (a) Program source files for Stack Application 1
   (b) Array implementation of Stack ADT
   (c) Linked list implementation of Stack ADT
   (d) Program source files for Stack Application 2
   An appropriate header file for the Stack ADT should be #included in (a) and (d)
6. Implement any Stack Application using array implementation of Stack ADT (by implementing files (a) and (b) given above) and then using linked list implementation of Stack ADT (by using files (a) and implementing file (c))
7. Implement another Stack Application using array and linked list implementations of Stack ADT (by implementing files (d) and using file (b), and then by using files (d) and (c))
8. Queue ADT – Array and linked list implementations
9. Search Tree ADT - Binary Search Tree
10. Hash Table – separate chaining
11. Implement an interesting application as separate source files and using any of the searchable ADT files developed earlier. Replace the ADT file alone with other appropriate ADT files. Compare the performance.
12. Heap Sort
13. Quick Sort

TOTAL: 45 PERIODS

MA 9263 PROBABILITY AND RANDOM PROCESSES L T P C
3 1 0 4

AIM

To provide the necessary basic concepts in probability and random processes for applications such as random signals, linear systems etc. in communications engineering.

OBJECTIVES

- The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable.
- Able to analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES 9 + 3

Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions – Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables - Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 9 + 3

Classification – Stationary process – Markov process - Poisson process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES 9 + 3

Auto-correlation functions – Cross-correlation functions – Properties – Power spectral density – Cross-spectral density – Properties.

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 9 + 3

Linear time invariant system – System transfer function – Linear systems with random inputs – Auto-correlation and Cross-correlation functions of input and output – White noise.

L: 45, T: 15, TOTAL : 60 PERIODS

TEXT BOOKS

1. Ibe, O.C.,"Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, (2007).
2. Peebles, P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th edition, New Delhi, (2002).

REFERENCES

1. Yates, R.D. and Goodman, D.J., "Probability and Stochastic Processes", John Wiley and Sons, 2nd edition, (2005).
2. Stark, H. and Woods, J.W., "Probability and Random Processes with Applications to Signal Processing", Pearson Education, Asia, 3rd edition, (2002).
3. Miller, S.L. and Childers, D.G.,"Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, (2004).
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill edition, New Delhi, (2004).

EC 9251 DIGITAL ELECTRONICS AND SYSTEM DESIGN L T P C
3 1 0 4

UNIT I BASIC CONCEPTS AND COMBINATIONAL CIRCUITS 9

Number Systems – n's complement –Codes - Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Tabulation method – problem formulation and design of combinational circuits, Adder, Subtractor, Encoder/decoder, – three state devices, Priority Encoder, Mux/Demux, Code-converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM and EEPROM – Coding of Combination Circuits in verilog.

UNIT II SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits – their design, state minimization, moore/mealy model, state assignment, circuit implementation, Registers- shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding, Semiconductor memories - Feedback sequential- Circuit analysis and design- sequential circuit design with verilog.

UNIT III FUNDAMENTAL MODE SEQUENTIAL CIRCUITS 9

Stable, Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuit

UNIT IV MEMORY, CPLDs AND FPGAs 9

ROM, Read/Write memory – Static RAM, Dynamic RAM, PAL, PLA, CPLD – FPGA XL 4000 –

CLBs – I/O Block – Programmable Inter connects– Realization of simple combinational and

sequential circuits

UNIT V LOGIC GATES 9

Logic families- TTL, NMOS, CMOS, BiCMOS logic-Electrical behavior-static, dynamic-CMOS input and output structures-CMOS logic families -low voltage CMOS logic & interfacing-Bipolar logic Realization of NAND and NOR logic.

L : 45, P: 15 TOTAL : 60 PERIODS

TEXT BOOKS

1. Morris Mano, " Digital logic ", Prentice Hall of India, 1998
2. John. F. Wakerly, "Digital design principles and practices", Pearson Education, Fourth Edition, 2007 .
3. Charles H. Roth, Jr, "Fundamentals of Logic Design", Fourth edition, Jaico Books, 2002

REFERENCES

1 William I. Fletcher, "An Engineering Approach to Digital Design", Prentice- Hall of India, 1980

2 Floyd T.L., "Digital Fundamentals", Charles E. Merril publishing company, 1982

3 Jain R.P., "Modern Digital Electronics", Tata McGraw Hill, 1999.

EC 9252 ELECTRONIC CIRCUITS II L T P C
3 1 0 4

UNIT I FEEDBACK AMPLIFIERS AND STABILITY 9

Basic feedback concepts – Properties of Negative feedback – Four feedback topologies with amplifier circuit. Examples – Analysis of series – shunt feedback amplifiers – stability problem – Frequency compensation.

UNIT II OSCILLATORS 9

Barkhausen criteria for oscillator – Analysis of RC oscillators – Phase shift Wein bridge oscillators – LC oscillators – Colpitt, Hartley, Clapp, Crystal , Armstrong, Franklin and Ring Oscillators

UNIT III TUNED AMPLIFIERS 9

Basic principles – Inductor losses – Use of transformers – Single tuned amplifier frequency analysis - Amplifier with multiple tuned circuits – Cascade – Synchronous tuning – Stagger tuning – Stability of tuned amplifiers using Neutralization techniques.

UNIT IV MULTIVIBRATORS AND TIME BASE GENERATORS 9

Switching characteristics of transistors – Bistable, Monostable and Astable operation – Collector coupled and Emitter coupled circuits – Schmitt trigger - Voltage sweep generators – Current sweep generators

UNIT V RECTIFIERS AND POWER SUPPLIES 9

Halfwave and fullwave rectifiers with filters – Ripple factor – Series Voltage Regulator analysis and design – IGBT – working and characteristics – AC voltage control using thyristors – SMPS – DC/DC convertors – Buck, Boost, Buck-Boost analysis and design.

L:45,T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1 David .A. Bell, Solid state pulse circuits, Prentice Hall of India,1992.
2. F. Bogart Jr. Electronic Devices and Circuits 6th Edition, Pearson Education, 2007.

REFERENCES

1. Paul Gray, Hurst, Lewis, Meyer," Analysis and Design of Analog Integrated Circuits", 4th Edition ,. John Willey & Sons 2005
2 . Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata McGraw Hill, 2007.
3 Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2007.
4. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 5th Edition,Oxford University Press, 2004.
5. Muhammed H.Rashid power electronics Pearson Education / PHI , 2004
6. Jacob Millman, Taub Pulse, Digital and Switching Waveforms 2nd Edition 2007

EC 9253	COMMUNICATION SYSTEMS	L T P C 3 0 0 3

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – Angle modulation – PM and FM –Modulators and Demodulators – Fourier Transform of modulated signals.

UNIT II RECEIVER CHARACTERISTICS 9

Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems – Single tuned receivers - Superheterodyne receivers

UNIT III BASEBAND TECHNIQUES 9

Review of low pass sampling – Quadrature sampling of Bandpass signals – Quantisation – Uniform and non-uniform quantisation – Quantisation noise – Companding laws of speech signals – PCM, DPCM, DM, ADPCM and ADM
Multiplexing – TDM (E and T lines), FDM

UNIT IV BANDPASS SIGNALING 9

Geometric representation of signals – Correlator and matched filter – ML detection – generation and detection, PSD, BER of coherent BPSK, BFSK, QPSK – Principles of QAM – Structure of non-coherent receivers – BFSK, DPSK.

UNIT V NOISE PERFORMANCE 9

Narrow band noise – PSD of in-phase and quadrature noise – Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.

TOTAL: 45 PERIODS

TEXT BOOKS

1. J.G.Proakis, M.Salehi, “Fundamentals of Communication Systems” – Pearson Education 2006

REFERENCES

1. B.Sklar, “Digital Communications Fundamentals and Applications” 2/e Pearson Education 2007
2. S.Haykin, “Communication Systems” 3/e, John Wiley 2007
3. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3/e, Oxford University Press,2007
4. D.Roody, J.Coolen, “Electronic Communications”, 4/e PHI 2006
5. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006

EC 9254 CONTROL SYSTEMS L T P C
3 1 0 4

UNIT I CONTROL SYSTEM MODELING 9

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems - Block diagram reduction Techniques - Signal flow graph

UNIT II TIME RESPONSE ANALYSIS 9

Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB

UNIT III FREQUENCY RESPONSE ANALYSIS 9

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Use of Nichol's Chart in Control System Analysis. Series, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB.

UNIT IV STABILITY ANALYSIS 9

Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram - Nyquist Stability Criterion - Relative Stability, Analysis using MATLAB

UNIT V STATE VARIABLE ANALYSIS 9

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability – State space representation for Discrete time systems. Sampled Data control systems – Sampling Theorem – Sampler & Hold – Open loop & Closed loop sampled data systems.

L:45,T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. J.Nagrath and M.Gopal," Control System Engineering", New Age International Publishers, 5th Edition, 2007.

REFERENCES

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.
3. Schaum's Outline Series,'Feedback and Control Systems' Tata McGraw-Hill, 2007.
4. John J.D'azzo & Constantine H.Houpis, 'Linear control system analysis and design', Tata McGrow-Hill, Inc., 1995.
5. Richard C. Dorf & Robert H. Bishop, " Modern Control Systems", Addidon – Wesley, 1999.

EC 9255 COMPUTER ARCHITECTURE AND ORGANIZATION L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Computing and Computers, Evolution of Computers, VLSI Era, System Design- Register Level, Processor Level, CPU Organization, Data Representation, Fixed – Point Numbers, Floating Point Numbers, Instruction Formats, Instruction Types. Addressing modes.

UNIT II DATA PATH DESIGN 9

Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth's algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth's Algorithm

UNIT III CONTROL DESIGN 9

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV MEMORY ORGANIZATION 9

Random Access Memories, Serial - Access Memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V SYSTEM ORGANIZATION 9

Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors, Superscalar and vector processor.

TOTAL: 45 PERIODS

TEXT BOOKS

1. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill Third edition, 1998.
2. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, " Computer Organisation", V edition, McGraw-Hill Inc, 1996.

REFERENCES

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Paraami, "Computer Architecture", BEH R002, Oxford Press.
3. P.Pal Chaudhuri, , "Computer organization and design", 2nd Ed., Prentice Hall of India, 2007.
4. Miles J. Murdocca and Vincent P. Heuring, Principles of Computer Architecture, Printice Hall, 2000
5. G.Kane & J.Heinrich, ' MIPS RISC Architecture ', Englewood cliffs, New Jersey, Prentice Hall, 1992.

EC 9256 ELECTRONIC CIRCUITS – II LAB L T P C
0 0 3 2

1. Design and Analysis of feeback Amplifiers
2. Design of RC Oscillators
3. Design of LC Oscillators
4. Design and frequency response of Tuned Amplifier
5. Design of Astable Multivibrator
6. Design of Monostable Multivibrator
7. Design of Schmitt trigger, hysterisis
8. AC voltage control using thyristors

TOTAL: 45 PERIODS

EC 9257 DIGITAL SYSTEM LAB L T P C
0 0 3 2

1 Implementation of simple Boolean expression using universal gates
2 Priority encoder
3 2 to 4 MUX and implementation of combination logic
4 JK and RS flip flop implementation using logic gates
5 Synchronous up/down counter
6 BCD ripple counter with 7 segment display
7 Ring counters
8 Data transfer using shift registers
9 Half adder and Full adder
10 Binary 4 bit parallel adder
11. System Design using VeriLog

TOTAL: 45 PERIODS

GE 9371 COMMUNICATION SKILLS AND SOFT SKILLS L T P C
FIFTH / SIXTH SEMESTER 0 0 2 1

AIM

To enhance the overall capability of students and to equip them with the necessary Communication Skills and Soft Skills that would help them excel in their profession.

OBJECTIVES

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their jobs.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

A. Viewing and discussing audio-visual materials (6 periods)

UIT I Resume / Report Preparation / Letter Writing: (2)
Letter writing – Job application with Resume - Project report - Email etiquette.

UNIT II Presentation skills (1)
Elements of effective presentation – Structure of presentation - Presentation tools – Body language.

UNIT III Soft Skills (1)
Time management – Stress management – Assertiveness – Negotiation strategies.

UNIT IV Group Discussion (1)
Group discussion as part of selection process, Structure of group discussion – Strategies in group discussion – Mock group discussions.

UNIT V Interview Skills (1)
Kinds of interviews – Interview techniques – Corporate culture – Mock interviews. (Career Lab Software may be used for this section).

Note: Career Lab software may be used to learn the skills, to be applied in the practice session.

B. Practice session (24 periods)

1. Resume / Report Preparation / Letter writing: (4)
Students prepare their own resume and report.

2. Presentation Skills: (8)
Students make presentations on given topics.

3. Group Discussion: (6)
Students participate in group discussions.

4. Interview Skills: (6)
Students participate in Mock Interviews

TOTAL: 30 PERIODS

REFERENCES

1. Anderson, P.V, **Technical Communication**, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2. Prakash P, **Verbal and Non-Verbal Reasoning**, Macmillan India Ltd., Second Edition, New Delhi, 2004.
3. John Seely, **The Oxford Guide to Writing and Speaking**, Oxford University Press, New Delhi 2004.
4. David Evans, **Decisionmaker**, Cambridge University Press, 1997.
5. Thorpe, E and Thorpe, S **Objective English**, Pearson Education, Second Edition, New Delhi 2007.
6. Turton, N.D and Heaton, J.B, **Dictionary of Common Errors**, Addision Wesley Longman Ltd., Indian reprint 1998.

EC 9301 DIGITAL COMMUNICATION TECHNIQUES L T P C
3 0 0 3

UNIT I BASEBAND COMMUNICATION 9

Line codes – PSDs – ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding - M-ary schemes – Eye pattern.

UNIT II SYNCHRONISATION AND EQUALISATION 9

Synchronisation – Carrier, symbol and frame synchronisation - Equalisation – Zero forcing, LMS.

UNIT III INFORMATION THEORY 9

Measure of information – Entropy – Source coding theorem – Discrete memoryless channels – lossless, deterministic, noiseless, BEC, BSC – Mutual information – Channel capacity – Shannon-Hartley law - Sub-band coding – Transform coding – LPC – Shannon-Fano coding, Huffman Coding, run length coding, LZW algorithm.

UNIT IV ERROR CONTROL CODING TECHNIQUES 9

Channel coding theorem – Linear block codes – Hamming codes – Cyclic codes (CRC) – Convolutional codes – Viterbi decoding (Soft/Hard decision decoding).

UNIT V ADVANCED ERROR CONTROL CODING 9

Trellis coded modulation principles - Turbo Coding - LDPC Codes

TOTAL: 45 PERIODS

TEXT BOOKS

1. B. Sklar, “Digital Communication Fundamentals and Applications”, 2/e, Pearson Education, 2007
2. S. Haykin, “Digital Communications”, John Wiley, 2005

REFERENCES

1. B.P.Lathi, “Modern digital and Analog Communication Systems” 3/e, Oxford University Press 2007
2. J.G Proakis, “Digital Communication”, 4/e, MGH 2001.
3. Amitabha Battacharya, “Digital communications”, TMH 2006

EC 9302 LINEAR INTEGRATED CIRCUITS L T P C
3 0 0 3

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICS 9

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator Voltage to Current converter, Instrumentation amplifier, Sine wave Oscillators, Low pass and band pass filters, comparator, Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant and variable Tran conductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators. Frequency synthesizers, Compander ICs

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Analog switches, High speed sample and hold circuits and sample and hold IC's, Types of D/A converter Current driven DAC, Switches for DAC, A/D converter, Flash, Single slope, Dual slope, Successive approximation, DM and ADM, Voltage to Time and Voltage to frequency converters.

UNIT V SPECIAL FUNCTION ICS 9

Timers, Voltage regulators - linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optics ICs and Opto couplers, Sources for Noises, Op Amp noise analysis and Low noise OP-Amps.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Sergio Franco, " Design with operational amplifiers and analog integrated circuits", McGraw Hill, 1997.

REFERENCES

1. Gray and Meyer, " Analysis and Design of Analog Integrated Circuits ", Wiley International, 1995.
2. Michael Jacob J., " Applications and Design with Analog Integrated Circuits ", Prentice Hall of Inida,1996.
3. Ramakant A. Gayakwad, " OP - AMP and Linear IC's ", Prentice Hall, 1994.
4. Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.
5. Taub and Schilling, " Digital Integrated Electronics ", McGraw Hill, 1977.
6. Caughlier and Driscoll, " Operational amplifiers and Linear Integrated circuits ", Prentice Hall, 1989.
7. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001.

EC9303 MICROPROCESSOR AND MICROCONTROLLER L T P C
3 0 0 3

UNIT I ARCHITECTURE OF 8085 /8086 9

8085- Functional Block Diagram- Description - Addressing Modes, Timing diagrams. 8086- Architecture, Instruction set, Addressing Modes. Introduction to 8087 - Architecture.

UNIT II ASSEMBLY LANGUAGE PROGRAMMING 9

Simple Assembly Language Programming, Strings, Procedures, Macros, Assembler Directives- Interrupts and Interrupt Applications.

UNIT III PERIPHERAL INTERFACING & APPLICATION 9

Programmable Peripheral Interface (8255), keyboard display controller (8279), ADC, DAC Interface, Programmable Timer Controller (8254), Programmable interrupt controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER 9

8051 Microcontroller- Instruction Set – ALP - Branching- I/ O Programming - ALU Instruction - 8051 Programming in C.

UNIT V MEMORY, I/O, INTERRUPTS - INTERFACING 9

Programming 8051 Timers- Serial Port Programming- Interrupts Programming LCD & Keyboard Interfacing- ADC, DAC & Sensor Interfacing, External Memory Interface- RTC Interfacing using I2C Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fourth edition, Penram International Publishing 2006.
2 Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition, Indian edition 2007. Tata McGraw Hill
3 Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems, Second Edition, Pearson Education 2008.

REFERENCES

1. Krishna Kant, " Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, 2007
2. Kenneth J.Ayala., "The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning, 2007, New Delhi.
3. A.K. Ray , K.M .Bhurchandi "Advanced Microprocessor and Peripherals" ,Second edition, Tata McGraw-Hill, 2007.
4. Barry B.Brey, "The Intel Microprocessors Architecture, Programming and Interfacing" Pearson Education, 2007. New Delhi.
5. Zdravko Karakehayov, "Embedded System Design with 8051 Microcontroller hardware and software", Mercel Dekkar, 1999.

EC9304 DIGITAL SIGNAL PROCESSING L T P C
3 1 0 4

UNIT I DISCRETE – TIME SIGNALS AND SYSTEMS 9

Review of discrete-time signals & systems - DFT and its properties, FFT algorithms & its application to convolution, Overlap-add & overlap-save methods.

UNIT II DESIGN OF INFINITE IMPULSE RESPONSE FILTERS 9

Calculation of IIR coefficients using pole-zero placement method, Analog filters – Butter worth & Chebyshev Type I. Analog Transformation of prototype LPF to BPF /BSF/ HPF. Transformation of analog filters into equivalent digital filters using Impulse invariant method and Bilinear Z transform method- Realization structures for IIR filters – direct, cascade, parallel & lattice forms.

UNIT III DESIGN OF FINITE IMPULSE RESPONSE FILTERS 9

Linear phase response of FIR-FIR design using window method-Frequency sampling method - Realization structures for FIR filters – Transversal and Linear phase lattice structures- Comparison of FIR & IIR.

UNIT IV QUANTIZATION EFFECTS AND DSP ARCHITECTURE 9

Representation of numbers-ADC Quantization noise-Coefficient Quantization error-Product Quantization error-truncation & rounding errors -Limit cycle due to product round-off error-Round- off noise power-limit cycle oscillation due to overflow in digital filters- Principle of scaling-Introduction to general and special purpose hardware for DSP – Harvard architecture-Pipelining-Special instruction-Replication.

UNIT V MULTIRATE SIGNAL PROCESSING 9

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase Decomposition of FIR filter-Multistage implementation of sampling rate conversion-Design of narrow band filters - Applications of Multirate signal processing.

L:45, T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
2. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.

REFERENCES

1. I.C.Ifeachor and B.W. Jervis, Digital Signal Processing- A practical approach, Pearson, 2002.
2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata McGraw-Hill, 1998.
3. D.J. De Fatta, J.G.Lucas and W.S. Hodgkiss, Digital Signal Processing- A system Design Approach, John Wiley & sons, Singapore, 1988.

EC9305 TRANSMISSION LINES & WAVE GUIDES L T P C
3 0 0 3

UNIT I TRANSMISSION LINE THEORY & PARAMETERS 8

Introduction to different types of transmission lines , Transmission line Equation – Solution – Infinite line concept - Distortion less line – loading – input impedance,Losses in Transmission lines– Reflection loss, Insertion loss, return loss, Transmission line parameters at radio frequencies. Introduction to planar transmission lines. Numerical Problems

UNIT II IMPEDENCE MATCHING AND TRANSFORMATION 9

Reflection Phenomena – Standing waves – λ/8, λ/4 & λ/2 lines – λ/4 Impedance transformers , Stub Matching – Single and Double Stub – Smith Chart and Applications. Numerical Problems

UNIT III NETWORKCOMPONENTS 8

Filter fundamentals, Constant K – LPF and HPF Filter design, Fundamentals of Attenuators and Equalizers – Lattice type , Concept of inverse networks –Transients in transmission lines. Numerical Problems

UNIT IV RECTANGULAR WAVE GUIDES 10

Waves between Parallel Planes – characteristic of TE , TM and TEM waves , Velocities of propagation ,Solution of wave Equation in Rectangular guides ,TE and TM modes , Dominant Mode,Attenuation,Mode Excitation, Dielectric slab wave guides, Numerical Problems .

UNIT V CYLINDRICAL WAVE GUIDES 10

Solution of wave equation in circular guides, TE and TM wave in circular guides, Wave impedance, attenuation, mode excitation, formation of cylindrical cavity, Application , cavity resonator and Q for dominant mode, Numerical Problems

TOTAL: 45 PERIODS

TEXT BOOKS

1. John D Ryder “Networks lines and fields`` Prentice Hall of India, 2005

REFERENCES

1. G.S.N Raju”ElectroMagnetic Field Theory and Transmission Lines”Pearson Education,First edition 2005
2. Bhag Guru & Hiziroglu,”Electromagnetic Field Theory Fundamentals`` Second edition Cambridge University press,2005
3. Annapurna Das Sisir K Das ,”Microwave Engineering`` Tata McGraw Hill, 2004.

EC9306 MEASUREMENTS AND INSTRUMENTATION L T P C
3 0 0 3

UNIT I SCIENCE OF MEASUREMENT 9

Measurement System – Instrumentation – Characteristics of measurement systems – Static and Dynamic – Errors in Measurements – Calibration and Standards.

UNIT II TRANSDUCERS 9

Classification of Transducers – Variable Resistive transducers – Strain gauges , Thermistor, RTD- Variable Inductive transducers- LVDT, RVDT,- Variable Capacitive Transducers – Capacitor microphone- Photo electric transducers – Piezo electric transducers – Thermocouple – IC sensors - Fibre optic sensors – Smart/intelligent sensors.

UNIT III SIGNAL CONDITIONING AND SIGNAL ANALYZERS 9

DC and AC bridges – Wheatstone, Kelvin, Maxwell, Hay and Schering.Pre- amplifier – Isolation amplifier – Filters – Data acquisition systems. Spectrum Analyzers – Wave analyzers – Logic analyzers.

UNIT IV DIGITAL INSTRUMENTS 9

Digital Voltmeters – Millimeters – automation in Voltmeter – Accuracy and Resolution in DVM - Guarding techniques – Frequency counter- Data Loggers – Introduction to IEEE 488/GPIB Buses.

UNIT V DATA DISPLAY AND RECORDING SYSTEMS 9

Dual trace CRO – Digital storage and Analog storage oscilloscope. Analog and Digital Recorders and printers. Virtual Instrumentation - Block diagram and architecture – Applications in various fields. Measurement systems applied to Micro and Nanotechnology.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Albert D.Helfrick and William D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2007.
2. Ernest o Doebelin and dhanesh N manik, “Measurement systems” ,5th edition, McGraw-Hill, 2007.

REFERENCES

1. John P. Bentley, “Principles of Measurement Systems”, Fourth edition, pearson Education Limited, 2005.
2. A. K. Sawhney, “Course In Electrical And Electronic Measurement And Instrumentation”, Dhanpat Rai Publisher, 2000.
3. Bouwens,A.J, “Digital Instrumentation”, Tata Mc-Graw Hill, 1986.
4. David A.Bell, “Electronic Instrumentation and Measurements”, Second edition, Prentice Hall of India, 2007.

EC9307 MICROPROCESSOR AND MICROCONTROLLER LAB L T P C
0 0 3 2

8085 based experiments

1. Assembly Language Programming of 8085

8086 based experiments

1. Programs for 16 bit Arithmetic, Sorting, Searching and String operations,
2. Programs for Digital clock, Interfacing ADC and DAC
3. Interfacing and Programming 8279, 8259, and 8253.
4. Serial Communication between two Microprocessor Kits using 8251.
5. Interfacing and Programming of Stepper Motor and DC Motor Speed control and Parallel Communication between two Microprocessor Kits using Mode 1 and Mode 2 of 8255.
6. Macroassembler Programming for 8086

8051 based experiments

1. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
2. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
3. Interfacing – DAC and ADC and 8051 based temperature measurement
4. Interfacing – LED and LCD
5. Interfacing – stepper motor traffic light control
6. Communication between 8051 Microcontroller kit and PC.
7. R8C based applications

TOTAL: 45 PERIODS

EC9308 DIGITAL SIGNAL PROCESSING LAB L T P C
0 0 3 2

MATLAB / EQUIVALENT SOFTWARE PACKAGE(30% OF THE COURSE)

1. Generation of sequences (functional & random), correlation and convolution
2. Spectrum Analysis using FFT
3. Filter Design & Analysis
4. Filter Implementation in time-domain & frequency domain
5. Study of Quantization errors in DSP algorithms
6. Multirate Filters
7. Adaptive filter
8. Equalization
9. Echo Cancellation

DSP PROCESSOR IMPLEMENTATION (70% OF THE COURSE)

1. Waveform Generation
2. FIR Implementation
3. IIR Implementation
4. FFT
5. Finite word Length effect
6. Multirate filters

TOTAL: 45 PERIODS

EC9309 COMMUNICATION SYSTEM LAB L T P C
0 0 3 2

1. Signal Sampling and reconstruction
2. Time Division Multiplexing
3. AM / FM Modulator and Demodulator
4. Pulse Code Modulation and Demodulation
5. Delta Modulation and Demodulation
6. Line coding schemes
7. FSK, PSK and DPSK schemes (MATLAB Simulation)
8. Error control coding schemes (MATLAB Simulation)
9. Spread spectrum modulation (MATLAB Simulation)
10. Communication system simulation using ADS

TOTAL: 45 PERIODS

EC9351 MEDICAL ELECTRONICS L T P C
3 0 0 3

UNIT I ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING 9

The origin of Biopotentials; biopotential electrodes; biological amplifiers; ECG, EEG, EMG, PCG, EOG – lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS 9

pH, pO2, pCO2, pHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters, differential count.

UNIT III ASSIST DEVICES 9

Cardiac pacemakers, DC Debrillators, Dialyser, Heart-Lung machine, Hearing aids.

UNIT IV PHYSICAL MEDICINE AND BIO-TELEMETRY 9

Diathermies – Short-wave, ultrasonic and microwave type and their applications, medical stimulator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation, electrical safety.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, Surgical diathermy, cryogenic application, introduction to telemedicine.

TOTAL: 45 PERIODS

TEXT BOOKS

1. John G.Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, (Asia) Pvt.Ltd., 2004.
2. Lesile Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2007.

REFERENCES

1. Khandpur, R.S. "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, Second edition, 2003.
2. Joseph.J, Carr and John M.Brown, "Introduction to Biomedical equipment technology", Pearson Education Inc.2004.

EC9352 WIRELESS COMMUNICATION L T P C
3 0 0 3

UNIT I WIRELESS CHANNELS 9

Large scale path loss – Path loss models -Link Budget design – small scale fading-Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading – Parameters of mobile multipath channels – Time dispersion parameters-coherence bandwidth – Doppler spread & Coherence time.

UNIT II CELLULAR ARCHITECTURE 9

Evolution of Mobile Communication- trends in Cellular radio and personal communications- Cellular concept-Frequency reuse - channel assignment- hand off-interference & system capacity- trunking & grade of service.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, $\pi/4$-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels, OFDM principle – Transceiver implementation, Cyclic prefix, PAPR, Intercarrier interference.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Diversity – Micro- and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver, MIMO systems – Spatial Multiplexing, System Model, Channel state information, Capacity in fading and non-fading channels.

UNIT V WIRELESS STANDARDS 9

Principles of Spread Spectrum Techniques, FDMA, TDMA & CDMA -Capacity Calculations – GSM & GPRS, CDMA in IS-95 / CDMA 2000, Wi-Fi, WiMax.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.
2. Rappaport,T.S., "Wireless communications", Pearson Education, 2003.

REFERENCES

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.
3. Simon Haykins & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.
4. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.
5. Blake,R., Wireless Communication Technology, Thomson Delmar, 2003.
6. Lee,W.C.Y., Mobile Communication Engineering, McGraw Hill, 1998.
7. Van Nee, R. and Ramji Prasad, OFDM for wireless multimedia communications, Artech House, 2000.

EC9353 COMMUNICATION NETWORKS L T P C
3 0 0 3

UNIT I NETWORK FUNDAMENTALS AND PHYSICAL LAYER 9

Introduction to Networks, definition of layers, services, interface and protocols. OSI reference model- layers and duties. TCP/IP reference model – layers and duties. Physical layer- general description, characteristics, signaling media types, topologies, examples physical layer (RS232C, ISDN, ATM,SONET)

UNIT II DATA LINK LAYER AND NETWORK INTERCONNECTION 9

Logical link control Functions:- Framming, Flow control , Error control: CRC, LLC protocols:- HDLC, P to P. Medium access layer:- Random access, Controlled access, Channelization, IEEE standards:- 802.3, 802.4 and 802.5. Internetworking, Interconnection issues, Interconnection devices:- Repeaters, Hubs, Routers/switches and Gateways.

UNITIII MESSAGE ROUTING TECHNOLOGIES 9

Circuit switching, packet switching, message switching. Internet protocols; IPV4, IPV6, ARP, RARP, ICMP, IGMP, VPN. Network Routing Algorithms: - Distance vector routing, OSPF, Dijikstra’s , Bellaman Ford, Congestion control algorithms.

UNIT IV END-END PROTOCOLS and SECURITY 9

Process-process delivery:- TCP, UDP and SCTP. Application protocols: WWW,HTTP,FTP and TELNET, Network management protocol: SNMP, Network security.

UNIT V DIGITAL SWITCHING 9

Switching functions, Space Division Switch, Time Division Switch, STS switching, TST switching, No 4 ESS Toll switch, digital cross connect systems.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Behrouz.A. Forouzan, Data Communication And Networking, 4th Edition, Tata McGraw Hill, 2007.
2. John C. Bellamy, Digital Telephony, 3rd Edition, John Wiley 2006.

REFERENCES

1. Stallings.W., Data And Computer Communication, 4th Edition, Prentice Hall of India, 1996
2. Tanenboum, A.S, Computer Netwotks, 3rd Edition , Prentice Hall Of India, 1996
3. Keshav.S. An Engineering Approach To Computer Networking, Addision – Wesley,1999.
4. J.E.Flood, Telecommunication Switching, Traffic and networks, Ist edition, Pearson Education, 2006

EC9354 ANTENNAS AND WAVE PROPAGATION L T P C
3 0 0 3

UNIT I FUNDAMENTALS OF RADIATION 9

Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi array.

UNIT II ERTURE AND SLOT ANTENNAS 9

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas ,Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

UNIT III ANTENNA ARRAYS 9

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array

UNIT IV SPECIAL ANTENNAS 9

Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR

UNIT V PROPAGATION OF RADIO WAVES 9

Modes of propagation , Structure of atmosphere , Ground wave propagation, Tropospheric propagation , Duct propagation , Troposcatter propagation , Flat earth and Curved earth concept ,Sky wave propagation – Virtual height ,critical frequency , Maximum usable frequency – Skip distance , Fading , Multi hop propagation.

TOTAL: 45 PERIODS

TEXT BOOKS

1. John D Kraus," Antennas for all applications",3 Ed, McGraw Hill, 2005
2. Edward C.Jordan and Keith G.Balmain"Electromagnetic Waves and Radiating Systems"Prentice Hall of India,2006

REFERENCES

1. Constantine.A.Balanis"Antenna Theory Analysis and Design" Wiley student edition,2006
2. Rajeswari Chatterjee,:"Antenna Theory and Practice"Revised Second edition"New Age international Publishers,2006
3. S.Drabowitch,"Modern Antennas" Second edition,Springer Publications,2007
4. Robert S.Elliott"Antenna theory and Design"Wiley student edition,2006
5. H.Sizun" Radio Wave Propagation for Telecommunication Applications"First Indian Reprint, Springer Publications,2007

EC9355 DIGITAL VLSI L T P C
3 0 0 3

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHEMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 PERIODS

TEXT BOOKS

1 Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated circuits: A design perspective". Second Edition, Prentice Hall of India, 2003.
2 M.J. Smith, "Application specific integrated circuits", Addisson Wesley, 1997

REFERENCES

1 N.Weste, K.Eshraghian, "Principles of CMOS VLSI DESIGN", second edition, Addision Wesley 1993
2 R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", 2005 Prentice Hall of India
3 A.Pucknell, Kamran Eshraghian, "BASIC VLSI DESIGN", Third edition, Prentice Hall of India, 2007.

EC9356 ELECTRONIC SYSTEM DESIGN LAB

L	T	P	C
0	0	3	2

1. Design of switched mode power supply
2. Design of AC/DC voltage regulator using SCR
3. Design of FM transceiver
4. Design of wireless data modem
5. Design of Audio power amplifier with speaker AGC load with AGC circuit.
6. Design of VCO
7. Design of voltage to frequency converter
8. Delta modulator and demodulator
9. 3.5 Digital Voltmeter
10. Design of PRBS generator clocked by CMOS crystal oscillator
11. Numerical controlled oscillator using VHDL.
12. Huffman encoder and decoder using VHDL.

TOTAL: 45 PERIODS

EC 9357 MEDICAL ELECTRONICS LAB

L	T	P	C
0	0	3	2

1. Bio-Amplifiers
2. Recording of ECG signal and analysis.
3. Recording of audiogram.
4. Recording of EMG.
5. Study and analysis of safety aspects of surgical diathermy.
6. Monitoring of electrical safety of hospital equipments.
7. Measurement of PH, PO2 and conductivity.
8. Recording of various physiological parameters using patient monitoring system and telemetry units.
9. Bio-signal processing using MATLAB
10. Medical Imaging using MATLAB
11. Study of spectra of bio signals using spectrum analyzer.
12. Study of Magnetic tape recorder

TOTAL: 45 PERIODS

EC 9358 **NETWORKING LAB** **L T P C**
0 0 3 2

1. Analysis of logical link control layer protocols – Stop & wait, Sliding window
2. Analysis of MAC protocols – ALOHA, SLOTTED ALOHA, CSMA, CSMA/CD, TOKEN BUS, TOKEN RING.
3. Client / Server communication using TCP / UDP Socket programming
4. Data packet scheduling, Congestion control, transmission flow control algorithms
5. Switches / Routers
6. Wi-Fi Physical Layer
7. Wi-Fi MAC Layer
8. Cryptography (Network Security)
9. NS2 based simulation

TOTAL: 45 PERIODS

MG9401 **PRINCIPLES OF MANAGEMENT** **L T P C**
3 0 0 3

UNIT I OVERVIEW OF MANAGEMENT **9**
Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - Strategies for International Business.

UNIT II PLANNING **9**
Nature and purpose of planning - Planning process - Types of plans – Objectives - - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING **9**
Nature and purpose of organizing - Organization structure - Formal and informal groups / organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - - Performance Appraisal.

UNIT IV DIRECTING **9**
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership - Leadership theories - Communication - Hurdles to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING 9

Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
4. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
5. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.

EC9401 RF AND MICROWAVE ENGINEERING L T P C
3 0 0 3

UNIT I TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION 9

Low frequency parameters-impedance ,admittance,hybrid and ABCD. High frequency parameters-Formulation of S parameters,properties of S parameters-Reciprocal and lossless networks,transmission matrix,Introduction to component basics,wire,resistor,capacitor and inductor,applications of RF

UNIT II RF TRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS 9

Amplifier power relation, stability considerations,gain considerations,noise figure,impedance matching networks,frequency response,T and Π matching networks,microstripline matching networks

UNIT III PASSIVE AND ACTIVE MICROWAVE DEVICES AND CIRCUITS 9

Open, short and matched terminations; coupling probes and loops; power divider; directional coupler; attenuators; phase shifter; circulator; isolator; Impedance matching Devices– Tuning screw, stub and quarter-wave transformers.Crystal diodes and Schottkey diode detector and mixers; PIN diode switch, Gunn diode oscillator; IMPATT diode oscillator and amplifier; varactor diode and parametric amplification; Introduction to MIC.

UNIT IV MICROWAVE GENERATION 9

High frequency effects in Tubes, Two cavity klystron amplifier; Reflex klystron oscillator; TWT amplifier; Magnetron oscillator – Theory and applications.

UNIT V MICROWAVE MEASUREMENTS 9

Measuring Instruments – VSWR meter, Power meter, Spectrum Analyser, Network Analyser – principles; Measurement of Impedance, frequency, power, VSWR, Q factor, dielectric constant, S-Parameter.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Reinhold.Ludwig and Pavel Bretshko 'RF Circuit Design", Pearson Education, Inc., 2006
2. Robert E.Colin, "Foundations for Microwave Engineering", 2 edition, McGraw Hill, 2001
3. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Inc., 2004

REFERENCES

1. Thomas H.Lee, "Planar Microwave Engineering", Cambridge University Press, 2004
2. M.M.Radmanesh, "RF and Microwave Electronics", Pearson Education, Inc., first 2005
3. S.Y.Liao, "Microwave Devices and Circuits", Pearson Education Limited, third edition 2006.
4. D.M.Pozar, "Microwave Engineering.", John Wiley & sons, Inc., 2006.

EC9402 OPTICAL COMMUNICATION L T P C
3 0 0 3

UNIT I OPTICAL FIBERS 9

ntroduction, light propagation in optical fibers, ray and mode theory of light, optical fiber structure and parameters, fiber materials, fiber fabrication techniques, optical signal attenuation mechanisms, merits and demerits of guided and unguided optical signal transmissions.

UNIT II TRANSMISSION CHARACTERISTICS 9

Optical signal distortion – Group delay, material dispersion, waveguide dispersion, polarization mode dispersion, intermodal dispersion, profile dispersion, fiber types, Standard Singlemode Fibers, Dispersion Shifted Fibers, Dispersion Flattened Fibers, Polarization Maintaining Fibers, Dispersion compensation, Principles of fiber nonlinearity.

UNIT III OPTICAL TRANSMITTERS 9

Materials for optical souces, light-emitting diodes, semiconductor laser diodes , longitudinal modes, gain and index-guiding, power-current characteristics, spectral behaviour, longitudinal mode control and tunability, noise, direct and external modulation, Laser sources and transmitters for free space communication.

UNIT IV OPTICAL RECEIVERS 9

Principles of optical detection, spectral responsivity, PIN, APD, preamplifier types, receiver noises, Signal to Noise Ratio (SNR) and Bit Error Rate (BER) , Principles of coherent detection, power and risetime budget.

UNIT V OPTICAL NETWORKING PRINCIPLES AND COMPONENTS 9

WDM optical networks, SONET/SDH/FDDI optical networks, layered optical network architecture, Optical couplers, filters, isolators, switches, optical amplifiers: erbium doped fiber amplifiers, semiconductor optical amplifiers.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Gerd Kaiser , “Optical Fiber Communications”, Third Edition, Mcgrawhill Publishers, 2000.
2. Govind P. Agrawal, “ Fiber-Optic Communication Systems”, Third Edition, John Wiley & Sons, 2004.

REFERENCES

1. John M. Senior, ”Optical Fiber Communications- Principles And Practice”, Second Edition, Prentice-Hall Of India Pvt. Ltd, 2007.
2. Rajiv Ramasamy & Kumar N. Sivarajan, “Optical Networks – A Practical Perspective”,2 Ed, Morgan Kauffman 2002.
3. Uyless Black, ”Optical Networks- Third Generation Transport Systems”, Pearson Education Asia, 2002.

EC9403 VLSI DESIGN LAB L T P C
0 0 3 2

1. FPGA BASED EXPERIMENTS.

(i) HDL based design entry and simulation of simple counters, state machines, adders (min 8 bit) and multipliers (4 bit min).
(ii) Synthesis, P&R and post P&R simulation of the components simulated in (i) above. Critical paths and static timing analysis results to be identified. Identify and verify possible conditions under which the blocks will fail to work correctly.
(iii) Hardware fusing and testing of each of the blocks simulated in (i). Use of either chipscope feature (Xilinx) or the signal tap feature (Altera) is a must. Invoke the PLL and demonstrate the use of the PLL module for clock generation in FPGAs.

2. IC DESIGN EXPERIMENTS: (BASED CADENCE/MAGMA/TANNER)

(a) Design and simulation of a simple 5 transistor differential amplifier. Measure gain, ICMR,
and CMRR
(b) Layout generation, parasitic extraction and resimulation of he circuit designed in (a)
(c) Synthesis and Standard cell based design of an circuits simulated in 1(i) above. Identification of critical paths, power consumption.
(d) For expt (c) above, P&R, power and clock routing, and post P&R simulation.
(e) Analysis of results of static timing analysis.

TOTAL: 45 PERIODS

EC9404 MICROWAVE AND OPTICAL COMMUNICATION LAB L T P C
0 0 3 2

1. Characteristics of Glass and Plastic Optical Fibers – Measurement of Numerical aperture and attenuation, OTDR Principle.

2. DC Characteristic of LEDs and Pin Photodiodes - Determination of source Conversion Efficiency and Detector Responsivity

3. PI Characteristic of Laser Diodes – Threshold Current Determination and Temperature Effects

4. Gain Characteristic Of APDs – Determination of break down voltage and average gain of APD.

5. Analog transmission Characteristic of a fiber optical link – Determination of operating range and system bandwidth for Glass and Plastic fiber links.

6. Determination of maximum bit rate of a digital fiber optical link – Glass and Plastic Fiber links

7. Optical link Simulation.

8. Gain and Radiation Pattern Measurement of Horn Antenna.

9. Gain and Radiation Pattern of Dipole antenna, Array antenna, Log Periodic antenna and Loop antenna.

10. Determination of mode characteristic of Reflex Klystron Oscillator

11. VSWR, Impedance Measurement & Impedance Matching.

12. Dielectric Constant Measurement.

13. Characteristic of Directional Couplers and Multiport Junction.

14. Gunn diode characteristics.

15. Microwave IC – Filter Characteristics

TOTAL: 45 PERIODS

EC9021	RADAR AND NAVIGATIONAL AIDS	L	T	P	C
		3	0	0	3

UNIT I RANGE EQUATION AND TYPES OF RADAR 9

Basic Radar, Radar equation, Radar parameters, Block diagram, Radar frequencies. Types of Radar: CW, Doppler, MTI, FMCW, Pulsed, Tracking Radar. DSP in Radar (MTD1)

UNIT II RADAR SYSTEM CONCEPTS 9

Different type of Noise, Noise figure, LNA. False alarm & Missed detection, Radar cross section, TR, ATR, Types of Displays -Color CRT, Bright displays, synthetic video displays, A scope, PPI.

UNIT III SIGNAL PROCESSING AND ANTENNAS 9

Detection of radar signals in Noise and clutter, detection of non fluctuating target in noise, Matched filter, Matched filter response to delayed Doppler shifted signals, Radar measurements.

Types of Antennas: Parabolic, Cassegrain and Electronically steered phased array antennas.

UNIT IV RADIO NAVIGATION AND LANDING AIDS 9

General principles, Radio compass (NDB), ADF, VOR, DME., Hyperbolic Navigation DECCA, OMEGA, LORAN, Mechanics of Landing: Instrument Landing System, Microwave Landing System.

UNIT V SATELLITE NAVIGATION AND HYBRID NAVIGATION SYSTEM 9

Basics of Satellite Navigation, Introduction to Global Positioning System., System Description, Basic principles, position, velocity determination, Signal structure-DGPS, Integration of GPS & INS

TOTAL: 45 PERIODS

TEXT BOOKS

1. M.I.Skolnik ,"Introduction to Radar Systems", Tata McGraw Hill 2006.
2. Myron Kyton and W.R.Fried "Avionics Navigation Systems" John Wiley & Sons 1997.

REFERENCES

1. Nagaraja "Elements of Electronic Navigation" Tata McGraw Hill, 2nd ed, 2000.
2. Albert Helfrick. D, 'Principles of Avionics', Avionics communications Inc., 2004
3. Nathansan, "Radar design principles-Signal processing and environment", 2/e, PHI, 2007.
4. Hofmann-Wellenhof, Hlichlinegger and J.Collins, "GPS Theory and Practice", 5/e Springer International Edition, 2007
5. Roger J.Sullivan, "Radar foundations for Imaging and advanced concepts", PHI,2004.

EC9022 TELEVISION AND VIDEO ENGINEERING L T P C
3 0 0 3

UNIT I FUNDAMENTALS OF TELEVISION 9

Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Vidicon- Plumbicon- Silicon Diode Array Vidicon- Solid-state Image scanners- Monochrome picture tubes- Composite video signal- video signal dimension-horizontal sync. Composition-vertical sync. Details-functions of vertical pulse train- Scanning sequence details. Picture signal transmission- positive and negative modulation- VSB transmission- Sound signal transmission-Standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

TV transmitter-TV signal Propagation- Interference- TV Transmission Antennas-Monochrome TV receiver- RF tuner- UHF, VHF tuner-Digital tuning techniques-AFT-IF subsystems-AGC Noise cancellation-Video and Sound inter-carrier detection-Vision IF subsystem- DC re-insertion-Video amplifier circuits-Sync operation- typical sync processing circuits-Deflection current waveforms, Deflection oscillators- Frame deflection circuits- requirements- Line deflection circuits-EHT generation-Receiver antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION 9

Compatibility- Colour perception-Three colour theory- Luminance, Hue and saturation-Colour television cameras-Values of luminance and colour difference signals-Colour television display tubes-Delta-gun Precision-in-line and Trinitron colour picture tubes- Purity and convergence- Purity and static and Dynamic convergence adjustments- Pincushion-correction techniques-Automatic degaussing circuit- Gray scale tracking-colour signal transmission- Bandwidth-Modulation of colour difference signals-Weighting factors-Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS 9

NTSC colour TV systems-SECAM system- PAL colour TV systems- Cancellation of phase errors-PAL-D Colour system-PAL coder-PAL-Decoder receiver-Chromo signal amplifier-separation of U and V signals-colour burst separation-Burst phase Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Colour signal matrixing. Sound in TV

UNIT V ADVANCED TELEVISION SYSTEMS 9

Satellite TV technology-Geo Stationary Satellites-Satellite Electronics-Domestic Broadcast System-Cable TV-Cable Signal Sources-Cable Signal Processing, Distribution & Scrambling- Video Recording-VCR Electronics-Video Home Formats-Video Disc recording and playback-DVD Players-Tele Text Signal coding and broadcast receiver- Digital television-Transmission and reception –Projection television-Flat panel display TV receivers-LCD and Plasma screen receivers-3DTV-EDTV.

TOTAL: 45 PERIODS

TEXT BOOKS

1. R.R.Gulati, “Monochrome Television Practice, Principles, Technology and servicing.” Third Edition 2006, New Age International (P) Publishers.
2. R.R.Gulati, Monochrome & Color Television, New Age International Publisher, 2003.

REFERENCES

1. A.M Dhake, “Television and Video Engineering”, 2nd ed., TMH, 2003.
2. R.P.Bali, Color Television, Theory and Practice, Tata McGraw-Hill, 1994

EC9023 MOBILE ADHOC NETWORKS L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Introduction to Ad Hoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models: - Indoor and out door models.

UNIT II MEDIUM ACCESS PROTOCOLS 9

MAC Protocols: design issues, goals and classification. Contention based protocols-with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III NETWORK PROTOCOLS 9

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

UNIT IV END-END DELIVERY AND SECURITY 9

Transport layer: Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT V CROSS LAYER DESIGN AND INTERGRATION OF ADHOC FOR 4G 9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective, Sensor Network Architecture, Data Dissemination, Data Gathering, Location Discovery, Quality of a Sensor Network Integration of adhoc with Mobile IP networks.

TOTAL: 45 PERIODS

TEXT BOOKS

1. C.Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks Architectures and protocols”, 2nd edition, Pearson Education. 2007
2. Charles E. Perkins, “Ad hoc Networking”, Addison – Wesley, 2000

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, “Mobile adhoc networking”, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, “The handbook of adhoc wireless networks”, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “A Survey of Mobility Models for Ad Hoc Network Research,” Wireless Communication and Mobile Comp., Special Issue on Mobile
4. Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.
5. Fekri M. Abduljalil and Shrikant K. Bodhe , “A survey of integrating IP mobility protocols and Mobile Ad hoc networks”, IEEE communication Survey and tutorials, v 9.no.1 2007.

6. V.T.Raisinhani and S.Iyer “Cross layer design optimization in wireless protocol stacks”, Computer communication, vol 27 no. 8, 2004.
7. V.T.Raisinhani and S.Iyer, ” ÉCLAIR; An Efficient Cross-Layer Architecture for wireless protocol stacks”, World Wireless cong., San Francisco, CA,May 2004.
8. V.Kawadia and P.P.Kumar,”A cautionary perspective on Cross-Layer designs”, IEEE Wireless commn. vol 12, no 1,2005.

EC9024 WIRELESS NETWORKS L T P C
3 0 0 3

UNIT I WIRELESS LOCAL AREA NETWORKS 9

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer- MAC Management Sublayer- Wireless ATM - HIPERLAN- HIPERLAN-2, WiMax

UNIT II 3G OVERVIEW & 2.5G EVOLUTION 9

Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview- Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III ADHOC & SENSOR NETWORKS 9

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT IV INTERWORKING BETWEEN WLANS AND 3G WWANS 9

Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility,Interworking Architectures for WLAN and GPRS, System Descripltion, Local Multipoint Distribution Service, Multichannel Multipoint Distribution system.

UNIT V 4G & BEYOND 9

4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Clint Smith. P.E., and Daniel Collins, “3G Wireless Networks”, 2nd Edition, Tata McGraw Hill, 2007.
2. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, http://books.elsevier.com/9780123735805:, 2007.
3. Kaveth Pahlavan,. K. Prashanth Krishnamuorthy, "Principles of Wireless Networks", Prentice Hall of India, 2006.

REFERENCES

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.

2. Dharma Prakash Agrawal & Qing-An Zeng, “Introduction to Wireless and Mobile Systems”, Thomson India Edition, 2nd Ed., 2007.
3. Gary. S. Rogers & John Edwards, “An Introduction to Wireless Technology”, Pearson Education, 2007.
4. Sumit Kasera and Nishit Narang, “ 3G Networks – Architecture, Protocols and Procedures”, Tata McGraw Hill, 2007.

EC9025 WIRELESS SENSOR NETWORKS L T P C
3 0 0 3

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS 8

Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks- Enabling Technologies for Wireless Sensor Networks.

UNIT II ARCHITECTURES 9

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS 10

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT 9

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS 9

Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

3. Bhaskar Krishnamachari, ”Networking Wireless Sensors”, Cambridge Press,2005.
4. Mohammad Ilyas And Imad Mahgaob,”Handbook Of Sensor Networks: Compact Wireless And Wired Sensing Systems”, Crc Press,2005.
5. Wayne Tomasi, “Introduction To Data Communication And Networking”, Parson Education, 2007.

EC9026 SPACE TIME COMMUNICATION L T P C
3 0 0 3

UNIT I MULTIPLE ANTENNA PROPAGATION AND ST CHANNEL CHARACTERIZATION 9

Wireless channel, Scattering model in macrocells, Channel as a ST random field, Scattering functions, Polarization and field diverse channels, Antenna array topology, Degenerate channels, reciprocity and its implications, Channel definitions, Physical scattering model, Extended channel models, Channel measurements, sampled signal model, ST multiuser and ST interference channels, ST channel estimation.

UNIT II CAPACITY OF MULTIPLE ANTENNA CHANNELS AND SPATIAL DIVERSITY 9

Capacity of frequency flat deterministic MIMO channel: Channel unknown to the transmitter, Channel known to the transmitter, capacity of random MIMO channels, Influence of ricean fading, fading correlation, XPD and degeneracy on MIMO capacity, Capacity of frequency selective MIMO channels, Diversity gain, Receive antenna diversity, Transmit antenna diversity, Diversity order and channel variability, Diversity performance in extended channels, Combined space and path diversity ,Indirect transmit diversity, Diversity of a space-time-frequency selective fading channel.

UNIT III MULTIPLE ANTENNA CODING AND RECEIVERS 9

Coding and interleaving architecture, ST coding for frequency flat channels, ST coding for frequency selective channels, Receivers(SISO,SIMO,MIMO),Iterative MIMO receivers, Exploiting channel knowledge at the transmitter: linear pre-filtering, optimal pre-filtering for maximum rate, optimal pre-filtering for error rate minimization, selection at the transmitter, Exploiting imperfect channel knowledge.

UNIT IV ST OFDM , SPREAD SPECTRUM AND MIMO MULTIUSER DETECTION 9

SISO-OFDM modulation, MIMO-OFDM modulation, Signaling and receivers for MIMO-OFDM,SISO-SS modulation, MIMO-SS modulation, Signaling and receivers for MIMO-SS.MIMO-MAC,MIMO-BC, Outage performance for MIMO-MU,MIMO-MU with OFDM,CDMA and multiple antennas

UNIT V ST CO-CHANNEL INTERFERENCE MITIGATION AND PERFORMANCE LIMITS IN MIMO CHANNELS 9

CCI characteristics, Signal models, CCI mitigation on receive for SIMO,CCI mitigating receivers for MIMO,CCI mitigation on transmit for MISO, Joint encoding and decoding, SS modulation, OFDM modulation, Interference diversity and multiple antennas, Error performance in fading channels, Signaling rate vs PER vs SNR, Spectral efficiency of ST doing/receiver techniques, System Design, Comments on capacity

TOTAL: 45 PERIODS

TEXT BOOKS

1. A. Paulraj, Rohit Nabar, Dhananjay Gore, “Introduction to Space Time Wireless Communication Systems”, Cambridge University Press, 2003

REFERENCES

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Sergio Verdu “ Multi User Detection” Cambridge University Press, 1998
3. Andre Viterbi “ Principles of Spread Spectrum Techniques” Addison Wesley 1995

EC9027	INFORMATION THEORY	L T P C 3 0 0 3

UNIT I QUANTITATIVE STUDY OF INFORMATION 8

Basic inequalities, Entropy, Kullback-Leibler distance, Mutual information, Bounds on entropy, Fisher information , Cramer Rao inequality, Second law of thermodynamics , Sufficient statistic , Entropy rates of a Stochastic process .

UNIT II CAPACITY OF NOISELESS CHANNEL 8

Fundamental theorem for a noiseless channel ,Data compression , Kraft inequality , Shannon-Fano codes , Huffman codes , Asymptotic equipartition , Rate distortion theory .

UNIT III CHANNEL CAPACITY 9

Properties of channel capacity , Jointly typical sequences , Channel Coding Theorem, converse to channel coding theorem, Joint source channel coding theorem

UNIT IV DIFFERENTIAL ENTROPY AND GAUSSIAN CHANNEL 9

AEP for continuous random variables, relationship between continuous and discrete entropy, properties of differential entropy, Gaussian channel definitions, converse to coding theorem for Gaussian channel, channels with colored noise, Gaussian channels with feedback

UNIT V NETWORK INFORMATION THEORY 11

Gaussian multiple user channels , Multiple access channel , Encoding of correlated sources , Broadcast channel , Relay channel , Source coding and rate distortion with side information , General multi-terminal networks

TOTAL: 45 PERIODS

TEXT BOOKS

1. Thomas Cover, Joy Thomas ,”Elements of Information theory “, Wiley, 2005.

REFERENCES

1. David Mackay , “Information theory, interference & learning algorithms”, Cambridge University Press, I edition, 2002.

EC9028 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

UNIT I NUMBER THEORETIC AND ALGEBRAIC ALGORITHMS 9

Introduction – Integer Arithmetic Modular Arithmetic – matrices – Linear congruence - Substitution ciphers – Transposition ciphers – Stream cipher - Block ciphers – Algebraic structure – GF(2) field.

UNIT II MODERN SYMMETRIC KEY CIPHERS 9

Modern block ciphers – Modern stream ciphers – DES – AES – Multiple uses of modern block ciphers and stream cipher.

UNIT III ASYMMETRIC KEY ENCIPHERMENT 9

Mathematics of cryptography – Primality Testing – Factorization – Chinese Remainder Theorem – Quadratic congrivence – Exponentiation & Logarithm – RSA Rabin – Elgamal – Elliptic curve

UNIT IV INTEGRITY AUTHENTICATION AND KEY MANAGEMENT 9

Message integrity – random oracle model – message authentication – SHA-512 – WHIRL POOL - Digital signature schemes – password – challenge response – zero knowledge – Biometrics – Keberos – symmetric key management – public key distribution – stegnography

UNIT V NETWORK SECURITY 9

Security at the Application Layer: E-mail – PGP – S/MIME – Security at the transport layer: SSL and TLS – Security at the network layer: IPsec, Two Security Protocol – Security Association – Internet Key Exchange – ISAKMP.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata McGraw Hill, 2007.
2. W.Stallings, “Cryptography & Network Security: Principles and Practice”, Prentice Hall, Third Edition, 2003.

REFERENCES

1. Douglas R.Stlinson, “Cryptography Theory and Practice”, CRC Press series on Discrete Mathematics and its application 1995.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security Private Communication in a Public World”, Pearson Education, Second Edition, 2003.

EC9029 ELECTRO MAGNETIC INTERFERENCE AND COMPATIBILITY **L T P C 3 0 0 3**

UNIT I BASIC CONCEPTS **7**

Definition of EMI and EMC; Intra and Inter system EMI; Sources and victims of EMI, Conducted and Radiated EMI emission and susceptibility; Transient & ESD; Case Histories; Radiation Hazards to humans.

UNIT II COUPLING MECHANISM **9**

Common made coupling; Differential mode coupling; Common impedance coupling; Ground loop coupling; Field to cable coupling; Cable to cable coupling; Power mains and Power supply coupling.

UNIT III EMI MITIGATION TECHNIQUES **10**

Shielding – principle, choice of materials for H, E and free space fields, and thickness; EMI gaskets; Bonding; Grounding – circuits, system and cable grounding; Filtering; Transient EMI control devices and applications; PCB Zoning, Component selection, mounting, trace routing.

UNIT IV STANDARDS AND REGULATION **7**

Units of EMI; National and International EMI Standardizing Organizations – IEC, ANSI, FCC, CISPR, BIS, CENELEC; FCC standards; EN Emission and Susceptibility standards and specifications; MIL461E Standards.

UNIT V EMI TEST METHODS AND INSTRUMENTATION **12**

EMI test sites - Open area site; TEM cell; Shielded chamber; Shielded Anechoic chamber; EMI test receivers; Spectrum Analyzer; Transient EMI Test wave Simulators; EMI coupling Networks - Line impedance Stabilization Networks; Feed through capacitors; Antennas and factors; Current probes and calibration factor; MIL-STD test methods; Civilian STD Test methods.

TOTAL: 45 PERIODS

TEXT BOOKS

1. V.P. Kodali, “Engineering EMC Principles, Measurements and Technologies”, IEEE Press, Newyork,2001
2. Henry W.Ott., “Noise Reduction Techniques in Electronic Systems”, A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988.

REFERENCES

1. Don R.J.White Consultant Incorporate, “Handbook of EMI/EMC”, Vol I-V, 1988.
2. Bemhard Keiser, “Principles of Electromagnetic Compatibility”, 3rd Ed, Artech house, Norwood, 1987.

EC9030 COMMUNICATION NETWORK DESIGN LT P C
3 0 0 3

UNIT I INTRODUCTION 9

Importance of Quantitative Modeling in Engineering of Telecommunication Networks, The Functional Elements of Networking, Evolution of Networking in the Wired and Wireless Domain.

UNIT II MULTIPLEXING 9

Performance Measures and Engineering Issues Network performance and source characterization, Circuit multiplexed Networks, packet Multiplexing over wireless networks, Events and processes in packet multiplexer models, Deterministic traffic Models and network calculus, stochastic traffic models, LRD traffic, Link Scheduling and network capacity in wireless networks.

UNIT III SWITCHING 9

Performance Measures of packet switches and circuit switches, queuing in packet switches, delay Analysis in Output Queued Switch, Input Queued Switch and CIOQ Switch with Parallelism, Blocking in Switching Networks, Closed Networks.

UNIT IV ROUTING 9

Algorithms for Shortest Path Routing - Dijkstra's Algorithm, Bellman Ford Algorithm, Generalized Dijkstra's Algorithm, Optimal Routing, Routing Protocols-Distance Vector, Link State and Exterior gateway protocols, Formulations of the Routing Problem-minimum interference Routing, MPLS, QoS Routing, Nonadditive and Additive metrics

UNIT V CASE STUDIES 9

Design of a wireless network and a wired network, prototype implementation to be simulated in a network simulator.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Anurag Kumar, D. Manjunath and Joy "Communication Networking", Morgan Kaufan Publishers,2005.
2. A.Lean Garica and Indra widjaja,"Communications Networks", Tata Mc Graw Hill, 2004.

REFERENCES

1. Thomas G.Robertazzi, "Computer Networks and Systems", Third Edition, Springer,2006.
3. Keshav.S., "An Engineering Approach to Computer Networking", Addison – Wesley, 1999.

EC9031 SATELLITE COMMUNICATION L T P C
3 0 0 3

UNIT I SATELLITE ORBITS AND TRAJECTORIES 8

Orbital Mechanics—Orbit Equations, Kepler's Laws, Orbital Period, Orbits and their types, look angle calculation; Satellite Launch.

UNIT II SATELLITE SUBSYSTEM 10

Satellite Subsystems—AOCS, TTC&M, Power, Transponders, Antennas; earth control-Effects of earth-Perturbation, suntransit, moontransit, satellite power design, MTBF. Basic Equations; System Noise and G/T ratio; Uplink, Downlink and Design for a specified C/N ratio, with GEO and LEO examples; Atmospheric and Rain effects on link performance.

UNIT III LINK DESIGN, MODULATION AND ERROR CONTROL 10

Single link design-double link design aspects, PAM, baseband processing, Digital Modulation for satellite links- BPSK,QPSK and QAM; TDM standards for satellite systems; Error control requirements for satellite link—ARQ, Concatenated Codes, Interleaving, Turbo codes.

UNIT IV MULTIPLE ACCESS FOR SATELLITE COMMUNICATIONS 9

FDM-FM-FDMA - TDMA-structure and system design; Onboard Processing systems; DAMA and PAMA; CDMA-system design and capacity.

UNIT V SOME APPLICATIONS 8

Remote sensing, navigation, scientific and military application, VSAT—Network architecture, Access Control protocols and techniques, VSAT Earth stations; Satellite Mobile Telephony—Global star, DBS/DTH Television, GPS, Weather satellites.

TOTAL: 45 PERIODS

TEXT BOOKS

1. T.Pratt, C. Bostian and J.Allnutt; "Satellite Communications", John Wiley and Sons, Second Edition., 2003.
2. D.Rody, "Satellite Communications", Regents/Prentice Hall; Englewoods (NJ), 1989**.**
3. M. Richharia, "Satellite communication systems", McGraw-Hill Professional Published 1999.

REFERENCES

1. W.L.Pritchard,H G Suyderhoud and R A Nelson, "Satellite Communication System Engineering", Second edition, Prentice Hall, 1993.
2. Tri. T. Ha, "Digital Satellite Communications", McGraw Hill, Second Edition, 1990.
3. B.N.Agarwal, "Design of Geosynchronous Space craft", Prentice Hall, 1986.

EC9032 DIGITAL SWITCHING & TRANSMISSION L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Overview of existing Voice, Data and Multimedia Networks and Services; Review of Basic Communication principles; Synchronous and Asynchronous transmission, Line Codes

UNIT II TRUNK TRANSMISSION 9

Multiplexing & Framing- types and standards; Trunk signaling; Optical Transmission-line codes and Muxing: SONET/SDH; ATM; Microwave and Satellite Systems.

UNIT III LOCAL LOOP TRANSMISSION 9

The Analog Local Loop; ISDN local loop; DSL and ADSL; Wireless Local Loop; Fiber in the loop; Mobile and Satellite Phone local loop.

UNIT IV SWITCHING 9

Evolution; Space switching, Time switching and Combination Switching; Blocking and Delay characteristics; Message ,Packet and ATM switching; Advances in switching techniques – shared memory fast packet switches, shared medium fast packet switches and space division fast packet switches, Photonic switching- Optical TDM, WDM.

UNIT V TELETRAFFIC ENGINEERING 9

Telecom Network Modeling; Arrival Process; Network Blocking performance; Delay Networks--Queing system analysis and delay performance.

TOTAL: 45 PERIODS

TEXT BOOKS

1. J. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition.
2. JE Flood, “Telecommunications Switching, Traffic and Networks”, Pearson, 2005.

REFERENCES

1. R.A.Thompson, “Telephone switching Systems”, Artech House Publishers, 2000.
2. W. Stalling, “ Data and Computer Communications”, Prentice Hall, 1993.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, “Fundamentals of Telecommunication Networks”, Wiley Interscience, 1994.
4. W.D. Reeve, “Subscriber Lop Signalling and Transmission Hand book”,IEEE Press(Telecomm Handbook Series), 1995.
5. Tarmo Anttalaien, “ Introduction to telecommunication network engineering”, 2nd edition, Artech House, 2003.
6. T. Viswanathan, “Telecommunication Switching Systems”, Prentice-Hall, 1992

EC9033	TELECOMMUNICATION SYSTEM MODELING AND SIMULATION	L T P C 3 0 0 3

UNIT I SIMULATION METHODOLOGY 8

Introduction, Aspects of methodology, Performance Estimation, Simulation sampling frequency, Low pass equivalent simulation models for bandpass signals, Multicarrier signals, Non-linear and time-varying systems, Post processing – Basic graphical techniques and estimations.

UNIT II RANDOM SIGNAL GENERATION & PROCESSING 8

Uniform random number generation, Mapping uniform random variables to an arbitrary pdf, Correlated and Uncorrelated Gaussian random number generation, PN sequence generation, Random signal processing, Testing of random number generators.

UNIT III MONTE CARLO SIMULATION 9

Fundamental concepts, Application to communication systems, Monte Carlo integration, Semianalytic techniques, Case study: Performance estimation of a wireless system.

UNIT IV ADVANCED MODELS & SIMULATION TECHNIQUES 10

Modeling and simulation of non-linearities: Types, Memoryless non-linearities, Non-linearities with memory, Modeling and simulation of Time varying systems : Random process models, Tapped delay line model, Modelling aand simulation of waveform channels, Discrete memoryless channel models, Markov model for discrete channels with memory.

UNIT V EFFICIENT SIMULATION TECHNIQUES 10

Tail extrapolation, pdf estimators, Importance sampling methods, Case study: Simulation of a Cellular Radio System.

TOTAL: 45 PERIODS

TEXT BOOKS

1. William.H.Tranter, K. Sam Shanmugam, Theodore. S. Rappaport, Kurt L. Kosbar, Principles of Communication Systems Simulation, Pearson Education (Singapore) Pvt. Ltd, 2004.

REFERENCES

1. M.C. Jeruchim, P.Balaban and K. Sam Shanmugam, “Simulation of Communication Systems: Modeling, Methodology and Techniques”, Plenum Press, New York, 2001.
2. Averill.M.Law and W. David Kelton, Simulation Modeling and Analysis, McGeaw Hill Inc., 2000.
3. Geoffrey Gorden, System Simulation, Prentice Hall of India, 2nd Edition, 1992.
4. Jerry Banks and John S. Carson, Discrete Event System Simulation, Prentice Hall of India, 1984.

EC9034 MULTIMEDIA COMPRESSION AND COMMUNICATION L T P C
3 0 0 3

UNIT I MULTIMEDIA COMPONENTS 9

Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video, hardware.

UNIT II AUDIO AND VIDEO COMPRESSION 9

Audio compression–DPCM-Adaptive PCM –adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding Video compression –principles-H.261-H.263-MPEG 1, 2, 4.

UNIT III TEXT AND IMAGE COMPRESSION 9

Compression principles-source encoders and destination encoders-lossless and lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding –Lempel ziv-welsh Compression-image compression

UNIT IV VoIP TECHNOLOGY 9

Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service-CODEC Methods-VOIP applicability

UNIT V MULTIMEDIA NETWORKING 9

Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-secluding and policing Mechanisms-integrated services-differentiated Services-RSVP.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Fred Halshall, “Multimedia communication - applications, networks, protocols and standards”, Pearson education, 2007.
2. Tay Vaughan, “Multideai: making it work”, 7/e, TMH, 2007.
3. Kurose and W.Ross, “Computer Networking “a Top down approach, Pearson education, 3rd ed, 2005.

REFERENCES

1. Marcus goncalves “Voice over IP Networks”, McGraw Hill,
2. KR. Rao,Z S Bojkovic, D A Milovanovic, “Multimedia Communication Systems: Techniques, Standards, and Networks”, Pearson Education 2007
3. R. Steimnetz, K. Nahrstedt, “Multimedia Computing, Communications and Applications”, Pearson Education, First ed, 1995.
4. Ranjan Parekh, “Principles of Multimedia”, TMH, 2006

EC9035	OPTICAL NETWORKS	L T P C
		3 0 0 3

UNIT I OPTICAL SYSTEM COMPONENTS 9

Light Propagation in optical fibers – Loss & bandwidth, System limitations, Non-Linear effects; Solitons; Optical Network Components – Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters.

UNIT II OPTICAL NETWORK ARCHITECTURES 9

Introduction to Optical Networks; SONET / SDH, Metropoliton-Area Networks, Layered Architecture ; Broadcast and Select Networks – Topologies for Broadcast Networks, Media-Access Control Protocols, Testbeds for Broadcast & Select WDM; Wavelength Routing Architecture.

UNIT III WAVELENGTH ROUTING NETWORKS 9

The optical layer, Node Designs, Optical layer cost tradeoff, Routing and wavelength assignment,Virtual topology design, Wavelength Routing Testbeds, Architectural variations.

UNIT IV PACKET SWITCHING AND ACCESS NETWORKS 9

Photonic Packet Switching – OTDM, Multiplexing and Demultiplexing, Synchronisation, Broadcast OTDM networks, Switch-based networks; Access Networks – Network Architecture overview, Future Access Networks, Optical Access Network Architectures; and OTDM networks.

UNIT V NETWORK DESIGN AND MANAGEMENT 9

Transmission System Engineering – System model, Power penalty - transmitter, receiver, Optical amplifiers, crosstalk, dispersion; Wavelength stabilization ; Overall design considerations; Control and Management – Network management functions, Configuration management, Performance management, Fault management, Optical safety, Service interface.

TOTAL: 45 PERIODS

TEXT BOOK

1. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks : A Practical Perspective”, Harcourt Asia Pte Ltd., Second Edition 2004.

REFERENCES

1. C. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks : Concept, Design and Algorithms”, Prentice Hall of India, Ist Edition, 2002.
2. P.E. Green, Jr., “Fiber Optic Networks”, Prentice Hall, NJ, 1993.
3. Biswanath Mukherjee, “Optical WDM Networks”, Springer Series, 2006.

EC9036 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems, Vidicon and Digital Camera working principles, - Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT 9

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.

REFERENCES

1. Kenneth R. Castleman, “Digital Image Processing", Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, ”Digital Image Processing using MATLAB”, Pearson Education, Inc., 2004.
3. D,E. Dudgeon and RM. Mersereau, “Multidimensional Digital Signal Processing”, Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, “Digital Image Processing” , John Wiley, New York, 2002
5. Milan Sonka et al, “Image Processing, Analysis and Machine vision”, Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

EC9037 ADVANCED DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

UNIT I DISCRETE TIME RANDOM SIGNALS 9

Discrete random process – Ensemble averages, Stationary and ergodic processes, Autocorrelation and Autocovariance properties and matrices, White noise, Power Spectral Density, Spectral Factorization, Innovations Representation and Process, Filtering random processes, ARMA, AR and MA processes.

UNIT II SPECTRUM ESTIMATION 9

Bias and Consistency, Periodogram, Modified periodogram, Blackman-Tukey method, Welch method, Parametric methods of spectral estimation, Levinson-Durbin recursion.

UNIT III LINEAR ESTIMATION AND PREDICTION 9

Forward and Backward linear prediction, Filtering - FIR Wiener filter- Filtering and linear prediction, non-causal and causal IIR Wiener filters, Discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS 9

Principles of adaptive filter – FIR adaptive filter – Newton's Steepest descent algorithm – Derivation of first order adaptive filter – LMS adaptation algorithms – Adaptive noise cancellation, Adaptive equalizer, Adaptive echo cancellers.

UNIT V WAVELET TRANSFORM 9

Short Time Fourier Transform, Continuous and discrete wavelet transform, Multiresolution analysis, Application of wavelet transform, Cepstrum and Homomorphic filtering.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Monson H, Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons Inc., New York, Indian Reprint, 2007.
2. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Second Edition, 2004.

REFERENCES

1. John G.Proakis, Dimitris G. Manolakis, Digital Signal Processing, Pearson, Fourth 2007.
2. Sophocles J. Orfanidis, Optimum Signal Processing, An Introduction, McGraw Hill, 1990.

EC9038 VLSI SIGNAL PROCESSING L T P C
3 0 0 3

UNIT I DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING 9

Introduction To DSP Systems -Typical DSP algorithms; Iteration Bound – data flow graph representations, loop bound and iteration bound, Longest path Matrix algorithm; Pipelining and parallel processing – Pipelining of FIR digital filters, parallel processing, pipelining and parallel processing for low power.

UNIT II RETIMING, UNFOLDING AND RANK ORDER FILTERS 9

Retiming - definitions and properties; Unfolding – an algorithm for Unfolding, properties of unfolding, parallel processing application; Algorithmic strength reduction in filters and transforms – 2-parallel FIR filter, 2-parallel fast FIR filter, DCT algorithm architecture, parallel architectures for rank-order filters, Odd- Even Merge-Sort architecture, parallel rank-order filters.

UNIT III FAST CONVOLUTION, PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS 9

Fast convolution – Cook-Toom algorithm, modified Cook-Took algorithm; Pipelined and parallel recursive filters – inefficient/efficient single channel interleaving, Look-Ahead pipelining in first- order IIR filters, Look-Ahead pipelining with power-of-two decomposition, Clustered Look-Ahead pipelining, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters.

UNIT IV ROUNDOFF NOISE, BIT-LEVEL ARITHMETIC ARCHITECTURES *9*

Scaling and roundoff noise- scaling operation, roundoff noise, state variable description of digital filters, scaling and roundoff noise computation, roundoff noise in pipelined first-order filters; Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 bit Baugh- Wooley carry-save multiplication, design of Lyon's bit-serial multipliers using Horner's rule, bit-serial FIR filter, CSD representation, CSD multiplication using Horner's rule for precision improvement.

UNIT V NUMERICAL STRENGTH REDUCTION, WAVE PIPELINING AND LOW POWER PRINCIPLES 9

Numerical Strength Reduction – subexpression elimination, multiple constant multiplications, iterative matching, Two-phase clock generator, clock skew in edge-triggered single-phase clocking, two-phase clocking, wave pipelining.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Keshab K.Parhi, "VLSI Digital Signal Processing systems, Design and implementation", John Wiley, Indian reprint, 2007.

REFERENCES

1. U. Meyer – Baese, Digital Signal Processing with Field Programmable Arrays, Springer, Second Edition, Indian Reprint, 2007.
2. S.Y. Kuang, H. J. White house, T. Kailath, VLSI and Modern Signal Processing, Prentice Hall, 1995.

EC9039	DIGITAL CONTROL ENGINEERING	LT P C 3 0 0 3

UNIT I CONTINUOUS TIME SYSTEMS 6

Review of frequency and time response analysis and specifications of control systems, need for controllers, continuous time compensations, continuous time PI, PD, PID controllers.

UNIT II SIGNAL PROCESSING IN DIGITAL CONTROL 12

Sampling, time and frequency domain descriptions, aliasing, hold operations, mathematical model of sample and hold, zero and first order hold, factors limiting the choice of sample rate, reconstruction, Difference equation description, Z-transform method of description, pulse transfer function, time and frequency response of discrete time control systems.

UNIT III DESIGN OF DIGITAL CONTROL ALGORITHMS 9

Review of principle of compensator design, Z-plane specifications, digital compensator design using frequency response plots, discrete integrator, discrete differentiator, development of digital PID controller, transfer function, design in Z-plane.

UNIT IV STATE VARIABLE TECHNIQUES 9

Discrete State Variable concepts, Characteristic equation, Eigenvalues and Eigenvectors, Jordan canonical models, Phase Variable companion forms.

UNIT V CONTROLLABILITY, OBSERVABILITY AND STABILITY 9

Definitions and Theorems of Controllability and Observability, Relationships between Controllability, Observability and Transfer Functions, Jury, Routh, Lyapunov stability analysis, Principles of state and output feedback.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Benjamin C.Kuo, Digital Control Systems, OXFORD University Press, II Edition, 2007
2. M.Gopal, Digital Control and State Variable Methods, TataMcGraw Hill, II Edition, 2007.

REFERENCES

1. K.Ogata, Discrete-Time Control Systems, PHI, II Edition,2007.
2. Gene. F.Franklin, J.D.Powell, M.Workman, Digital Control of Dynamic Systems, Addison-Wesley, III Edition, 2000.

EC9040	ROBOTICS	LT P C
		3 0 0 3

UNIT I SCOPE OF ROBOTS 4

The scope of industrial Robots - Definition of an industrial robot - Need for industrial robots - applications.

UNIT I ROBOT COMPONENTS 9

Fundamentals opf Robot Technology - Automation and Robotics - Robot anatomy - Work volume - Prescision of movement - End effectors - Sensors.

UNIT III ROBOT PROGRAMMING 9

Robot Programming - Methods - interlocks textual languages. Characteristics of Robot level languages, characteristic of task level languages.

UNIT IV ROBOT WORK CELL 9

Robot Cell Design and Control - Remote Cemter compilance - Safety in Robotics.

UNIT V FUTURE TRENDS 14

Advanced robotics, Advanced robotics in Space - Specific features of space robotics systems - long-term technical developments, Advanced robotics in under - water operations. Robotics Technology of the Future - Future Applications.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Barry Leatham - Jones, "Elements of industrial Robotics" PITMAN Publishing, 1987.

REFERENCES

1. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, "Industrial Robotics Technology, Programming and Applications ", McGraw Hill Book Company 1986.
2. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., "Robotics Control Sensing, Visioon and Intelligence " McGraw Hill International Editions, 1987.
3. Bernard Hodges and Paul Hallam, " Industrial Robotics", British Library Cataloging in Publication 1990.
4. Deb, S.R. Robotics Technology and flexible automation, Tata Mc GrawHill, 1994.

EC9041 SPEECH PROCESSING L T P C
3 0 0 3

UNIT I BASIC CONCEPTS 10

Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT II SPEECH ANALYSIS 10

Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT III SPEECH MODELING 8

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.

UNIT IV SPEECH RECOGNITION 8

Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.

UNIT V SPEECH SYNTHESIS 9

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Lawrence Rabinerand Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.
3. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press, 1997.

REFERENCES

1. Steven W. Smith, “The Scientist and Engineer’s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.
3. Claudio Becchetti and Lucio Prina Ricotti, “Speech Recognition”, John Wiley and Sons, 1999.
4. Ben gold and Nelson Morgan, “Speech and audio signal processing”, processing and perception of speech and music, Wiley- India Edition, 2006 Edition.

EC9042	AVIONICS	L T P C
		3 0 0 3

UNIT I INTRODUCTION 9

Introduction to aircraft – Axes system – Parts, importance and role of Avionics – systems which interface directly with pilot – Aircraft state sensor systems – Navigation systems – External world sensor systems – task automation systems. Avionics architecture evolution. Avionics Data buses - MIL STD 1553, ARINC 429, ARINC 629.

UNIT II RADIO NAVIGATION 9

Types of Radio Navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS

UNIT III INERTIAL AND SATELLITE NAVIGATION SYSTEMS 9

Inertial sensors – Gyroscopes, Accelerometers, Inertial navigation systems – Block diagram, Platform and strap down INS. Satellite Navigation - GPS

UNIT IV AIR DATA SYSTEMS AND AUTOPILOT 9

Air data quantities – Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot – basic principles – longitudinal and lateral autopilot.

UNIT V AIRCRAFT DISPLAYS 9

Display technologies – LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays - Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Albert Helfrick. D, 'Principles of Avionics', Avionics communications Inc., 2004
2. Collinson, R.P.G, 'Introduction to Avionics', Chapman and Hall, 1996.

REFERENCES

1. Middleton, D.H, 'Avionics Systems', Longman Scientific and Technical, Longman Group UK Ltd, England, 1989.
2. Spitzer, C.R. 'Digital Avionics Systems', Prentice Hall, Englewood Cliffs, N.J., USA 1993.
3. Spitzer, C.R, 'The Avionics Handbook', CRC Press, 2000.
4. Pallet, E.H.J, 'Aircraft Instruments and Integrated Systems', Longman Scientific

EC9043 FOUNDATIONS FOR NANOELECTRONICS LT P C
3 0 0 3

UNIT I INTRODUCTION TO QUANTUM MECHANICS 9

Particles, waves, probability amplitudes, schrodinger equation, wavepackets solutions, operators, expectation values, eigenfuntions, piecewise constant potentials.

UNIT II SIMPLE HARMONIC OSCILLATORS AND APPROXIMATIONS 9

SHM Operators, SHM wavepacket solutions, Quantum LC circuit, WKB approximations, variational methods.

UNIT III SYSTEMS WITH TWO AND MANY DEGREES OF FREEDOM 9

Two level systems with static and dynamic coupling, problems in more than one dimensions, electromagnetic field quantization, density of states.

UNIT IV STATISTICAL MECHANICS 9

Basic concepts, microscopic, quantum systems in equilibrium, statistical models applied to metals and semiconductors

UNIT V APPLICATIONS 9

Hydrogen and Helium atoms, electronic states, Atomic force microscope, Nuclear Magnetic Resonance, carbon nanotube properties and applications

TOTAL: 45 PERIODS

TEXT BOOKS

1. Hagelstein, Peter L., Stephen D. Senturia, and Terry P. Orlando, "Introduction to Applied Quantum and Statistical Physics.", New York, NY: Wiley, 2004.
2. Rainer Waser, "Nanoelectronics and Information Technology", Wiley 2005
3. Michael A. Nielsen and Isaac L. Chuang, "Quantum Computation and Quantum Information", Cambridge University Press, 2000.

REFERENCES

1. Neil Gershenfeld "The Physics of Information Technology", Cambridge University Press, 2000.
2. Adrian Ionesu and Kaustav Banerjee eds. " Emerging Nanoelectronics: Life with and after CMOS" , Vol I, II, and III, Kluwer Academic, 2005.

EC9044 **RF MICROELECTRONICS** **L T P C**
3 0 0 3

UNIT I RF CHARACTERISTICS OF PASSIVE COMPONENTS 8

RF characteristics of chip resistor, capacitor and inductors, semiconductor realization of resistors, capacitors, inductors, transformers. Coaxial, stripline, and microstrip line design guidelines and behavior at RF.

UNIT II MOS CHARACTERISTICS AT RF 9

Long and Short channel approximations, bandwidth estimation techniques, open and short circuit time constant procedures, high frequency amplifiers.

UNIT III AMPLIFIER DESIGN 9

Series shunt amplifiers, tuned amplifiers, neutralization, feedback and RF stability criteria, gain and phase margins, compensation techniques Class A,B,C,D,E,F power amplifier definitions, PA characteristics, RF PA design examples.

UNIT IV LNAS AND MIXERS 9

Noise definitions and noise models, two port noise parameters of MOSFET, LNA topologies, noise match and power match design considerations, linearity and large signal performance of LNAs,Mixer fundamentals, nonlinear mixers, multiplier based mixers, sub-sampling mixers.

UNIT V OCSILLATORS, PHASE LOCKED LOOPS 9

Colpitts oscillator, Ring Oscillators, VCOs, Linearized PLL models, noise properties of PLLs, phase detectors, loop filters, charge pumps, PLL design examples, detailed considerations of phase noise.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Thomas Lee, “The Design of Radio Frequency CMOS Integrated Circuits”, Cambridge University Press, Second Edition 2004
2. Behzad Razavi “RF Microelectronics”, John Wiley, 2006.

REFERENCES

1. Reinhold Ludwig, Pavel Bretchko “RF Circuit Design”; Pearson Education, 2001
2. Ulrich Rohde “RF/Microwave Circuit Design for Wireless Applications” John Wiley. 2000

EC9045	CAD FOR VLSI	L T P C
		3 0 0 3

UNIT I VLSI DESIGN METHODOLOGIES 9

Introduction to VLSI Design methodologies - Review of Data structures and algorithms – Review of VLSI Design automation tools - Algorithmic Graph Theory and Computational Complexity - Tractable and Intractable problems - general purpose methods for combinatorial optimization.

UNIT II DESIGN RULES 9

Layout Compaction - Design rules - problem formulation - algorithms for constraint graph compaction - placement and partitioning - Circuit representation - Placement algorithms – partitioning.

UNIT III FLOOR PLANNING 9

Floor planning concepts - shape functions and floorplan sizing - Types of local routing problems - Area routing - channel routing - global routing - algorithms for global routing.

UNIT IV SIMULATION 9

Simulation - Gate-level modeling and simulation - Switch-level modeling and simulation - Combinational Logic Synthesis - Binary Decision Diagrams - Two Level Logic Synthesis.

UNIT V MODELLING AND SYNTHESIS 9

High level Synthesis - Hardware models - Internal representation - Allocation - assignment and scheduling - Simple scheduling algorithm - Assignment problem - High level transformations.

TOTAL: 45 PERIODS

TEXT BOOKS

1. S.H. Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons,2002.

REFERENCE

1. N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwar Academic Publishers, 2002.

EC9046 OPTOELECTRONICS DEVICES L T P C
3 0 0 3

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State and Semiconductor Junction Devices.

UNIT II DISPLAY DEVICES AND LASERS 9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Displays, Liquid Crystal Displays, Numeric Display, Laser Emission, Absorption, Radiation, Population Inversion, Optical feedback, Threshold condition, Semiconductor lasers.

UNIT III DETECTION DEVICES 9

Photo detector, Thermal detector,Photo Conductors, Photo diodes, Photo Multiplier Tube, Solar Cell, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR AND SWITCHING DEVICES 9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Acousto-optic modulators, Interferometric modulators,Semiconductor Optical Amplifiers, Optical Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction, hybrid and Monolithic Integration- Li Nbo_3 devices, Active Couplers, Integrated transmitters and Receivers, Guided wave devices.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jasprit Singh, “OptoElectronics – An Introduction to materials and Devices”, McGraw-Hill International Edition, 1998.

REFERENCES

1. S.C. Gupta, “Optoelectronic Devices and Systems”, PHI, 1st edition, 2005.
2. Bhattacharya, 2ed “Semiconductor Opto Electronic Devices”, Prentice Hall of India Pvt., Ltd., New Delhi, 1997
3. J.Wilson and J.Haukes, “Opto Electronics – An Introduction”, Prentice Hall of India Pvt., Ltd., New Delhi, 1995.
4. Tamir.T,Grifel and Henry.L.Bertoni, “Guided wave Optoelectronics: Device Characterisation, Analysis and Design” Plenum Press, 1995.

EC9047 **POWER ELECTRONICS** **L T P C**
3 0 0 3

UNIT I POWER SEMICONDUCTOR DEVICES 9
Power transistors, Fast recovery diodes, Thyristors, Power TRIAC, MOSFET, IGBT, GTO - characteristics, rating, Protection circuits, Driver Circuits.

UNIT II CONTROLLED RECTIFIERS AND AC VOLTAGE CONTROLLERS 9
Single Phase and Three Phase Controlled rectifiers, Design of Trigger circuits - Dual Converters- AC Voltage controllers

UNIT III POWER SUPPLIES 9
DC – DC Converters – Gating requirements, Switching mode regulators – Boost, Buck, Buck-Boost and Cuk regulators, DC and AC Power supplies – Switched mode, Resonant and Bidirectional Power supplies.

UNIT IV INVERTERS 9
Voltage and current source inverters, Resonant, Series inverter, PWM inverter.

UNIT V APPLICATIONS 9
DC motor drives, Induction and Synchronous motor drives, Switched reluctance and brushless motor drives – Solid state relays – Microelectronic Relays

TOTAL: 45 PERIODS

TEXT BOOKS
1. Muhammad H.Rashid, “Power Electronics - Circuits, Devices and Applications”, Third Edition, Prentice Hall of India, 2004.

REFERENCES
1. M.D.Singh, K.B. Khanchandani, “Power Electronics”, Tata McGraw-Hill, 1998.
2. Ned Mohan, Tore M.Undeland, William P.Robbins, “Power Electronics, Converters, Applications and Design”, John Wiley & Sons, 1994.
3. B.K.Bose, “Modern Power Electronics”, Jaico Publishing House, 1999.
4. Sen, Power Electronics”, Tata McGraw-Hill, 1987.

EC9048 MICRO ELECTROMECHANICAL SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION TO MEMS 9

MEMS and Microsystems, Miniaturization, Typical products, Micro sensors, Micro actuation, MEMS with micro actuators, Microaccelorometers and Micro fluidics, MEMS materials, Micro fabrication

UNIT II MECHANICS FOR MEMS DESIGN 9

Elasticity, Stress, strain and material properties, Bending of thin plates, Spring configurations, torsional deflection, Mechanical vibration, Resonance, Thermo mechanics – actuators, force and response time, Fracture and thin film mechanics.

UNIT III ELECTRO STATIC DESIGN AND SYSTEM ISSUES 9

Electrostatics: basic theory, electro static instability. Surface tension, gap and finger pull up, Electro static actuators, Comb generators, gap closers, rotary motors, inch worms, Electromagnetic actuators. bistable actuators. Electronic Interfaces, Feed back systems, Noise , Circuit and system issues,

UNIT IV MEMS APLLICATION 9

Case studies – Capacitive accelerometer, Peizo electric pressure sensor, Microfluidics application, Modeling of MEMS systems, CAD for MEMS.

UNIT V INTRODUCTION TO OPTICAL AND RF MEMS 9

Optical MEMS, - System design basics – Gaussian optics, matrix operations, resolution. Case studies, MEMS scanners and retinal scanning display, Digital Micro mirror devices. RF Memes – design basics, case study – Capacitive RF MEMS switch, performance issues.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Stephen Santeria," Microsystems Design", Kluwer publishers, 2000.
2. N.P.Mahalik, "MEMS",Tata McGraw hill, 2007

REFERENCES

1. Nadim Maluf," An introduction to Micro electro mechanical system design", Artech House, 2000.
2. Mohamed Gad-el-Hak, editor," The MEMS Handbook", CRC press Baco Raton,2000.
3. Tai Ran Hsu," MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002.
4. Liu,"MEMS", Pearson education, 2007.

EC9049 **ANATOMY AND PHYSIOLOGY** **L T P C**
3 0 0 3

AIM:
To provide the students the exposure to the fundamentals in human anatomy and physiology.

UNIT I **8**
Cell: Structure and organelles - Functions of each component in the cell. Cell membrane – transport across membrane – origin of cell membrane potential (Nernst and Goldman and Katz equations) – Action potential.

UNIT II **9**
Blood composition - functions of blood – functions of RBC. WBC types and their functions. Blood groups –importance of blood groups –identification of blood groups. blood flow factors regulating blood flow such as viscosity, radius , density etc (Fahreus lindqvist effect, Poiseuille's Law)

UNIT III **9**
Structure of Kidney and nephron. Mechanism of Urine formation and acid base regulation. Dialysis. Components in of respiratory system. Oxygen and carbon dioxide transport and acid base regulation.

UNIT IV **9**
Structure of heart – Properties of Cardiac muscle – Cardiac muscle and pacemaker potential - Cardiac cycle – ECG - Heart sound - volume and pressure changes and regulation of heart rate.

UNIT V **10**
Structure of a Neuron. Synaptic conduction. Conduction of action potential in neuron Parts of brain cortical localization of functions.. EEG. Simple reflexes , withdrawal reflexes. Autonomic nervous system and its functions

TOTAL: 45 PERIODS

TEXT BOOKS
1. Essential of human Anatomy and Physiology by Elaine.N. Marieb
Eight edition, Pearson Education New Delhi ,2007.

REFERENCE S
1. Review of Medical Physiology,22nd edition By William F.Ganong Mc Graw Hill New Delhi,
2. Text book of Physiology, Prof. A.K. Jain Third edition volume I and II Avichal Publishing company, New Delhi

EC9050 RADIOLOGICAL EQUIPMENT LT P C
3 0 0 3

AIM

To get the clear understanding of X-ray generation and radio isotopes and various techniques used for visualizing organs in detail.

OBJECTIVES

- To study the functioning of X-ray tubes and scattered radiation and method by which fogginess can be reduced.
- To study the different types radio diagnostic unit.
- To know the techniques to visualize opaque, transparent organs.
- To study the special techniques adopted to visualize different sections of any organ.

UNIT I MEDICAL X-RAY EQUIPMENT 9

Nature of X-Rays - X-ray Absorption - Tissue Contrast.X-Ray Equipment (Block Diagram) – X-ray Tube, the collimator, Bucky Grid, power supply. Digital Radiography - discrete digital detectors, storage phosphor and film Scanning. X-Ray Image intensifier tubes - Fluoroscopy – Digital Fluoroscopy. Angiography, Cine angiography. Digital Subtraction Angiography. Mammography.

UNIT II COMPUTER TOMOGRAPHY 9

Principles of Tomography - First to Fourth generation scanners – Image reconstruction technique- Back projection and Iterative method. Spiral CT Scanning - Ultra fast CT Scanners- X-Ray Sources – Collimation – X-Ray Detectors – Viewing System.

UNIT III MRI 9

Fundamentals of Magnetic Resonance- Interaction of nuclei with static Magnetic Field and Radio frequency wave – Rotation and Precession –induction of a magnetic resonance signal – bulk Magnetization – Relaxation Processes T1 and T2. Block diagram approach of MRI system- System Magnet (Permanent, Electromagnet and super conductors) , generation of Gradient magnetic Fields , Radio Frequency coils (sending and receiving) Shim coils, Electronic components.

UNIT IV NUCLEAR MEDICINE SYSTEMS 9

Radio isotopes- alpha, beta and gamma radiations. Radio pharmaceuticals. Radiation detectors - Gas Filled, ionization Chambers, proportional counter, GM counter and Scintillation Detectors. Gamma Camera- Principle of operation, Collimator, Photo multiplier tube, X-Y Positioning Circuit, Pulse height Analyzer. Principles of SPECT and PET.

UNIT V RADIATION THERAPY AND RADIATION SAFETY 9

Radiation therapy-Linear accelerator, betatron, cesium and cobalt .Radiation Protection in Medicine –Radiation Protection principles, Radiation measuring instruments-Dosimeter, film Badges, Thermo luminescent dosimeters – Electronic dosimeter- ICRP regulation Practical reduction of dose to staff and visitors.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Steve webb, Physics of medical Imaging, , Taylor and Francis, 1988.
2 . R. Hendee and Russell Ritenour "Medical Imaging Physics", Fourth Edition William, Wiley –Liss, 2002.

REFERENCES

1. Physics and Radiobiology of Nuclear Medicine –Third edition – Gopal B.Saha – Publisher – Springer, 2006.
2. Medical Physics and Biomedical Engineering –B.H Brown , PV Lawford, R H Small wood , D R Hose , D C Barber , CRC Press, 1999.
3. Standard handbook of Biomedical Engineering and Design – Myer Kutz Publisher – McGraw – Hill, 2003.
4. P.Raghunathan, "Magnetic Resonance Imaging and Spectroscopy in Medicine" Concepts and Techniques, Orient Longman, 2007.

EC9071 HOSPITAL MANAGEMENT L T P C
3 0 0 3

UNIT I OVERVIEW OF HOSPITAL ADMINISTRATION 9

Distinction between Hospital and Industry, Challenges in Hospital Administration – Hospital Planning – Equipment Planning – Functional Planning.

UNIT II HUMAN RESOURCE MANAGEMENT ON HOSPITAL 9

Principles of HRM – Functions of HRM – Profile of HRD Manager – Tools of HRD – Human Resource Inventory – Manpower Planning.

UNIT III RECRUITMENT AND TRAINING 9

Different Departments of Hospital, Recruitment, Selection, Training Guidelines – Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer.

UNIT IV PLANNING SUPPORTIVE SERVICES 9

Medical Records Department – Central Sterilization and Supply Department – Pharmacy – Food Services - Laundry Services.

UNIT V COMMUNICATION AND SAFETY ASPECTS IN HOSPITAL 9

Purposes – Planning of Communication, Modes of Communication – Telephone, ISDN, Public Address and Piped Music – CCTV.
Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.C.Goyal, "Hospital Administration and Human Resource Management", PHI – Fourth Edition, 2006.
2. G.D.Kunders, "Hospitals – Facilities Planning and Management – TMH, New Delhi – Fifth Reprint 2007.

REFERENCES

1. Cesar A.Caceres and Albert Zara, "The Practice of Clinical Engineering, Academic Press, New York, 1977.

EC9072 **MEDICAL INFORMATICS** **L T P C**
3 0 0 3

UNIT I MEDICAL INFORMATICS 9

Introduction - Structure of Medical Informatics –Internet and Medicine -Security issues , Computer based medical information retrieval, Hospital management and information system, Functional capabilities of a computerized HIS, e-health services, Health Informatics – Medical Informatics, Bioinformatics

UNIT II COMPUTERISED PATIENT RECORD 9

Introduction - History taking by computer, Dialogue with the computer, Components and functionality of CPR, Development tools, Intranet, CPR in Radiology- Application server provider, Clinical information system, Computerized prescriptions for patients.

UNIT III COMPUTERS IN CLINICAL LABORATORY AND MEDICAL IMAGING 9

Automated clinical laboratories-Automated methods in hematology, cytology and histology, Intelligent Laboratory Information System - Computerized ECG, EEG and EMG, Computer assisted medical imaging- nuclear medicine, ultrasound imaging ultrasonography-computed X-ray tomography, Radiation therapy and planning, Nuclear Magnetic Resonance

UNIT IV COMPUTER ASSISTED MEDICAL DECISION-MAKING 9

Neuro computers and Artificial Neural Networks application, Expert system - General model of CMD, Computer –assisted decision support system-production rule system-cognitive model, semester networks , decisions analysis in clinical medicine-computers in the care of critically patients-computer assisted surgery-designing

UNIT V RECENT TRENDS IN MEDICAL INFORMATICS 9

Virtual reality applications in medicine, Computer assisted surgery , Surgical simulation , Telemedicine - Tele surgery computer aids for the handicapped, computer assisted instrumentation in Medical Informatics - Computer assisted patient education and health - Medical education and health care information.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.D.Lele Computers in medicine progress in medical informatics, Tata Mcgraw Hill Publishing computers Ltd,2005, New Delhi
2. Mohan Bansal, Medicl informatics Tata Mcgraw Hill Publishing computers Ltd, 2003 New Delhi

EC9073	BIOINFORMATICS	L T P C
		3 0 0 3

UNIT I INTRODUCTION **9**

Overview of structural Bioinformatics ; Characteristics, Categories, Navigation and information retrieval of Bioinformatics databases,

UNIT II DATABASES **9**

Description and Organisation of Sequence, Structure and Other databases; Database Warehousing and data mining in Bioinformatics.

UNIT III TOOLS **9**

Need for tools, Knowledge discovery, Industry trends and data mining tools; Data submission tools, Data analysis tools, Prediction tools and modeling tools.

UNIT IV MACHINE LEARNING IN BIOINFORMATICS **9**

Neural network, Genetic and fuzzy logic applications in Bioinformaitcs; Modeling for Bioinformatics – Hidden Markov, Comparative, probabilistic and molecular modeling

UNIT V ALGORITHMS **9**

Classification algorithms, implementing algorithms , biological algorithms, bioinformatics tasks and corresponding algorithms and algorithms and bioinformatics software; Data analysis algorithms – Sequence comparison, Substitution matrices and sequence alignment optimal algorithm; Prediction algorithms – Gene prediction, Phylogenetic prediction and protein structure prediction algorithms.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Orpita Bosu and Simminder Kaur Thukral, Bioinformatics Databases, Tools and Algorithms, Oxford University press, 2007, New Delhi.
2. Yi – Ping Phoebe Chen, Bioinformatics Technolgies, Springer International Edition, 2007, New Delhi

REFERENCES

1. Harshawardhan P.Bal, Bioinformatics principles and applications, TataMcGraw Hill Publishing Company Ltd, 2007, New Delhi
2. Kenneth Baclawski, Tianhua Niu, Bioinformatics, Jaico Publishing House, 2007, Delhi.
3. Lukas K. Beehler and Hooman H. Rashidi, Bioinformatics basics Applications in biological science and medicine, Taylor and Francis Group, 2005,

EC9074 BIOSIGNAL PROSESSING L T P C
3 0 0 3

UNIT I SIGNALS AND FILTERING TECHNIQUES 9

Characteristics of some dynamic biomedical systems ,signal conversion. Filters – IIR FIR, Integer filters, Homomorphic filters-Generalized linear filters, Homomorphic deconvolution and application . Matched filter – Detection of spikes and wave complexes .

UNIT II SIGNAL AVERAGING AND FILTERING FOR REMOVAL OF ARTIFACTS 8

Random noise , structured noise and physiological interference . Stationary and nonstationary processes . Time – Domain filters – Moving average filter , synchronous averaging artifacts. Frequency domain filters – optimal filters-Wiener filter , adaptive filter for removal of interference . Application – ECG, Maternal – Fetal ECG , Muscle contraction interference.

UNIT III FREQUENCY DOMAIN ANALYSIS OF NON-STATIONARY SIGNALS 10

Fourier spectrum , Estimation of PSD function – Periodogram , averaging, estimation of autocorrelation function.Measures derived frompower spectral density and application Time variant systems , Fixed segmentation ,Adaptive segmentation ,Adaptive filter for segmentation . Application – ECG , PCG and Heart rate variability.

UNIT IV BIOSIGNAL CLASSIFICATION AND DIAGNOSTIC DECISION 9

Diagnostic of bundle-branch block – Illustration , Pattern classification , Supervised classification , Unsupervised pattern classification ,probabilistic models and statistical decision . Training test steps , Neural Network and application

UNIT V NON LINEAR FILTERING TECHNIQUES 9

Non linear signal processing – state space reconstruction – Lyapnov exponents, correlation dimension, Entropy non linear diagnostics. Empirical non linear filter – non linear noise reduction, comparison of NNR and ICA.

Model based filtering – non linear model parameter estimation, state space model based filtering.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Willis J Tompkins, Bio Medical Digital Signal Processing, Prentice Hall of India, New Delhi, 2003
2. Rangaraj M.Rangayyan, Biomedical Signal Analysis- A case study approach, Wiley Inter Science/IEEE press 2002

REFERENCES

1. Gari D. Clifford, Francisco Azuaje, Patrick E McSharry ‘Advanced Methods and tools for ECG Data Analysis’

EC9075 CMOS ANALOG IC DESIGN I: BUILDING BLOCKS L T P C
3 0 0 3

UNIT I INTRODUCTION AND REVIEW 9

Comparison of MOS and Bipolar Transistors, square-law ,regions – cutoff , triode, sat. ,biasing , body effect, parasitics and equivalent circuits, short and long channel approximations, noise sources .

UNIT II BUILDING BLOCKS 9

MOS amplifiers, source followers, cascades, differential stage design, folded cascode stages.

UNIT III BASIC OPERATIONAL AMPLIFIERS 9

Stability in opamps, systematic design operational amplifiers.

UNIT IV MULTISTAGE OPAMP DESIGN I 9

Fully differential amplifiers, current output amplifiers, rail to rail input and output amplifiers, Class AB and driver amplifiers.

UNIT V MULTISTAGE OPAMP DESIGN II 9

Feedback voltage and transconductance amplifiers, feedback transimpedance amplifiers and current amplifiers.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Wiley Sansen: Analog Design Essentials, Springer 2006.

REFERENCES

1. Philip E Allen, D R Holberg, “CMOS Analog IC Design”, Oxford University Press, 2004
2. Behzad Razavi “Design of Analog CMOS Integrated Circuits”, McGraw Hill, 2001.

EC9076 CMOS ANALOG IC DESIGN II : FUNCTIONAL BLOCKS L T P C
3 0 0 3

UNIT I REGULATORS 8

Voltage and current reference circuits, terms - sensitivity Bandgap Reference: Principles, CMOS Bandgaps , Start-Up Circuits, Curvature Compensation, Sub 1V CMOS Bandgaps, Current References V-I convertors, LDO design, DC/DC converter design.

UNIT II FILTERS 10

Switched capacitor filters, Principle of charge conservation, MOS Capacitors and Switches , Transmission gate , Clock Feedthrough, z-domain analysis of SC Integrator, Stray insensitive SC Integrator , Building Blocks of SC Integrator , switched current filters, continuous time filters, active –rc filters , mos-c filters , Gmc filters improving gm linearity by feedback, comparison Distortion in elementary transistor circuits definition of terms - HD , IM - self & cross , IP , SFDR , P1dB distortion in MOS amplifiers, MOS resistors & capacitors, Distortion in op-amp, reduction of distortion by Feedback

UNIT III CMOS ADC AND DAC 9

Principles and definition of terms - INL , DNL , SFDR, DAC – resistive , capacitive , current steering, Basic circuit topologies of comparators and latches, ADC – integrating, SAR , charge redistribution, Flash, interpolating/folding , pipelined ADCs, pipeline DAC architectures

UNIT IV SIGMA DELTA CONVERTERS 9

Sigma Delta Modulation, Switch Problem, Realization of Good Low voltage Switches, charge pumps, Switched Op-amp Design Example, noise shaping principles.

UNIT V COUPLING EFFECTS IN MIXED SIGNAL SYSTEMS 9

Circuit noise generation, Circuit noise coupling : power supply pinning, supply bounce, substrate coupling, circuit placement. PSRR : definition and examples

TOTAL: 45 PERIODS

TEXT BOOK

1. Wiley Sansen: Analog Design Essesntials, Springer 2006

REFERENCES

1. Philip E Allen, D R Holberg, “CMOS Analog IC Design”, Oxford University Press, 2004
2. Behzad Razavi “Design of Analog CMOS Integrated Circuits”, McGraw Hill, 2001.

EC9077 OPERATING SYSTEMS L T P C
3 0 0 3

UNIT I OPERATING SYSTEM OVERVIEW 9

Introduction – Multiprogramming – Time sharing – Multi-user Operating systems – System Call – Structure of Operating Systems

UNIT II PROCESS MANAGEMENT 9

Concept of Processes – Interprocess Communication– Racing – Synchronisation – Mutual Exclusion – Scheduling –Implementation Issues – IPC in Multiprocessor System – Threads

UNIT III MEMORY MANAGEMENT 9

Partition – paging – segmentation – virtual memory concepts – relocation algorithms – buddy systems – Free space management – Case study.

UNIT IV DEVICE MANAGEMENT AND FILE SYSTEMS 9

File concept – access methods – directory structure – File system mounting – file sharing – protection – file system implementation – I/O Hardware – Application I/O Interface – Kernal I/O subsystem – Transforming I/O to Hardware Operations – Streams – Disk Structure – Disk Scheduling Management – RAID structure

UNIT V MODERN OPERATING SYSTEMS 9

Concepts of distributed operating systems – Real time operating system – Case studies: UNIX, LINUX and Windows 2000.

TOTAL: 45 PERIODS

TEXT BOOK

1. Abraham Silberschatz, Peter Galvin and Gagne, 'Operating System Concepts', Seventh Edition, John Wiley, 2007.
2. William Stallings, 'Operating Systems – Internals and Design Principles', Fifth Edition, Prentice Hall India, 2005.

REFERENCES

1. Andrew Tanenbaum, 'Modern Operating Systems', 2nd Edition, Prentice Hall, 2003.
2. Deital.H.M, "Operating Systems - A Modern Perspective", Second Edition, Addison Wesley, 2004.
3. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill, 2001.
4. D.M.Dhamdhere, "Operating Systems – A Concept based Approach", Second Edition, Tata McGraw Hill, 2006.
5. Crowley.C, "Operating Systems: A Design – Oriented Approach", Tata McGraw Hill, 1999.
6. Ellen Siever, Aaron Weber, Stephen Figgins, 'LINUX in a Nutshell', Fourth Edition, O'reilly, 2004.

CS9078 SOFT COMPUTING L T P C
3 0 0 3

UNIT I FUZZY SET THEORY 10

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION 8

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS 10

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TOTAL: 45 PERIODS

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, “Artificial Intelligence and Intelligent Systems”, Oxford University Press, 2006.

REFERENCES

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.
5. Dr.S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India, 2007.
6. Amit Konar, “Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain”, CRC Press, 2008.

EC9078 EMBEDDED AND REAL TIME SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION TO EMBEDDED COMPUTING 9

Complex systems and micro processors – Design example: Model train controller – Embedded system design process – Formalism for system design – Instruction sets Preliminaries – ARM Processor – CPU: Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanism – CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS 9

CPU buses – Memory devices – I/O devices – Component interfacing – Design with microprocessors – Development and Debugging – Program design – Model of programs – Assembly and Linking – Basic compilation techniques – Analysis and optimization of execution time, power, energy, program size – Program validation and testing.

UNIT III PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and multi processes – Processes – Context Switching – Operating Systems –Scheduling policies - Multiprocessor – Inter Process Communication mechanisms – Evaluating operating system performance – Power optimization strategies for processes.

UNIT IV HARDWARE ACCELERATES & NETWORKS 9

Accelerators – Accelerated system design – Distributed Embedded Architecture – Networks for Embedded Systems – Network based design – Internet enabled systems.

UNIT V CASE STUDY 9

Data Compressor - Software Modem – Personal Digital Assistants – Set–Top–Box. – System-on-Silicon.

TOTAL: 45 PERIODS

TEXT BOOK

1. Wayne Wolf, “Computers as Components - Principles of Embedded Computer System Design”, Morgan Kaufmann Publisher, 2006.

REFERENCES

1. David E-Simon, “An Embedded Software Primer”, Pearson Education, 2007.
2. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, dreamtech press, 2005.
3. Tim Wilmshurst, “An Introduction to the Design of Small Scale Embedded Systems”, Pal grave Publisher, 2004.
4. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-Graw Hill, 2004.
5. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier,2006.

EC9079 PARALLEL AND DISTRIBUTED PROCESSING L T P C
3 0 0 3

UNIT I PARALLEL ARCHITECTURE 9

Parallel Computer Models, Program and Network properties, Principles of scalable performance

UNIT II PROCESSORS AND MEMORY HIERARCHY, BUS 9

Advanced processor Technology, Super scalar and vector processor, Memory hierarchy technology, Virtual Memory Technology, Backplane Bus systems.

UNIT III PIPELINING AND SUPER SCALAR TECHNIQUES 9

Linear Pipeline, Nonlinear pipeline, Instruction pipeline, Arithmetic pipeline, Superscalar and super pipeline design, Parallel and scalable architectures- Multiprocessor and Multicomputers.

UNIT IV SOFTWARE FOR PARALLEL PROGRAMMING 9

Parallel programming models, languages, compliers- Parallel Program Development and Environments.

UNIT V DISTRIBUTED SYSTEMS 9

Models, Hardware concepts, communication, synchronization mechanism, case study: MPI and PVM, Distributed file systems.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Hwang. K, “Advanced computer Architecture”, Parallelism, scalability, Programmability, Tata McGraw Hill, 1993.
2. Tanenbaum A.S, “Distributed Operating Systems”, Peaeson Education Asia, 2002.
3. Dezso Sima,Terence Fountain, Peter Kacsuk, “Advanced Computer Architectures”, Pearson Education, 2007.

REFERENCES

1. V.Rajaraman and C.Siva Ram Murthy, "Parallel Computers Architecture and Programming", PHI, 2000.
2. Quinn, M.J., "Designing Efficient Algorithms for Parallel Computers", McGraw – Hill, 2003.
3. Culler, D.E., "Parallel Computer Architecture", A Hardware – Software approach, Harcourt Asia Pte. Ltd., 1999.

EC9080 ADVANCED MICROPROCESSORS L T P C
3 0 0 3

UNIT I 80186, 80286, 80386 AND 80486 MICROPROCESSORS 9

80186 Architecture, Enhancements of 80186 – 80286 Architecture – Real and Virtual Addressing Modes – 80386 Architecture – Special Registers – Memory Management – Memory Paging Mechanism – 80486 Architecture – Enhancements – Cache Memory Techniques – Exception Handling – Comparison of Microprocessors (8086 – 80186 – 80286 – 80386 – 80486).

UNIT II PENTIUM MICROPROCESSORS 9

Pentium Microprocessor Architecture – Special Pentium Registers – Pentium Memory Management – New Pentium Instructions – Pentium Pro Microprocessor Architecture – Special features – Pentium II Microprocessor Architecture – Pentium III Microprocessor Architecture – Pentium III Architecture – Pentium IV Architecture – Comparison of Pentium Processors.

UNIT III RISC PROCESSORS I 9

PowerPC620 – Instruction fetching – Branch Prediction – Fetching – Speculation, Instruction dispatching – dispatch stalls – Instruction Execution – Issue stalls- Execution Parallelism – Instruction completion – Basics of P6 micro architecture – Pipelining – our-of-order core pipeline – Memory subsystem.

UNIT IV RISC PROCESSORS II(SUPERSCALAR PROCESSORS) 9

Intel i960 – Intel IA32- MIPS R8000 – MIPS R10000 – Motorola 88110 – Ultra SPARC processor- SPARC version 8 – SPARC version 9.

UNIT V PC HARDWARE OVERVIEW 9

Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX. Peripheral Interfaces and Controllers, Memory and I/O Port Addresses.

TOTAL: 45 PERIODS

TEXT BOOKS

1. B.B.Brey, " The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386,80486 PENTIUM, PENTIUM Pro, PII, PIII & IV Architecture, Programming & Interfacing", Prentice-Hall of India, 7th Edition, 2006.
2. John Paul Shen, Mikko H.Lipasti, "Modern Processor Design", Tata McGraw Hill, 2006.
3. B.Govindarajulu, IBM PC and clones Hardware, Trouble Shooting and Maintenance, Second Edition, Tata McGraw Hill, 2005 New Delhi.

REFERENCES

1. Douglas V.Hall, “Microprocessors and Interfacing”, Tata McGraw Hill, II Edition 1999.
2. Mohamed Rafiquzzaman, “Microprocessors and Microcomputer Based System Design”, II Edition, CRC Press, 2007.
3. A.K.Ray, K.M. Bhurchandi, “Advanced microprocessors and peripherals”, II Edition, Tata McGraw Hill 2006.

EC9081 MICROCONTROLLER ENGINEERING L T P C
3 0 0 3

UNIT I RISC PROCESSORS 9

RISC Vs CISC, RISC properties and evolution, Advanced RISC microcontrollers, PIC 8-bit microcontrollers.

UNIT II R8C 16-BIT MICROCONTROLLER 9

The R8C Architecture, CPU Registers, Instruction Set, On-Chip Peripherals, R8C Tiny Development Tools, ADC, PWM, UART, Timer Interrupts, System design using R8C Microcontroller.

UNIT III SYSTEM DESIGN TECHNIQUES 9

Design Methodologies, Specification, System Analysis and Architecture Design, Hardware -Software Design Examples.

UNIT IV EMBEDDED SOFTWARE DEVELOPMENT 9

Cross development tools, Debugging techniques, Real-time Operating System, Memory Management, Scheduling techniques.

UNIT V SYSTEM DEVELOPMENT 9

Microcontroller based System Design, Peripheral Interfacing, Inter-Integrated Circuit Protocol for RTC, EEPROM, ADC/DAC, Application in Automobiles, Robotics and consumer Electronics.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Julio Sanchez Maria P.Canton, “Microcontroller Programming: The microchip PIC”,CRC Press, Taylor & Francis Group,2007.
2. D. E. Simon, “An Embedded Software Primer”, Addison-Wesley, 1999.
3. Wayne Wolf, “Computers as Components: Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 2006.

EC9083 RELIABILITY ENGINEERING L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Hardware Reliability and Software Reliability Concepts, Reliability Management, Benefits of Reliability Program, Basic Reliability measurement units**:-** bath tube curve, Failures, Faults, MTBF, MTTF, Failure rate, Hazard Rate, Reliability factors, Reliability and Unreliability costs, Reliability Life cycle Modeling - Hardware-Series

Model-parallel models- Redundant Models-Shared load systems-Baye's theorem applications-Boolean Truth table-FTA - Software:-Historic developments of models, classification schemes, Environments and runs-random process- with and without Repair-particularization. Calendar time modeling

UNIT II DESIGN TOOLS 9

Design Evaluation-Stress strength Analysis-FMEA-FMECA-Worst Case Analysis-Roboust Design approach-Human Factors-Parts Control and Derating Software considerations

UNIT III EVALUATION 9

Hardware: Development/growth testing-test analyse and Fix (TAAF)-Production Reliability Acceptance testing (PRAT)- Qualification Testing-Environmental Stress Screening-Burn-in-Accelerated Life Testing Software: Testing components-State-based classes-Parallel Architecture-system testing-Testing OOPs models

UNIT IV PREDICTION 9

Hardware: Benefits of Reliability Predictions, Field and Industry Data-Parts count-Part stress method- Reliability allocation and apportionment-Reliability prediction goals.

Software: Execution time component-Calendar Time component-Prediction Models:-Jelinski-Morando Model-Shooman Model-Musa Model-Littlewood-Verrall Model-Crow Model.Least-Squares estimation- Bayesian ineference

UNIT V IMPLEMENTATION AND PLANNING 9

Organization Responsibility-System engineering – Reliability program elements-Management of Operational Phases-Life cycle Cost analysis-Resource management-Evaluation of software Engineering Technologies-planning for Application.

TOTAL: 45 PERIODS

TEXT BOOK

1. Birolini.A Reliability Engineering – Theory and Practice, 4th edition, Springer International Edition, New Delhi, 2006.

REFERENCES

1. Willian E. Perry, Effective methods for Software Testing: John Wiley and Sons., 2002, Singapore
2. Ireson, W.G Coombs, C.F & Moss R. Handbook of Reliability Engineering and Management, Mcgraw Hill,1996 New York
3. O'Connor, P.D.T. Practical Reliability Engineering ,John Wiley and Sons, .1996. New York:
4. John.D.Musa, Antony Iannino, Kazuhira Okumoto, Software Reliability Measurement, Prediction and application, International edition Mc-graw hill Book co.-1987,Singapore
5. Angus J E, J B Bowen, & S J Vandenberg. "Reliability Model Demostration Study" Rome Air Development Centre, Technical Report RADC-TR-83-207, Rome, 1983,Newyork
6. K.C.Kapur & Lamberson L.R . Reliability in Engineering Design, John Wiley and sons Inc, 1974,New York
7. Mann, N.R, Schafer, R.E & Singpurwalla, N. D " Methods for Statistical Analysis of Reliability life", John Wiley and sons, 1974, New York.

EC9084 NUMERICAL METHODS AND LINEAR ALGEBRA L T P C
3 0 0 3

UNIT I VECTOR SPACES AND LINEAR TRANSFORMATIONS 9+3

Vector Spaces – Subspaces – Linear Spans – Linear Independence and Linear Dependence - Basis and Dimension – Linear Transformation, Null space and range - Dimension theorem (no proof) - Matrix representation of Linear Transformation.

UNIT II INNER PRODUCT SPACES 9+3

Change of basis – Dual space - Inner Product Spaces – Norms and Cauchy – Schwarz inequality - Orthonormal sets - Gram Schmidt orthonormalization process – adjoint of linear operator - method of least squares.

UNIT III NUMERICAL LINEAR ALGEBRA 9+3

Gauss elimination method – Pivoting strategy - Gauss elimination method for Tridiagonal matrix – Jacobi, Gauss - Seidel iterative Method - Power method and QR Method for approximating Eigenvalues.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolation - Newton's forward and backward difference interpolation – Numerical differentiation by finite differences – Trapezoidal, Simpson's 1/3 and Gaussian Quadrature formula.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Numerical solution of first and second order ordinary differential equations by Taylor series method - Euler Method - Modified Euler's Method - Runge – Kutta Methods - Millne's Predictor and Corrector Method – Finite difference methods for two – point Boundry Value problems.

TOTAL: 45+15=60 PERIODS

TEXT BOOKS

1. Stephen H Friedberg, Arnold J Insel and Lawrence Spence, "Linear Algebra", PrenticeHall of India, New Delhi (2004).
   (Section 1.2,1.3,1.4,1.5,1.6,2.1,2.2,2.5,2.6,6.1,6.2.,6.3)
2. J.D.Faires, Richard Burden, "Numerical Methods" Brooks/Cole (Thomson Publications) (1998).
   (Section 3.2, 3.3, 4.2, 4.3, 4.5, 4.9, 5.2, 5.3, 5.4, 6.2, 6.3, 6.6)

REFERENCES

1. S.Kumaresan, "Linear Algebra – A geometric approach", Prentice – Hall of India, New Delhi, 2000
2. G.Strang, "Linear Algebra and its applications", Thomson (Books/Cole), (2003)
3. S.Lipschutz "Theory and Problems of Linear Algebra", Schaum's outline series, McGraw Hill, (2004)
4. M.K.Jain, S.R.K.Iyengar, R.K.Jain, "Numerical methods fo Scientific and Engineering Computation" New Age International Publishers, New Delhi (2003).
5. H.M.Antia, "Numerical Methods for Scientists and Engineers", Hindustan Book Agency, New Delhi, (2002)
6. C.F.Gerald, P.O.Wheatley, "Applied Numerical Analysis" Pearson Education, New Delhi (2002).

EC9085 NATURAL LANGUAGE PROCESSING L T P C
3 0 0 3

UNIT I **9**

Introduction – Models -and Algorithms - The Turing Test -Regular Expressions Basic Regular Expression Patterns -Finite State Automata -Regular Languages and FSAs – Morphology -Inflectional Morphology - Derivational Morphology -Finite-State Morphological Parsing - Combining an FST Lexicon and Rules -Porter Stemmer

UNIT II **9**

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing-Backoff - Deleted Interpolation – Entropy - English Word Classes - Tagsets for English -Part of Speech Tagging -Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging -

UNIT III **9**

Context Free Grammars for English Syntax- Context-Free Rules and Trees - Sentence-Level Constructions –Agreement – Sub Categorization – Parsing – Top-down – Earley Parsing -Feature Structures - Probabilistic Context-Free Grammars

UNIT IV **9**

Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus - Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis -Semantic Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation - Information Retrieval

UNIT V **9**

Discourse -Reference Resolution - Text Coherence -Discourse Structure - Dialog and Conversational Agents - Dialog Acts – Interpretation – Coherence -Conversational Agents - Language Generation – Architecture -Surface Realizations - Discourse Planning – Machine Translation -Transfer Metaphor – Interlingua – Statistical Approaches

TOTAL: 45 PERIODS

TEXT BOOKS

1. D. Jurafsky and J. Martin “Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”,
2. C. Manning and H. Schutze, “Foundations of Statistical Natural Language Processing”,

REFERENCE

1. James Allen. “Natural Language Understanding”, Addison Wesley, 1994.

EC9086 **WEB TECHNOLOGY** **L T P C**
3 0 0 3

UNIT I **9**

Java fundamentals – Class, Object – Inheritance – Polymorphism – Packages – Interfaces – Exception handling

UNIT II **9**
I/O – AWT – Event handling – Introduction to Threads - Basics of Networking –TCP and UDP sockets – Connecting to the Web

UNIT III **9**
Applets – JDBC – Swings – Remote Method Invocation

UNIT IV **9**

World Wide Web – HTML – List –Tables – Frames – Forms – HTTP commands – XML – DTD, Schema – XSLT – XML Parser – Client side scripting

UNIT V **9**
Server side scripting – JSP – Servlets – Session management – Cookies .

TOTAL: 45 PERIODS

TEXT BOOKS
1. Deitel and Deitel, "Java – How to program", 3rd ed., Pearson Education, 2001.
2. Robert W. Sebesta, "Programming the World Wide Web", 3rd ed., Pearson Education, 2006. (Units 4,5)

REFERENCES
1. Herbert Schildt, "Java – The Complete Reference", 7th ed., Tata McGraw Hill, 2007.
2. Chris Bates, "Web Programming", 3rd ed., Wiley, 2006.
3. Black Book, "Java 6 Programming", Dreamtech Press, 2007.
4. Deitel, "Java How to Program", Pearson Education, 2003.
5. W Clay Richardson, et al, "Professional Java JDK 6 Edition", Wrox, 2007.

EC9087 **INTERNET AND JAVA** **L T P C**
3 0 0 3

UNIT I INTERNET WORKING WITH TCP/IP **9**
Review of network technologies, Internet addressing, Address resolution protocols (ARP/RARP), Routing IP data grams Reliable stream transport service (TCP) TCP/IP over ATM networks, Internet applications-E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II WORLD WIDE WEB **9**
HTTP protocol, Web browsers Netscape, Internet explorer, Web site and web page design, HTML,XHTML, XML, CSS, Dynamic HTML, CGI.

UNIT III JAVASCRIPT PROGRAMMING 9

Introduction, Control statements, Functions, Arrays and Objects - Programming

UNIT IV JAVA PROGRAMMING 9

Language features, Classes, Object and methods. Sub-classing and dynamic binding, Multithreading, Overview of class library, Object method serialization, Remote method invocation, Java Servelets and Javaserver pages.

UNIT V WEB DESIGN AND DATABASES 9

Macromedia Dream Weaver, Web Servers, Databases – SQL, MYSQL, DBI and ADO.NET, Web design

TOTAL: 45 PERIODS

TEXT BOOKS

1. Deitel, Internet and World Wide Web, Pearson Education / PHI, 2007
2. Deitel, "Java How to Program", Pearson Education / PHI, 2006.
3. Herbert Schildt, The complete Reference JAVA 2, Fifth Edition, Tata McGRaw Hill Publishing Com.Ltd, New Delhi.
4. A S Godbole A Kahate, "Web Technoligies, TCP/IP to Internet Application Archtiectures", TMH 2007

REFERENCES

1. Margaret Levine Young, "Internet The Complete Reference", Tata McGraw Hill, 1999
2. Balagurusamy.E.`Programming with Java, A premier` Second Edition, Tata McGraw Hill,2006
3. Douglas E.Comer,"Internetworking with TCP/IP", Vol 1: 3rd edition, Prentice Hall of India, 1999..
4. Cay S. Horstmann & Gary Cornell, Core Java™ Volume – I & II, Pearson Education, 2006

GE9022 TOTAL QUALITY MANAGEMENT LT P C
3 0 0 3

AIM:

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES 9

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL : 45 PERIODS

TEXT BOOK

1. Dale H.Besterfiled, et at., “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint (2006).

REFERENCES

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi,L and Anand Samuel,“Total Quality Management”, Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman,B and Gopal, R.K, “Total Quality Management – Text and Cases”, Prentice Hall (India) Pvt. Ltd., 2006.

GE9021 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

AIM:

To sensitize the engineering students on blending both technical and ethical responsibilities.

OBJECTIVES:

- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one's own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Riysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Concepts and Cases", Thompson Learning, (2000).

REFERENCES

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999)
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, (2003)
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, (2001)
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004)
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)