ANNA UNIVERSITY CHENNAI : : CHENNAI – 600 025

AFFILIATED INSTITUTIONS

B.E. (8 SEMESTER) ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM – R 2008

SEMESTER VI

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MG2351	Principles of Management	3	0	0	3
EC2351	Measurements and Instrumentation	3	0	0	3
EC2352	Computer Networks	3	0	0	3
EC2353	Antenna and Wave Propagation	3	1	0	4
EC2354	VLSI Design	3	0	0	3
	Elective I	3	0	0	3
PRACTICAL					
EC2356	Computer Networks Lab	0	0	3	2
EC2357	VLSI Design Lab	0	0	3	2
GE2321	Communication Skills Lab	0	0	4	2
	TOTAL	**18**	**1**	**10**	**25**

SEMESTER VII

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
EC2401	Wireless Communication	3	0	0	3
EC2402	Optical Communication and Networking	3	0	0	3
EC2403	RF and Microwave Engineering	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
	Elective IV	3	0	0	3
PRACTICAL					
EC2404	Electronics System Design Lab	0	0	3	2
EC2405	Optical & Microwave Lab	0	0	3	2
	TOTAL	**18**	**0**	**6**	**22**

SEMESTER VIII

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
	Elective V	3	0	0	3
	Elective VI	3	0	0	3
PRACTICAL					
EC2451	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

LIST OF ELECTIVES
SEMESTER VI – Elective I

CODE NO.	COURSE TITLE	L	T	P	C
EC2021	Medical Electronics	3	0	0	3
EC2022	Operating Systems	3	0	0	3
EC2023	Solid State Electronic Devices	3	0	0	3
EC2024	Speech Processing	3	0	0	3
MA2264	Numerical Methods	3	1	0	4
CS2021	Multicore Programming	3	0	0	3

SEMESTER VII - Elective II

CODE NO.	COURSE TITLE	L	T	P	C
EC2030	Advanced Digital Signal Processing	3	0	0	3
GE2022	Total Quality Management	3	0	0	3
EC2035	Cryptography and Network Security	3	0	0	3
EC2036	Information Theory	3	0	0	3
GE2071	Intellectual Property Rights	3	0	0	3
GE2021	Professional Ethics in Engineering	3	0	0	3

SEMESTER VII - Elective III

CODE NO.	COURSE TITLE	L	T	P	C
EC2027	Advanced Microprocessors				
EC2028	Internet and Java	3	0	0	3
CS2060	High Speed Networks	3	0	0	3
CS2053	Soft Computing	3	0	0	3
EC2037	Multimedia Compression & Communication	3	0	0	3
EC2039	Parallel and Distributed Processing	3	0	0	3

SEMESTER VII - Elective IV

CODE NO.	COURSE TITLE	L	T	P	C
EC2029	Digital Image Processing	3	0	0	3
EC2031	Electromagnetic Interference and Compatibility	3	0	0	3
EC2033	Power Electronics	3	0	0	3
EC2034	Television and Video Engineering	3	0	0	3
EC2038	Nano Electronics	3	0	0	3
EC2041	Avionics	3	0	0	3

SEMESTER VIII - Elective V

CODE NO.	COURSE TITLE	L	T	P	C
EC2042	Embedded and Real Time Systems	3	0	0	3
EC2046	Advanced Electronic system design	3	0	0	3
EC2047	Optoelectronic devices	3	0	0	3
EC2050	Mobile Adhoc Networks	3	0	0	3
EC2051	Wireless Sensor Networks	3	0	0	3
EC2052	Remote Sensing	3	0	0	3
EC2053	Engineering Acoustics	3	0	0	3

SEMESTER VIII - Elective VI

CODE NO.	COURSE TITLE	L	T	P	C
EC2043	Wireless networks	3	0	0	3
EC2044	Telecommunication Switching and Networks	3	0	0	3
EC2045	Satellite Communication	3	0	0	3
EC2048	Telecommunication System Modeling and Simulation	3	0	0	3
EC2049	Radar and Navigational Aids	3	0	0	3
EC2054	Optical Networks	3	0	0	3

MG2351 PRINCIPLES OF MANAGEMENT L T P C
3 0 0 3

UNIT I OVERVIEW OF MANAGEMENT 9

Definition - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

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 Styles - Leadership theories - Communication - Barriers 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. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

REFERENCES:

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. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.

EC2351 MEASUREMENTS AND INSTRUMENTATION **L T P C**
3 0 0 3

UNIT I BASIC MEASUREMENT CONCEPTS 9

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error :- accuracy and precision, types, statistical analysis – moving coil, moving iron meters – multimeters – Bridge measurements : – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes :– delayed time base oscilloscopes, analog and digital storage oscilloscope, sampling oscilloscope – Q meters – Vector meters – RF voltage and power measurements – True RMS meters.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators – pulse and square wave generators, RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer :- digital spectrum analyzer, Vector Network Analyzer – Digital L,C,R measurements, Digital RLC meters.

UNIT IV DIGITAL INSTRUMENTS 9

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – Automation in digital instruments, Automatic polarity indication, automatic ranging, automatic zeroing, fully automatic digital instruments, Computer controlled test systems, Virtual instruments.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS 9

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – data loggers –computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

TOTAL= 45 PERIODS

TEXT BOOKS:

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Pearson / Prentice Hall of India, 2007.
2. Ernest O. Doebelin, Measurement Systems- Application and Design, TMH, 2007.

REFERENCES:

1. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson Education, 2003.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.
3. David A. Bell, Electronic Instrumentation and measurements, Prentice Hall of India Pvt Ltd, 2003.
4. B.C. Nakra and K.K. Choudhry, Instrumentation, Meaurement and Analysis, 2nd Edition, TMH, 2004.
5. James W. Dally, William F. Riley, Kenneth G. McConnell, Instrumentation for Engineering Measurements, 2nd Edition, John Wiley, 2003.

EC2352 COMPUTER NETWORKS L T P C
3 0 0 3

UNIT I PHYSICAL LAYER 9

Data Communications – Networks - Networks models – OSI model – Layers in OSI model – TCP / IP protocol suite – Addressing – Guided and Unguided Transmission media

Switching: Circuit switched networks – Data gram Networks – Virtual circuit networks Cable networks for Data transmission: Dialup modems – DSL – Cable TV – Cable TV for Data transfer.

UNIT II DATA LINK LAYER 10

Data link control: Framing – Flow and error control –Protocols for Noiseless and Noisy Channels – HDLC

Multiple access: Random access – Controlled access

Wired LANS : Ethernet – IEEE standards – standard Ethernet – changes in the standard – Fast Ethernet – Gigabit Ethernet.

Wireless LANS : IEEE 802.11–Bluetooth.

Connecting LANS: Connecting devices - Backbone networks - Virtual LANS

Virtual circuit networks: Architecture and Layers of Frame Relay and ATM.

UNIT III NETWORK LAYER 9

Logical addressing: IPv4, IPv6 addresses

Internet Protocol: Internetworking – IPv4, IPv6 - Address mapping – ARP, RARP, BOOTP, DHCP, ICMP, IGMP, Delivery - Forwarding - Routing – Unicast, Multicast routing protocols.

UNIT IV TRANSPORT LAYER 8

Process-to-Process delivery - User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QoS) – Techniques to improve QoS.

UNIT V APPLICATION LAYER 9

Domain Name System (DNS) – E-mail – FTP – WWW – HTTP – Multimedia Network Security: Cryptography – Symmetric key and Public Key algorithms - Digital signature – Management of Public keys – Communication Security – Authentication Protocols.

TOTAL= 45 PERIODS

TEXT BOOKS

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, 2006: Unit I-IV
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, 2003: Unit V

REFERENCES

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.
2. James .F. Kurouse & W. Rouse, “Computer Networking: A Topdown Approach Featuring”,3/e, Pearson Education.
3. C.Sivaram Murthy, B.S.Manoj, “Ad hoc Wireless Networks – Architecture and Protocols”, Second Edition, Pearson Education.

4. Greg Tomshon, Ed Tittel, David Johnson. “Guide to Networking Essentials”, fifth edition, Thomson India Learning, 2007.
5. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2000.

EC2353 ANTENNA AND WAVE PROPAGATION L T P C
3 1 0 4

UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA FUNDAMENTALS 9

Review of electromagnetic theory: Vector potential, Solution of wave equation, retarded case, Hertizian dipole. Antenna characteristics: Radiation pattern, Beam solid angle, Directivity, Gain, Input impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation patterns, Equivalence of Impedances, Effective aperture, Vector effective length, Antenna temperature.

UNIT II WIRE ANTENNAS AND ANTENNA ARRAYS 9

Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array

UNIT III APERTURE ANTENNAS 9

Aperture Antennas: Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS 9

Special Antennas: Long wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Biconical Antenna, Log periodic Dipole Array, Spiral Antenna, Microstrip Patch Antennas.
Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement.

UNIT V RADIO WAVE PROPAGATION 9

Calculation of Great Circle Distance between any two points on earth, Ground Wave Propagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionospheric propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth’s magnetic fields, Faraday rotation, Whistlers.

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

TEXTBOOKS

1. E.C.Jordan and Balmain, “Electromagnetic waves and Radiating Systems”, Pearson Education / PHI, 2006
2. A.R.Harish, M.Sachidanada, “Antennas and Wave propagation”, Oxford University Press, 2007.

REFERENCES

1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas for all Applications", Tata McGraw-Hill Book Company, 3 ed, 2007.
2. G.S.N.Raju, Antenna Wave Propagation, Pearson Education, 2004.
3. Constantine A. Balanis, Antenna Theory Analysis and Desin, John Wiley, 2nd Edition, 2007.
4. R.E.Collins, "Antenna and Radiowave propagation",
5. W.L Stutzman and G.A. Thiele, "Antenna analysis and design", John Wiley, 2000.

EC2354 VLSI DESIGN L T P C
3 0 0 3

UNIT I CMOS TECHNOLOGY 9

A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues

UNIT II CIRCUIT CHARACTERIZATION AND SIMULATION 9

Delay estimation, Logical effort and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling- SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation

UNIT III COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN 9

Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

UNIT IV CMOS TESTING 9

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan

UNIT V SPECIFICATION USING VERILOG HDL 9

Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

TOTAL= 45 PERIODS

TEXTBOOKS:

1. Weste and Harris: CMOS VLSI DESIGN (Third edition) Pearson Education, 2005
2. Uyemura J.P: Introduction to VLSI circuits and systems, Wiley 2002.

REFERENCES:

1 D.A Pucknell & K.Eshraghian Basic VLSI Design, Third edition, PHI, 2003
2 Wayne Wolf, Modern VLSI design, Pearson Education, 2003
3 M.J.S.Smith: Application specific integrated circuits, Pearson Education, 1997
4 J.Bhasker: Verilog HDL primer, BS publication,2001
5 Ciletti Advanced Digital Design with the Verilog HDL, Prentice Hall of India, 2003

EC2356 COMPUTER NETWORKS LAB L T P C
0 0 3 2

1. PC to PC Communication
   Parallel Communication using 8 bit parallel cable
   Serial communication using RS 232C
2. Ethernet LAN protocol
   To create scenario and study the performance of CSMA/CD protocol through simulation
3. Token bus and token ring protocols
   To create scenario and study the performance of token bus and token ring protocols through simulation
4. Wireless LAN protocols
   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
5. Implementation and study of stop and wait protocol
6. Implementation and study of Goback-N and selective repeat protocols
7. Implementation of distance vector routing algorithm
8. Implementation of Link state routing algorithm
9. Implementation of Data encryption and decryption
10. Transfer of files from PC to PC using Windows / Unix socket processing

TOTAL= 45 PERIODS

Requirement for a batch of 30 students

S.No.	Description of Equipment	Quantity required
1.	PC (with recent specification)	30 Nos.
2.	Ethernet LAN trainer	2
3.	Wireless LAN trainer	2
4.	Network Simulator Software	20 Nos.
5.	C. Complier	All the 30 Systems
6.	Java	All the 30 systems

EC2357 VLSI DESIGN LAB L T P C
0 0 3 2

1. Design Entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
2. Design Entry and simulation of sequential logic circuits (counters, PRBS generators, accumulators). Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
3. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.
4. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.1. and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1. and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated atleast on oscilloscopes (logic analyzer preferred).
5. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR.
6. Layout of a simple CMOS inverter, parasitic extraction and simulation.
7. Design of a 10 bit number controlled oscillator using standard cell approach, simulation followed by study of synthesis reports.
8. Automatic layout generation followed by post layout extraction and simulation of the circuit studied in Expt. No.7

Note 1. For Expt. 1 To 4 can be carried out using Altera (Quartus) / Xilinx (Alliance) / ACTEL (Libero) tools.

Note 2. For expt. 5-8 introduce the student to basics of IC design. These have to be carried out using atleast 0.5u CMOS technology libraries. The S/W tools needed Cadence / MAGMA / Tanner.

TOTAL= 45 PERIODS

GE2321 COMMUNICATION SKILLS LAB L T P C
(Fifth / Sixth Semester) 0 0 4 2

I. PC based session	**(Weightage 40%)**	**24 periods**

A. English Language Lab (18 Periods)

1. Listening Comprehension: (6)
Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.

2. Reading Comprehension: (6)
Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. Speaking: (6)
Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises – Common Errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. Discussion of audio-visual materials (6 periods)

(Samples are available to learn and practice)

1. **Resume / Report Preparation / Letter Writing** (1)
   Structuring the resume / report - Letter writing / Email Communication - Samples.

2. **Presentation skills:** (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3. **Soft Skills:** (2)
   Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. **Group Discussion:** (1)
   Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5. **Interview Skills:** **(**1)
   Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews- Video samples.

II. Practice Session	**(Weightage – 60%)**	**24 periods**

1. **Resume / Report Preparation / Letter writing**: Students prepare their own resume and report. (2)
2. **Presentation Skills:** Students make presentations on given topics. (8)
3. **Group Discussion**: Students participate in group discussions. (6)
4. **Interview Skills**: Students participate in Mock Interviews (8)

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. Evans, D, **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.

Lab Requirements:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

Guidelines for the course

GE2321 COMMUNICATION SKILLS LABORATORY

1. A batch of 60 / 120 students is divided into two groups – one group for the PC-based session and the other group for the Class room session.

2. The English Lab (2 Periods) will be handled by a faculty member of the **English Department**. The Career Lab (2 Periods) may be handled by any competent teacher, **not necessarily from English Department**

3. **Record Notebook:** At the end of each session of English Lab, review exercises are given for the students to answer and the computer evaluated sheets are to be compiled as record notebook. Similar exercises for the career lab are to be compiled in the record notebook.

4. **Internal Assessment:** The 15 marks (the other 5 marks for attendance) allotted for the internal assessment will be based on the record notebook compiled by the candidate. 10 marks may be allotted for English Lab component and 5 marks for the Career Lab component.

5. **End semester Examination:** The end-semester examination carries 40% weightage for English Lab and 60% weightage for Career Lab.

   Each candidate will have separate sets of questions assigned by the teacher using the teacher-console enabling PC–based evaluation for the 40% of marks allotted.

   The Career Lab component will be evaluated for a maximum of 60% by a local examiner & an external examiner drafted from other Institutions, similar to any other lab examination conducted by Anna University.

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

EC2401 WIRELESS COMMUNICATION L T P C
3 0 0 3

UNIT I SERVICES AND TECHNICAL CHALLENGES 9

Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS 9

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS 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.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS 9

Principle of Diversity, Macrodiversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalisers- Linear and Decision Feedback equalisers, Review of Channel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCEIVER SCHEMES 9

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards

TOTAL= 45 PERIODS

TEXT BOOKS:

1. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, "Modern Wireless Communications", Pearson Education, 2007.

REFERENCES:

1. Rappaport. T.S., "Wireless communications", Pearson Education, 2003.
2. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

EC2402 OPTICAL COMMUNICATION AND NETWORKING L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Introduction**,** Ray theory transmission- Total internal reflection-Acceptance angle – Numerical aperture – Skew rays – Electromagnetic mode theory of optical propagation – EM waves – modes in Planar guide – phase and group velocity – cylindrical fibers – SM fibers.

UNIT II TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS 9

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses - Fiber Bend losses – Midband and farband infra red transmission – Intra and inter Modal Dispersion – Over all Fiber Dispersion – Polarization- non linear Phenomena. Optical fiber connectors**,** Fiber alignment and Joint Losses – Fiber Splices – Fiber connectors – Expanded Beam Connectors – Fiber Couplers.

UNIT III SOURCES AND DETECTORS 9

Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters, mono and hetero structures - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD

Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise -Noise sources , Signal to Noise ratio , Detector response time.

UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS 9

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration – Probability of Error – Quantum limit.

Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements.

UNIT V OPTICAL NETWORKS 9

Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks – Wavelength Routed Networks – Non linear effects on Network performance – Performance of WDM + EDFA system – Solitons – Optical CDMA – Ultra High Capacity Networks.

TOTAL= 45 PERIODS

TEXT BOOKS:

1. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. **2007**
2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. **2000**

REFERENCES:

1.J.Gower, “Optical Communication System”, Prentice Hall of India, 2001
2. Rajiv Ramaswami, “Optical Networks “ , Second Edition, Elsevier , 2004.
3. Govind P. Agrawal, “ Fiber-optic communication systems”, third edition, John Wiley & sons, 2004.
4. R.P. Khare, “Fiber Optics and Optoelectronics”, Oxford University Press, 2007.

EC2403 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 MICROWAVE PASSIVE COMPONENTS 9

Microwave frequency range, significance of microwave frequency range - applications of microwaves. Scattering matrix -Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Microwave junctions - Tee junctions -Magic Tee - Rat race - Corners - bends and twists - Directional couplers - two hole directional couplers- Ferrites - important microwave properties and applications – Termination - Gyrator- Isolator-Circulator - Attenuator - Phase changer – S Matrix for microwave components – Cylindrical cavity resonators.

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES 9

Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs -Principles of tunnel diodes - Varactor and Step recovery diodes - Transferred Electron Devices -Gunn diode- Avalanche Transit time devices- IMPATT and TRAPATT devices. Parametric devices -Principles of operation - applications of parametric amplifier .Microwave monolithic integrated circuit (MMIC) - Materials and fabrication techniques

UNIT V MICROWAVE TUBES AND MEASUREMENTS 9

Microwave tubes- High frequency limitations - Principle of operation of Multicavity Klystron, Reflex Klystron, Traveling Wave Tube, Magnetron. Microwave measurements: Measurement of power, wavelength, impedance, SWR, attenuation, Q and Phase shift.

TOTAL= 45 PERIODS

TEXT BOOK:

1) Samuel Y Liao, “Microwave Devices & Circuits” , Prentice Hall of India, 2006.
2) Reinhold.Ludwig and Pavel Bretshko ‘RF Circuit Design”, Pearson Education, Inc., 2006

REFERENCES:

1. Robert. E.Collin-Foundation of Microwave Engg –Mc Graw Hill.
2. Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata Mc Graw
3. Hill Inc., 2004.
4. M.M.Radmanesh , RF & Microwave Electronics Illustrated, Pearson Education, 2007.
5. Robert E.Colin, 2ed “Foundations for Microwave Engineering”, McGraw Hill, 2001
6. D.M.Pozar, “Microwave Engineering.”, John Wiley & sons, Inc., 2006.

EC2404 ELECTRONICS SYSTEM DESIGN LAB L T P C
0 0 3 2

1. Design of a 4-20mA transmitter for a bridge type transducer.
   Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
2. Design of AC/DC voltage regulator using SCR
   Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.
3. Design of process control timer
   Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.
4. Design of AM / FM modulator / demodulator
   i. Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector.
   ii. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.
5. Design of Wireless data modem.
   Design a FSK modulator using 555/XR 2206 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565/XR 2212.
6. PCB layout design using CAD
   Drawing the schematic of simple electronic circuit and design of PCB layout using CAD
7. Microcontroller based systems design
   Design of microcontroller based system for simple applications like security systems combination lock.
8. DSP based system design
   Design a DSP based system for echo cancellation, using TMS/ADSP DSP kit.
9. Psuedo-random Sequence Generator
10. Arithmetic Logic Unit Design

Note: Kits should not be used. Instead each experiment may be given as mini project.

TOTAL= 45 PERIODS

LIST OF EQUIPMENTS:

1) Dual Power supply ±15V
   Ammeter (Multimeter)
   Temperature Measurement Transducer
2) Power Supply (for IC 555)
   Relays
   Indicator LEDs
3) System with ARCAD Software
4) TMS320C5416 (with CCS) and system, speaker
5) 8051 based Trainer kit, and system with interfaces like ADC, DAC, Keyboard and display
6) CRO – 5
7) Function Generator – 5
8) Regulated Power supply – [0-30V)-10, 5V-2
9) Transistors and Diodes – 2N3055, BFW10, BC547, BT012, IN4007, CED, SL100
10) ICs – IC741, IC7414, IC555, IC7805, IC7474, IC7107
11) Resistors – 5.6K, 56K, 9K, 22K, 100K, 27Ω
12) Capacitors – 0.1µf, 100µf, 50µf, 10nf,47nf
13) 8Ω Speaker
14) TSOP

EC2405 OPTICAL & MICROWAVE LAB L T P C
0 0 3 2

Microwave Experiments:

1. Reflex Klystron – Mode characteristics
2. Gunn Diode – Characteristics
3. VSWR, Frequency and Wave Length Measurement
4. Directional Coupler – Directivity and Coupling Coefficient – S – parameter measurement
5. Isolator and Circulator – S - parameter measurement
6. Attenuation and Power measurement
7. S - matrix Characterization of E-Plane T, H-Plane T and Magic T.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

Optical Experiments:

1. DC characteristics of LED and PIN Photo Diode.
2. Mode Characteristics of Fibers
3. Measurement of Connector and Bending Losses.
4. Fiber Optic Analog and Digital Link
5. Numerical Aperture Determination for Fibers
6. Attenuation Measurement in Fibers

TOTAL= 45 PERIODS

Microwave Experiments:
LIST OF EQUIPMENTS:

1) Klystron Power Supply – 6
2) Reflex Klystron Oscillator – 6 (X band)
3) Gunn Power Supply – 3
4) Gunn Oscillator – 3 (X band)
5) Isolator – 9
6) Variable attenuator – 9 (0.6 dB)
7) PIN modulator – 3
8) Slotted waveguide Section with Probe and Carriage – 2
9) Frequency meter (direct reading type) – 4
10) Directional coupler 3dB, 10dB – 1 each
11) Circulator – 1
12) E Plane T, H Plane T, Magic T – 2 each
13) Horn antenna – 2 (X band) compatible
14) Turn table for antenna measurement – 1
15) Waveguide stands – 30
16) Detectors – 10
17) Network analyzer (Scalar or Vector) – 1
18) Power meter
19) BNC to BNC and BNC to TNC Cables – Required numbers
20) Bolts, nuts and Screws and Screw driver – Required numbers

Optical Experiments:
LIST OF EQUIPMENTS:

1) 850 nm LED Module – 3 Nos
2) 850 nm PIN Photo Diode Module – 2 Nos
3) Glass / Plastic Fiber Patch Cords – 1 meter length
4) Optical Power meter – 2 Nos
5) Stabilized Current Source (0-100 mA) – 3 Nos
6) Variable Supply (0-30v) – 2 Nos
7) Digital Multimeter – 2 Nos
8) Fiber Spools of Varied length with Connectors
9) Numerical Aperture measurement kit – 1No
10) Fiber Optic Analog Tranceiver kit/Module – 1 No
11) Fiber Optic Digital Tranceiver kit/Module – 1 No
12) CRO (0-100MHZ) – 2 Nos
13) Signal Generator – 1 No
14) Pulse Generator – 1 No

EC2021 MEDICAL ELECTRONICS L T P C
3 0 0 3

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

The origin of Bio-potentials; 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 MEASUREMENT 9

PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionosing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

TOTAL= 45 PERIODS

TEXTBOOKS

1. Leislie 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, 2003.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment Technology”, John Wiley and Sons, New York, 2004.

EC2022 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 BOOKS

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.

EC2023 SOLID STATE ELECTRONIC DEVICES L T P C

3 0 0 3

UNIT I CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS 9

Semiconductor materials - Periodic Structures - Crystal Lattices - Cubic lattices - Planes and Directions - Diamond lattice - Bulk Crystal Growth - Starting Materials - Growth of Single Crystal lngots - Wafers - Doping - Epitaxial Growth - Lattice Matching in Epitaxial Growth - Vapor - Phase Epitaxy - Atoms and Electrons - Introduction to Physical Models - Experimental Observations - Photoelectric Effect - Atomic spectra - Bohr model - Quantum Mechanics - Probability and Uncertainty Principle - Schrodinger Wave Equation - Potential Well Equation - Potential well Problem - Tunneling.

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS AND JUNCTIONS 9

Energy bands in Solids, Energy Bands in Metals, Semiconductors, and Insulators - Direct and Indirect Semiconductors - Variation of Energy Bands with Alloy Composition -

Charge Carriers in Semiconductors - Electrons and Holes - Electrons and Holes in Quantum Wells - Carrier Concentrations - Fermi Level - Electron and Hole Concentrations at Equilibrium - Temperature Dependence of Carrier Concentrations - Compensation and Space Charge Neutrality - Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility - Drift and Resistance - Effects of Temperature and Doping on Mobility - High field effects - Hall Effect - invariance of Fermi level at equilibrium - Fabrication of p-n junctions, Metal semiconductor junctions.

UNIT III METAL OXIDE SEMICONDUCTOR FET 9

GaAS MESFET - High Electron Mobility Transistor - Short channel Effects - Metal Insulator Semiconductor FET - Basic Operation and Fabrication - Effects of Real Surfaces - Threshold Voltage - MOS capacitance Measurements - current - Voltage Characteristics of MOS Gate Oxides - MOS Field Effect Transistor - Output characteristics - Transfer characteristics - Short channel MOSFET V-I characteristics - Control of Threshold Voltage - Substrate Bias Effects - Sub threshold characteristics - Equivalent Circuit for MOSFET - MOSFET Scaling and Hot Electron Effects - Drain - Induced Barrier Lowering - short channel and Narrow Width Effect - Gate Induced Drain Leakage.

UNIT IV OPTOELCTRONIC DEVICES 9

Photodiodes - Current and Voltage in illuminated Junction - Solar Cells - Photo detectors - Noise and Bandwidth of Photo detectors - Light Emitting Diodes - Light Emitting Materials - Fiber Optic Communications Multilayer Heterojunctions for LEDs - Lasers - Semiconductor lasers - Population Inversion at a Junction Emission Spectra for p-n junction - Basic Semiconductor lasers - Materials for Semiconductor lasers.

UNIT V HIGH FREQUENSY AND HIGH POWER DEVICES 9

Tunnel Diodes, IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode - transferred - electron mechanism, formation and drift of space charge domains, p-n-p-n Diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.

TOTAL= 45 PERIODS

TEXT BOOK

1. Ben. G. Streetman & Sanjan Banerjee, Solid State Electronic Devices, 5th Edition, PHI, 2003.

REFERENCES

1. Donald A. Neaman, Semiconductor Physics and Devices, 3rd Edition, TMH, 2002.
2. Yannis Tsividis, Operation & Mode line of MOS Transistor, 2nd Edition, Oxford University Press, 1999.
3. Nandita Das Gupta & Aamitava Das Gupta, Semiconductor Devices Modeling a Technology, PHI, 2004.
4. D.K. Bhattacharya & Rajinish Sharma, Solid State Electronic Devices, Oxford University Press, 2007.

EC2024 SPEECH PROCESSING L T P C
3 0 0 3

UNIT I MECHANICS OF SPEECH 9

Speech production: Mechanism of speech production, Acoustic phonetics - Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM - Auditory perception: psycho acoustics.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING 9

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH 9

Basic Principles of linear predictive analysis – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm, – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

UNIT V APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING 9

Algorithms: Dynamic time warping, K-means clusering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification – Voice response system – Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP

TOTAL= 45 PERIODS

TEXT BOOK:

1. Thomas F, Quatieri, Discrete-Time Speech Signal Processing, Prentice Hall / Pearson Education, 2004.

REFERENCES:

1. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons Inc., Singapore, 2004
2. L.R.Rabiner and R.W.Schaffer – Digital Processing of Speech signals – Prentice Hall -1979
3. L.R. Rabiner and B. H. Juang, Fundamentals of Speech Recognition, Prentice Hall, 1993.
4. J.R. Deller, J.H.L. Hansen and J.G. Proakis, Discrete Time Processing of Speech Signals, John Wiley, IEEE Press, 1999.

MA2264 NUMERICAL METHODS L T P C
3 1 0 4

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9

Solution of equation –Fixed point iteration: x=g(x) method - Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon method– Iterative method - Gauss-Seidel method - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION 9

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

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

TEXT BOOKS

1. Veerarjan, T and Ramachandran, T. 'Numerical methods with programming in 'C' Second Editiion, Tata McGraw-Hill Publishing.Co.Ltd. (2007).
2. Sankara Rao K, 'Numerical Methods for Scientisits and Engineers' – 3rd editiion Printice Hall of India Private Ltd, New Delhi, (2007).

REFERENCES

1. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata McGraw-Hill, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P.O., "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, New Delhi, 2006.
3. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, 2004

CS2021 MULTICORE PROGRAMMING L T P C
3 0 0 3

UNIT I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES 9

Scalable design principles – Principles of processor design – Instruction Level Parallelism, Thread level parallelism. Parallel computer models –- Symmetric and distributed shared memory architectures – Performance Issues – Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture**.**

UNIT II PARALLEL PROGRAMMING 9

Fundamental concepts – Designing for threads – scheduling - Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT III OPENMP PROGRAMMING 9

OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and livelocks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV MPI PROGRAMMING 9

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V MULTITHREADED APPLICATION DEVELOPMENT 9

Algorithms, program development and performance tuning.

TOTAL= 45 PERIODS

TEXT BOOK

1. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Mcgraw Hill, 2003.

REFERENCES

1. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 1999.

EC2027 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 Controller, Memory and I/O Port Addresses.

TOTAL= 45 PERIODS

TEXTBOOKS:

1. B.B.Brey The Intel Microprocessor 8086/8088 /80186/80188, 80286, 80386, 80486 PENTIUM, PENTIUM Pro, PII, PIII & IV Archietecture, Programming & Interfacing, Pearson Education , 2004.
1. John Paul Shen, Mikko H.Lipasti, “Modern Processor Design”, Tata Mcgraw Hill, 2006.

REFERENCES

1. Douglas V.Hall, “Microprocessors and Interfacing”, Tata McGraw Hill, II Edition 2006
2. Mohamed Rafiquzzaman, “Microprocessors and Microcomputer Based System Design”, II Edition, CRC Press, 2007.

EC2028 INTERNET AND JAVA L T P C
3 0 0 3

UNIT I INTERNETWORKING WITH TCP / IP 9

Review of network technologies, Internet addressing, Address resolution protocols (ARP / RARP), Routing IP datagrams, Reliable stream transport service (TCP) TCP / IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II INTERNET ROUTING 9

Concepts of graph theory, Routing protocols, Distance vector protocols (RIP), Link state protocol (OSPP), Path vector protocols (BGP and IDRP), Routing for high speed multimedia traffic, Multicasting, Resource reservation (RSVP), IP switching.

UNIT III WORLD WIDE WEB 9

HTTP protocol, Web browsers netscape, Internet explorer, Web site and Web page design, HTML, Dynamic HTML, CGI, Java script.

UNIT IV INTRODUCTION TO JAVA 9

The java programming environment, Fundamental Programming structures, Objects and Classes, Inheritance, Event handling, Exceptions and Debugging, Multithreading , RMI.

UNIT V JAVA PROGRAMMING 9

Networking with Java, Swing: Applets and Applications, Menu's & Tool Bars, Java and XML – Creating packages, Interfaces, JAR files & Annotations, Javabeans, JDBC.

TOTAL= 45 PERIODS

TEXTBOOKS

1. Douglas E.Comer, "Internetworking with TCP/IP", Vol. I: 5th edition, Pearson Education, 2007 (Unit – I &II)
2. Robert W.Sebesta, "Programming the worldwide web", 3/e, Pearson Education. (Unit-III), 2007.
3. Steven Holzner et. al, "Java 2 Programming" , Black Book, Dreamtech Press, 2006. (Unit –IV & V)

REFERENCES

1. Cay S.Hortsmann, Gary Cornwell, "Core Java 2", Vol I, Pearson Education, 7/e, 2005.
2. W. Richard Stevens, " TCP/IP Illustrated, The Protocol" , Vol I , Pearson Education, 1st Edition, 2006.
3. Behrouz A. Farouzon , "TCP/IP Protocol Suite, 3rd edition , Tata McGraw Hill, 2007
4. Chris Bates, " Web Programming Building Internet Applications", Wiley Publications.
5. Kogent Solutions Inc., " Java Server Programming", Black Book, Dreamtech Press, 2007 Platinum edition.

EC2029 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 restoration - Lagrange multiplier 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

TEXTBOOKS:

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

EC2030 ADVANCED DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

UNIT I DISCRETE RANDOM PROCESS 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 SPECTRAL 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 cancellors.

UNIT V ADVANCED TRANSFORM TECHNIQUES 9

2-D Discrete Fourier transform and properties– Applications to image smoothing and sharpening – Continuous and Discrete wavelet transforms – Multiresolution Analysis – Application to signal compression.

TOTAL= 45 PERIODS

TEXT BOOKS:

1. Monson H Hayes," Statistical Digital Signal processing and Modeling", Wiley Student Edition, John Wiley and Sons, 2004.
2. R.C. Gonzalez and R.E. Woods, " Digital Image Processing", Pearson, Second Edition, 2004.

REFERENCES:

1. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. Sophocles J. Orfanidis, Optimum Signal Processing, An Introduction, McGraw Hill, 1990.

EC2031 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY L T P C
3 0 0 3

UNIT I BASIC CONCEPTS 9

Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT II EMI MEASUREMENTS 9

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments-Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection t6echnique open area site, shielded anechoic chamber, TEM cell.

UNIT III EMC STANDARD AND REGULATIONS 8

National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT IV EMI CONTROL METHODS AND FIXES 10

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES 9

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

TOTAL= 45 PERIODS

TEXT BOOKS

1. Prasad Kodali.V – Engineering Electromagnetic Compatibility – S.Chand&Co – New Delhi – 2000
2. Clayton R.Paul – Introduction to Electromagnetic compatibility – John Wiley & Sons – 1992

REFERENCES

1. Keiser – Principles of Electromagnetic Compatibility – Artech House – 3rd Edition – 1994
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I - 1985

CS2060 HIGH SPEED NETWORKS LT P C
3 0 0 3

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 8

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 11

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 8

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V PROTOCOLS FOR QOS SUPPORT 9

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL= 45 PERIODS

TEXT BOOK

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland, Pravin Varaiya, "High performance communication networks", Second Edition , Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

EC2033 POWER ELECTRONICS L T P C
3 0 0 3

UNIT I POWER ELECTRONICS DEVICES 9

Characteristics of power devices – characteristics of SCR, diac, triac, SCS, GTO, PUJT – power transistors – power FETs – LASCR – two transistor model of SCR – Protection of thyristors against over voltage – over current, dv/dt and di/dt.

UNIT II TRIGGERING TECHNIQUES 9

Turn on circuits for SCR – triggering with single pulse and train of pulses – synchronizing with supply – triggering with microprocessor – forced commutation – different techniques – series and parallel operations of SCRs.

UNIT III CONTROLLED RECTIFIERS 9

Converters – single phase – three phase – half controlled and fully controlled rectifiers – Waveforms of load voltage and line current under constant load current – effect of transformer leakage inductance – dual converter.

UNIT IV INVERTERS 9

Voltage and current source inverters, resonant, Series inverter, PWM inverter. AC and DC choppers – DC to DC converters – Buck, boost and buck – boost.

UNIT V INDUSTRIAL APPLICATIONS 9

DC motor drives – Induction and synchronous motor drives – switched reluctance and brushless motor drives – Battery charger – SMPS – UPS – induction and dielectric heating.

TOTAL= 45 PERIODS

TEXT BOOKS

1. Muhamed H.Rashid : Power Electronics Circuits, Devices and Applications, 3rd Edition. 2004 PHI.
2. M.D. Singh and K.B. Kanchandani, Power Electronics, 2nd Edition, TMH, 2007.

REFERENCES

1. Sen: Power Electronics, TMH, 1987.
2. Dubey: Thyristorised Power Controllers, Wiley Eastern 1986.
3. Vithayathil: Power Electronics – Principles and Applications, McGraw-Hill, 1995.
4. Lander: Power Electronics, 3rd Edition, McGraw-Hill, 1994.
5. Jacob, Power Electronics, Thomson Learning, 2002.
6. V.R. Moorthy, Power Electronics, Oxford University Press, 2005.

EC2034 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

TEXTBOOKS

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

EC2038 NANO ELECTRONICS L T P C

3 0 0 3

UNIT I INTRODUCTION TO NANOTECHNOLOGY 9

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nanodots – self assembly – dip pen nanolithography. Nanomaterials: preparation – plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS 9

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing

capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts.

Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES 9

Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic propertics – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS 9

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TOTAL= 45 PERIODS

TEXTBOOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002
2. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003

CS2053 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 ARTIFICIAL INTELLIGENCE 10

Introduction, Knowledge Representation – Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity Basic knowledge Representation Issues Knowledge acquisition – Heuristic Search: Techniques for Heuristic search Heuristic Classification - State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and 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 BOOKS:

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. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
3. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
4. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.
6. Amit Konar, “Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain”, CRC Press, 2008.

GE2022 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

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, 3rd 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.

EC2035 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

UNIT I INTRODUCTION 10

OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

UNIT II PUBLIC KEY CRYPTOGRAPHY 10

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION 9

Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest

algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

UNIT IV NETWORK SECURITY 8

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V SYSTEM LEVEL SECURITY 8

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems**.**

TOTAL= 45 PERIODS

TEXT BOOKS

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Pearson Education, Third Edition, 2003.
2. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2007

REFERENCES

1. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003
3. Wade Trappe and Lawrence C. Washington , " Introduction to Cryptography with coding theory" , Pearson Education, 2007.
4. Wenbo Mao, " Modern Cryptography Theory and Practice" , Pearson Education , 2007
5. Thomas Calabrese, "Information Security Intelligence : Cryptographic Principles and Applications", Thomson Delmar Learning,2006.
6. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.

EC2036 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

TEXTBOOK

1. Elements of Information theory – Thomas Cover, Joy Thomas : Wiley 1999

REFERENCE

1. Information theory, inference & learning algorithms – David Mackay year?

EC2037 MULTIMEDIA COMPRESSION AND COMMUNICATION L T P C
3 0 0 3

UNIT I MULTIMEDIA COMPONENTS 9

Introduction - Multimedia skills - Multimedia components and their chacracteristics - 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 Halsall “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

REFERENCES

1. Marcus gonzalves "Voice over IP Networks", Mcgaraw 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
4. Ranjan Parekh, "Principles of Multimedia", TMH 2006

EC2039 PARALLEL AND DISTRIBUTED PROCESSING L T P C
3 0 0 3

UNIT I INTRODUCTION TO PARALLEL PROCESSING AND PARALLEL ARCHITECTURES 9

Need and definition of parallel processing, shared memory multiprocessing, Distributed memory, using parallelism, tools and languages, Parallelism in sequential machines, Multiprocessor architecture, Pipelining, Array processors.

UNIT II SHARED MEMORY PROGRAMMING AND THREAD BASED IMPLEMENTATION 9

Shared Memory Programming and its general model, Process model under UNIX, Thread management, Example with threads, Attributes of Threads, Mutual Exclusion with threads and Thread implementation..

UNIT III DISTRIBUTED COMPUTING – MESSAGE PASSING AND RPC MODEL 9

Message-passing model, General model, programming model, PVM, Remote procedure calls (RPC), Parameter passing, JAVA Remote Method Invocation, Distributed computing environment(DCE), Developing Applications in DCE.

UNIT IV DEBUGGING PARALLEL PROGRAMS AND OTHER PARALLELISM PARADIGMS 9

Debugging Techniques, Debugging Message passing parallel programs and shared memory parallel programs, Dataflow computing, systolic architectures, functional and logic paradigms, distributed shared memory.

UNIT V DISTRIBUTED DATABASES AND DISTRIBUTED OPERATING SYSTEMS 9

Reasons for and objectives of distributed databases, issues and systems, distribution options, concurrency control, DDBMS structure. Need for Distributed operating systems, network operating systems, distributed OS, Goals of DOS and Design issues.

TOTAL= 45 PERIODS

TEXT BOOKS

1. M.Sasikumar, D.Shikhare and P. Ravi Prakash, "Introduction to Parallel processing". PHI 2006.
2. V. Rajaraman, C. Siva Ram Murthy, "Parallel computers: Architecture and programming", PHI 2006.

REFERENCES

1. Harry F. Jordan, Gita Alaghband, “Fundamentals of parallel processing”, PHI 2006.
2. Quinn, M.J., “Designing Efficient Algorithms for Parallel Computers”, McGraw -Hill, 1995.
3. Culler, D.E., “Parallel Computer Architecture”, A Hardware – Software approach, Harcourt Asia Pte. Ltd., 1999

EC2041 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

TEXTBOOKS:

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

GE2071 INTELLECTUAL PROPERTY RIGHTS (IPR) L T P C
3 0 0 3

UNIT I **9**

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property - Immovable Property and - Intellectual Property.

UNIT II **9**

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III **9**

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT) – TRIPS Agreement.

UNIT IV **9**

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V **9**

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Subbaram N.R. “Handbook of Indian Patent Law and Practice “, S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. www.ipmatters.net/features/000707_gibbs.html.

GE2021 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

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 – Risk Benefit Analysis – 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)

EC2042 EMBEDDED AND REAL TIME SYSTEMS L T P C

3 0 0 3

UNIT I INTRODUCTION TO EMBEDDED COMPUTING 9

Complex systems and microprocessors – 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

Hardware and software co-design - Data Compressor - Software Modem – Personal Digital Assistants – Set–Top–Box. – System-on-Silicon – FOSS Tools for embedded system development.

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.

EC2043 WIRELESS NETWORKS L T P C
3 0 0 3

UNIT I MULTIPLE RADIO ACCESS 9

Medium Access Alternatives*:* Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks , Handoff and Roaming Support, Security and Privacy.

UNIT II WIRELESS WANS 9

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000)

UNIT III WIRELESS LANS 9

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT IV ADHOC AND 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 V WIRELESS MANS AND PANS 9

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TOTAL= 45 PERIODS

TEXT BOOKS:

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.

REFERENCES:

1. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks",Pearson Education Asia, 2002.
3. Gary. S. Rogers & John Edwards, “An Introduction to Wireless Technology”, Pearson Education, 2007.
4. Clint Smith, P.E. & Daniel Collins, “3G Wireless Networks”, Tata McGraw Hill, 2nd Ed,. 2007.

EC2044 TELECOMMUNICATION SWITCHING AND NETWORKS L T P C
3 0 0 3

UNIT I MULTIPLEXING 9

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings, SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT II DIGITAL SWITCHING 9

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SS7 signaling.

UNIT III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT 9

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network

Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT IV DIGITAL SUBSCRIBER ACCESS 9

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT V TRAFFIC ANALYSIS 9

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TOTAL= 45 PERIODS

TEXTBOOKS:

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

REFERENCES:

1. R.A.Thomson, "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 Loop Signaling and Transmission Hand book", IEEE Press(Telecomm Handbook Series), 1995.
5. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

EC2045 SATELLITE COMMUNICATION L T P C

3 0 0 3

UNIT I SATELLITE ORBITS 9

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II SPACE SEGMENT AND SATELLITE LINK DESIGN 11

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III SATELLITE ACCESS 10

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Brocast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

UNIT IV EARTH SEGMENT 8

Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT V SATELLITE APPLICATIONS 10

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet

TOTAL= 45 PERIODS

TEXT BOOKS:

1. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006.
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007.

REFERENCES:

1. N.Agarwal, 'Design of Geosynchronous Space Craft, Prentice Hall, 1986.
2. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech House Bostan London, 1997.
3. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.
4. Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book Co., 1984.
5. Robert G. Winch, 'Telecommunication Trans Mission Systems', McGraw-Hill Book Co., 1983.
6. Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.
7. G.B.Bleazard, ' Introducing Satellite communications NCC Publication, 1985.
8. M.Richharia, 'Satellite Communication Systems-Design Principles", Macmillan 2003

EC2046 ADVANCED ELECTRONIC SYSTEM DESIGN L T P C
3 0 0 3

UNIT I INTRODUCTION TO RF DESIGN 9

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of microstrip filter design. Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design(S_{12}=0) – Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT III DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCRs, Design of crowbar and foldback protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT IV DESIGN OF DATA ACQUISITION SYSTEMS 9

Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V DESIGN OF PRINTED CIRCUIT BOARDS 9

Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TOTAL= 45 PERIODS

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, RF Circuit Design – Theory and Applications, Pearson Education, 2000.
2. Sydney Soclof, Applications of Analog Integrated Circuits, Prentice Hall of India, 1990.
3. Walter C.Bosshart, Printed Circuit Boards – Design and Technology, TMH, 1983.

REFERENCES

1. Keith H.Billings, Handbook of Switched Mode Supplies, McGraw-Hill Publishing Co., 1989.
2. Michael Jaacob, Applications and Design with Analog Integrated Circuits, Prentice Hall of India, 1991.
3. Otmar Kigenstein, Switched Mode Power Supplies in Practice, John Wiley and Sons, 1989.
4. Muhammad H.Rashid, Power Electronics – Circuits, Devices and Applications, Prentice Hall of India, 2004.

EC2047 OPTO ELECTRONIC 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 Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS 9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES 9

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR 9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TOTAL= 45 PERIODS

TEXTBOOKS

1. Pallab Bhattacharya “Semiconductor Opto Electronic Devices”, Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, “Opto Electronics – As Introduction to materials and devices”, McGraw-Hill International Edition, 1998

REFERENCES

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India,2005.
2. J. Wilson and J.Haukes, “Opto Electronics – An Introduction”, Prentice Hall, **1995**.

EC2048 TELECOMMUNICATION SYSTEM MODELING AND SIMULATION
L T P C
3 0 0 3

UNIT I SIMULATION METHODOLOGY 9

Introduction, Aspects of methodology, Performance Estimation, Sampling frequency, Low pass equivalent models for bandpass signals, multicarrier signals, Non-linear and time varying systems, Post processing, Basic Graphical techniques and estimations

UNIT II SIMULATION OF RANDOM VARIABLES RANDOM PROCESS 9

Generation of random numbers and sequence, Guassian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

UNIT III MODELING OF COMMUNICATION SYSTEMS 9

Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT IV ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION 9

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT V SIMULATION AND MODELING METHODOLOGY 9

Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

TOTAL= 45 PERIODS

TEXTBOOK

1. MC.Jeruchim, P.Balaban and Sam K Shanmugam, Simulation of communication Systems: Modeling, Methodology and Techniques, Plenum Press, New York, 2001.

REFERENCES

1. Averill.M.Law and W.David Kelton,Simulation Modeling and Analysis, McGraw-Hill Inc., 2000.
2. Geoffrey Gorden, System Simulation, 2nd Edition, Prentice Hall of India, 1992.
3. W.Turin, Performance Analysis of Digital Communication Systems, Computer Science Press, New York, 1990.
4. Jerry banks and John S.Carson, Discrete Event System Simulation, Prentice Hall of India, 1984.
5. William H. Tranter, K. Sam shanmugam, Theodore s. Rappaport, K.Kurt L.Kosbar, Principles of Communication Systems Simulation, Pearson Education (Singapore) Pvt Ltd, 2004.

EC2049 RADAR AND NAVIGATIONAL AIDS L T P C
3 0 0 3

UNIT I 9

Introduction to Radar

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar

The Radar Equation

Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters- System losses – Other Radar Equation Considerations

UNIT II 9

MTI and Pulse Doppler Radar

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

UNIT III **9**

Detection of Signals in Noise –Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –-Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas - Phase Shifters - Frequency-Scan Arrays

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter.

Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV **9**

Introduction - Introduction - Four methods of Navigation .

Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders

Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR - Recent Developments.

Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers - Range and Accuracy of Decca - The Omega System

UNIT V **9**

DME and TACAN - Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment

Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS)

Doppler Navigation - The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems.

Inertial Navigation - Principles of Operation - Navigation Over the Earth - Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems.

Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS)

TOTAL= 45 PERIODS

TEXTBOOKS

1. Merrill I. Skolnik ," Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003.
2. N.S.Nagaraja, Elements of Electronic Navigation Systems, 2nd Edition, TMH, 2000.

REFERENCES

1. Peyton Z. Peebles:, "Radar Principles", Johnwiley, 2004
2. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

EC2050 MOBILE ADHOC NETWORKS L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Introduction to adhoc networks – definition, characteristics features, applications. Charectristics 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 desiging- 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 INTEGRATION OF ADHOC FOR 4G 9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary prespective. Intergration of adhoc with Mobile IP networks.

TOTAL= 45 PERIODS

TEXTBOOKS

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, Mobilead hoc 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 Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.
4. A survey of integrating IP mobility protocols and Mobile Ad hoc networks, Fekri M. Abduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, v 9.no.1 2007
5. V.T.Raisinhani and S.Iyer “Cross layer design optimization in wireless protocol stacks”Comp. communication, vol 27 no. 8, 2004.
6. V.T.Raisinhani and S.Iyer,”ÉCLAIR; An Efficient Cross-Layer Architecture for wireless protocol stacks”,World Wireless cong., San francisco,CA,May 2004.
7. V.Kawadia and P.P.Kumar,”A cautionary perspective on Cross-Layer design,”IEEE Wireless commn., vol 12, no 1,2005.

EC2051 WIRELESS SENSOR NETWORKS L T P C
3 0 0 3

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS 8

Challenges for Wireless 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

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.

EC2052 REMOTE SENSING L T P C
3 0 0 3

UNIT I REMOTE SENSING 9

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation - Planck’s law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface:Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors - Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT V MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system – an introduction.

TOTAL= 45 PERIODS

TEXT BOOKS

1. M.G. Srinivas(Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang,"Introduction to Geograhic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
4. Burrough P A, "Principle of GIS for land resource assessment", Oxford
5. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
6. Singal, "Remote Sensing", Tata McGraw-Hill, New Delhi, 1990.
7. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman and Company 1996.

EC2053 ENGINEERING ACOUSTICS L T P C
3 0 0 3

UNIT I ACOUSTICS WAVES 9

Acoustics waves - Linear wave equation – sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales.

Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source - radiation impedance - Fundamental properties of transducers.

Absorption and attenuation of sound

Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS 9

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass.

Noise, Signal detection, Hearing and speech

Noise, spectrum level and band level – combing band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS: 9

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design.

Environmental Acoustics:

Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION 9

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers.

TOTAL= 45 PERIODS

TEXT BOOK:

1. Lawrence E.Kinsler, Austin, R.Frey, Alan B.Coppens, James V.Sanders, Fundamentals of Acoustics, 4th edition, Wiley, 2000.

REFERENCE:

1. L.Beranek , “Acoustics” - Tata McGraw-Hill

EC2054 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.