Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M. Tech COMMUNICATION SYSTEMS (Full Time)
Curriculum and Syllabus
2013 Regulation

I SEMESTER						
S.No	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**C**
1	MMA130006	Applied Mathematics for Electronic Engineers	3	1	0	4
2	MEC13C001	High Performance Networks	3	0	0	3
3	MEC13C002	Mobile Communication	3	0	0	3
4	MEC13C003	Optical Communication Systems and Networks	3	0	0	3
5	MEC13C004	Advanced Engineering Electromagnetic and Radiating System	3	0	0	3
6	MEC13V001	VLSI Architecture and Design Methodologies	3	1	0	4
7	MEC13CL01	Communication Engineering Laboratory	0	0	3	2
		TOTAL	**18**	**2**	**3**	**22**

II SEMESTER						
S.No	**Subject Code**	**Title of the Subject**	L	T	P	**C**
1	MEC13C005	Communication Network Security	3	0	0	3
2	MEC13V005	Embedded System	3	0	0	3
3	MEC13A001	Advanced Digital Signal Processing	3	0	0	3
4	MEC13C006	Spread Spectrum Communication	3	0	0	3
5	MEC13C007	Satellite Communication Systems	3	0	0	3
6	MEC13CEXX	Elective – I	3	0	0	3
7	MEC13AL02	Term Paper	0	3	0	2
8	MEC13CL02	Cadence & Arm Processor Laboratory	0	0	3	2
		TOTAL	**18**	**3**	**3**	**22**

III SEMESTER						
S.No	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**C**
1	MEC13C008	Electro Magnetic Interference & Compatibility in System Design	3	0	0	3
2	MEC13C009	Soft Computing	3	0	0	3
3	MEC13CEXX	Elective – II	3	0	0	3
4	MEC13CEXX	Elective – III	3	0	0	3
5	MEC13CL03	Project Phase – I	0	0	9	4
		TOTAL	**12**	**0**	**9**	**16**

IV SEMESTER						
S.No	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**C**
1	MEC13CL04	Project Work & Viva Voce	-	-	24	15
		TOTAL	**0**	**0**	**24**	**15**

Total Credits: 75

ELECTIVES						
S.No	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**C**
1	MEC13CE01	MULTIMEDIA COMPRESSION TECHNIQUES	3	0	0	3
2	MEC13A008	NEURAL NETWORKS AND ITS APPLICATIONS	3	0	0	3
3	MEC13CE02	INTERNETWORKING MULTIMEDIA	3	0	0	3
4	MEC13A004	MICROCONTROLLER BASED SYSTEM DESIGN	3	0	0	3
5	MEC13AE04	BIOMEDICAL INSTRUMENTATION	3	0	0	3
6	MEC13AE03	SYNTHESIS AND OPTIMIZATION OF DIGITAL CIRCUITS	3	0	0	3
7	MEC13CE03	SPEECH SIGNAL PROCESSING	3	0	0	3
8	MEC13AE02	MICROWAVE INTEGRATED CIRCUITS	3	0	0	3
9	MEC13A006	COMPUTER ARCHITECTURE AND PARALLEL PROCESSING	3	0	0	3
10	MEC13CE04	SIMULATION OF COMMUNICATION SYSTEMS & NETWORKS.	3	0	0	3
11	MEC13CE11	NETWORK MANAGEMENT	3	0	0	3
12	MEC13CE05	HIGH SPEED SWITCHING ARCHITECTURE	3	0	0	3
13	MEC13CE06	QUANTUM COMPUTING	3	0	0	3

MMA130006 APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS 3 1 0 4

OBJECTIVES

- To enable the students to learn the basic concepts of random process and special functions

UNIT – I ADVANCED MATRIX THEORY 12 Hrs

Generalized Eigen vectors-Jordan canonical form –Matrix Norms-QR algorithm-Pseudo Inverse-Singular value decomposition –Least Square Solutions.

UNIT – II RANDOM PROCESS 12 Hrs

Classification of Random Process-Stationary Process-Ergodic Process-Markov Process –Markov Chains-Auto Correlation –Auto Covariance –Cross Correlation-Cross Covariance-Spectral Density.

UNIT – III SPECIAL FUNCTIONS 12 Hrs

Bessel's Equation-Bessel Functions-Recurrence relations-Generating function-Orthogonal property-Legendre's equation-Legendre Polynomials- Rodrigue's formula.

UNIT – IV CALCULUS OF VARIATIONS 12 Hrs

Variation and its properties-Euler's equations- Functionals dependent on First and Higher Order Derivatives- Functional depend on functions of several independent variables-Problems with moving boundaries-Direct methods-Ritz and Kantorovich methods.

UNIT – V INTEGRAL EQUATIONS 12 Hrs

Types of Integral equations-Fredholm Integral equation-Volteera Integral equation-Green's function- Fredholm Integral equations with Separable kernels- Iterative methods solving equations of second kind- Properties of Symmetric kernels.

Total No. of Hours: 60

REFERENCES:

1. Bronson R., "*Theory and problems of Matrix Operations"* (Schaum's Outline Series), Mc Graw Hill,(1989)
2. Lewis D.W., *"Matrix theory"*, Allied publishers,(1995)
3. Richard Johnson A., *"Miller & Freund's Probability and Statistics for Enginners"*(8th ed.) Prentice Hall of India(2009)
4. Veerarajan T., *"Probability Statistics and Random Process"* , Tata McGraw Hill Publishing Co.,(2008)
5. Venkataraman M.K., " *Higher Mathematics for Engineering and Science"* , The National Publishing Co.,(2006)
6. Gupta A.S., *"Calculus of variations with applications"*, Prentice Hall of India,(2004)
7. Raisinghania M.D., *"Integral Equations and Boundary Value Problems"* (3rd ed), S. Chand & Co., (2010)
8. Hildebrand F.B., *"Methods of Applied Mathematics*" , Dover Books, (1992)

MEC13C001 HIGH PERFORMANCE NETWORKS 3 0 0 3

OBJECTIVES:

- To enable the students to learn the basic concepts of TCP/IP networks and ATM networks

UNIT – I BASICS OF NETWORKS 9 Hrs

Telephone, Computer, Cable Television and Wireless Network, Networking principles, Service integration, Network services and Layered Architecture, Traffic Characterization and QOS. Networks services: Network Elements and Network Mechanisms.

UNIT – II PACKET SWITCHED NETWORKS 9 Hrs

OSI and IP Models: Ethernet (IEEE 802.3): Token Ring (I EEE 802.5), FDDI, DQDB, frame relay: SMDS: Internetworking with SMDS, 802.11 Standards & their deployment

UNIT – III INTERNET AND TCP/IP NETWORKS 9 Hrs

Overview, Internet Protocol: TCP/IP: Performance of TCP/IP Networks-Circuit Switched Networks: SONET; DWDM, Fibre To home, DSL. Intelligent Networks, CATV.

UNIT – IV ATM AND WIRELESS NETWORKS 9 Hrs

Main features – Addressing, Signaling and Routing: ATM Head Restructure – Adaption Layer, Management and Control: BISDN; Internetworking with ATM.

UNIT –V OPTICAL NETWORKS AND SWITCHING 9 Hrs

Optical links – WDM systems, Cross – Connects, Optical LAN's optical paths and networks: TDS and SDS: Modular switch design Packet switching, Distributed, Shared, Input, and output Buffers.

Total No. of Periods: 45

REFERENCES:

1. Jean Warland and Pravin Varaiya, "*High, Performance Communication Networks*", 2nd Edition, Harcourt and Morgan Kauffman, London, 2000.
2. Leon Gracia, Widjaja, "*Communication Networks*", Tata McGraw Hill, New Delhi, 2000.
3. Behrouz.a. Forouzan, "*Data Communication and Networking*", Tata McGraw Hill, New Delhi, 2000.

MEC13C002 MOBILE COMMUNICATION 3 0 0 3

OBJECTIVES:

- To enable the students to learn the basic concepts of mobile communication and multiple access schemes.

UNIT – I INTRODUCTION TO WIRELESS MOBILE COMMUNICATION 9 Hrs

History and evolution of mobile radio systems, Types of mobile wireless services / systems – Cellular, WLL, Paging, Satellite systems, Standards, Future trends in personal wireless systems

UNIT –II CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9 Hrs

Cellular concept and frequency reuse, Multiple Access Schemes, Channel assignment and handoff, interference and system capacity Trunking and Erlang capacity calculations

UNIT –III MOBILE RADIO PROPAGATION 9 Hrs

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and Baseband impulses respond models, parameters of mobile multipath channels and Antenna systems in mobile radio.

UNIT –IV MODULATION AND SIGNAL PROCESSING 9 Hrs

Analog and digital modulation techniques, performance of various modulation techniques – Spectral efficiency, Error – rate, Power Amplification, Equalizing Rake receiver concepts, Diversity and space – time processing, Speech coding and channel coding

UNIT –V SYSTEM EXAMPLES AND DESIGN ISSUES 9 Hrs

Multiple Access Techniques – FDMA, TDMA and CDMA systems, Operational systems, wireless networking, and design issues in personal wireless systems

Total No. of Periods: 45

REFERENCES:

1. Schiller, "*Mobile Communication*", Pearson Education Asia Ltd., 2000
2. W.C.Y.Lee, "*Mobile Communication Engineering: Theory and Application*", Second Edition, McGraw Hill, New York, 1998.
3. T.S. Rappaport," *Wireless Digital Communication, Principles and Pra*ctice", Prentice Hall, NJ, 1996
4. K. Feher, "*Wireless Digital Communication*", PHI, New Delhi, 1995.

MEC13C003 OPTICAL COMMUNICATION SYSTEMS AND NETWORKS 3 0 0 3

OBJECTIVES

- To enable the students to equip with the design issues of fiber optic systems

UNIT –I FIBRE OPTIC GUIDES **9 Hrs**

Light wave generation systems, systems components, optical fibers, SI, GI fiber, modes, Dispersion in fibers, Limitations due to dispersions, fiber loss, non liner effects

UNIT –II OPTICAL TRANSMITTERS AND FIBRES **9 Hrs**

Basic concepts, LED structures spectral distribution, semiconductor lasers, gain coefficients, modes, SLM and STM operation, Transmitter design, Receiver PIN and APD diodes design, noise sensitivity degradation,

UNIT –III LIGHT WAVE SYSTEM **9 Hrs**

Coherent, homodyne and Hetro dyne keying formats, BER in synchronous and Asynchronous, Case Study (Budgets calculations for Optical Communication Networks with simulation studies.)

UNIT –IV AMPLIFIERS **9 Hrs**

Basic concepts, Semiconductor laser amplifiers Raman-and Brillouin-fibre amplifiers, Erbium doped-fibre and amplifiers, pumping phenomenon – Dispersion Compensation – Limitations, post-and pre-compensation techniques, Equalizing filters

UNIT –V COMMUNICATION USING QUANTUM MECHANICS **9 Hrs**

Introduction to Quantum Computing Bits to QU bits. Power of Quantum Computing Mechanics, QU bits single Multiple QU bit gates -Applications of Quantum Computing.

Total No. of Periods: 45

REFERENCES:

1. Franze & Jain, "*Optical Communication, Systems and Components*", Narosa Publication, new Delhi, 2000
2. Gerd.Keiser, "*Optical Fiber Communication, System*", McGraw Hill, New York, 2000
3. G.P Agarwal, "*Fiber Optic Communication System*". 2nd Edition, John Wiley &b Sons, New York, 1997.
4. Franz and Jain, "*Optical Communication System*", Narosa Publications, New Delhi, 1995
5. Vishal Sahni "*Quantum Computing*", Publisher: Tata Mcgraw Hill Education Private Limited (2007)

MEC13C004 ADVANCED ENGINEERING ELECTROMAGNETIC AND RADIATING SYSTEM 3 0 0 3

OBJECTIVES

- **To enable the students to learn the basic concepts of electromagnetism and antenna theory.**

UNIT – I TIME-VARYING AND TIME-HARMONIC ELECTROMAGNETIC FIELDS 9 Hrs

Introduction - Maxwell's Equations - Constitutive Parameters and Relations - Circuit-Field Relations – Boundary Conditions - Power and Energy - Time-Harmonic Electromagnetic Fields.

UNIT – II WAVE EQUATION AND ITS SOLUTION 9 Hrs

Introduction - Time-Varying Electromagnetic Fields - Time-Harmonic Electromagnetic Fields - Solution to the Wave Equation - Wave Propagation and Polarization - Transverse Electromagnetic Modes - Transverse Electromagnetic Modes in Lossy Media – Reflection and Transmission - Normal Incidence—Lossless Media – Oblique Incidence—Lossless Media Auxiliary Vector Potentials, Construction of Solutions, and Radiation and Scattering Equations – The Vector Potential - The Vector Potential -The Vector Potentials.

UNIT – III ELECTROMAGNETIC THEOREMS AND PRINCIPLES 9 Hrs

Introduction - Duality Theorem - Uniqueness Theorem - Image Theory – Reciprocity Theorem Circular Cross-Section Waveguides and Cavities - Introduction - Circular Waveguide - Circular Cavity - Radial Waveguides - Dielectric Waveguides and Resonators Spherical Transmission Lines and Cavities – Introduction - Construction of Solutions - The Spherical Cavity - Green's Function - Green's Functions in Engineering

UNIT – IV ANTENNAS 9 Hrs

Retarded potentials, Dipoles, Monopole and Loop Antennas, Linear and Planar arrays, array synthesis, phased arrays, helical antennas. Field equivalence principle and radiation from apertures, horn and parabolic antennas, Yagi – Uda and log-periodic antennas.

UNIT – V 9 Hrs

Micro strip antennas and arrays, Dielectric Antennas, Antenna Measurements, Radiation pattern, power loss Directivity, Calculations - Antennas for Mobile Communications - Use of Electromagnetic Band Gap (EBG) substrates; semi-smart base station antennas.

References: **Total No. of Hrs: 45**

1. Cheng, "*Advanced Engineering Electromagnetic*" 2nd Edition, Constantine A. Balanis
2. J. D. Kraus, "Antennas", Mc Graw Hill, 1988
3. D.K. Cheng, "*Field and Wave Electrodynamics*", 2nd Ed., Addison-Wesley-Longman, 2000
4. R. E. Colin, "*Antennas and Radio Wave Propagation*", McGraw-Hill, 1985
5. C.A. Balanis, "*Antenna Theory – Analysis and Design"* John Wiley, 1982

MEC13V001 VLSI ARCHITECTURE AND DESIGN METHODOLOGIES 3 1 0 4

OBJECTIVES

- To enable the students to absorb the concepts of different PLDs
- To enable the students to equip with the different ASIC and FPGA Techniques

UNIT- I CMOS DESIGN 12 Hrs

Overview of digital VLSI design Methodologies- Logic design with CMOS-transmission gate circuits-Clocked CMOS-dynamic CMOS circuits, Bi-CMOS circuits- Layout diagram,Stick diagram-IC fabrications – Trends in IC technology.

UNIT- II PROGRAMABLE LOGIC DEVICES 12 Hrs

Programming Techniques-Anti fuse-SRAM-EPROM and EEPROM technology –Re-Programmable Devices Architecture- Function blocks, I/O blocks,Interconnects,Xilinx- XC9500,Cool Runner - XC-4000,XC5200, SPARTAN, Virtex - Altera MAX 7000- Flex 10K-Stratix.

UNIT- III ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING 12 Hrs

System partition – FPGA partitioning – Partitioning methods- floor planning – Placement physical design flow – Global routing – Detailed routing – Special Routing- Circuit Extraction – Drc.

UNIT - IV ANALOG VLSI DESIGN 12 Hrs

Introduction to Analog VLSI- Design of CMOS 2stage-3 stage Op-Amp –High Speed and High Frequency Op-Amps-Super MOS-Analog Primitive Cells-Realization of Neural Networks.

UNIT- V LOGIC SYNTHESIS AND SIMULATION 12 Hrs

Overview Of Digital Design With Verilog HDL, Hierarchical Modelling Concepts, Modules And Port Definitions, Gate Level Modelling, Data Flow Modelling, Behavioural Modelling, Task & Functions, Verilog And Logic Synthesis-Simulation-Design Examples,Ripple Carry Adders, Carry Look Ahead Adders, Multiplier, Alu, Shift Registers, Multiplexer, Comparator, Test Bench.

Total No. of Hrs: 45

REFERENCES:

1. M.J.S Smith, "*Application Specific integrated circuits*", Addison Wesley Longman Inc.1997.
2. Kamran Eshraghian, Douglas A.pucknell and Sholeh Eshraghian, "*Essentials of VLSI circuits and system*", Prentice Hall India, 2005.
3. Wayne Wolf, "Modern *VLSI Designs* "Prentice Hall India, 2006.
4. Mohamed Ismail, Terri Fiez, "*Analog VLSI Signal and information Processing*", McGraw Hill International Editions, 1994.
5. Samir Palnitkar, "*Veri Log HDL, A Design guide to Digital and Synthesis*" 2nd Ed, Pearson, 2005.

MEC13CL01 COMMUNICATION ENGINEERING LABORATORY 0 0 3 2

OBJECTIVES:

- To enable the students to learn the basic concepts of filter design and signal processing applications

1. SIMULATION AND TESTING OF CONVOLUTIONAL CODES (VITERBI)
2. SIMULATION AND TESTING OF SOURCE CODING TECHNIQUES (HUFFMAN, SHANNON – FANO)
3. DIGITAL FILTERS -DESIGN AND REALIZATION (FIR & IIR)
4. BASIC SIGNAL PROCESSING APPLICATIONS USING MATLAB
5. MATLAB IMPLEMENTATION OF DIFFERENT TYPES OF LATTICE FILTERS
6. FIBER-OPTIC LINK DESIGN
7. FIBER-OPTIC COMPONENTS CHARACTERISTICS
8. ANTENNA RADIATION PATTERN MEASUREMENT

MEC13C005 COMMUNICATION NETWORK SECURITY 3 0 0 3

OBJECTIVES

To study the various cryptographic algorithms, firewall and wireless network security concepts

UNIT -I INTRODUCTION ON SECURITY 9 Hrs

Security Goals, Types of Attacks: Passive attack, active attack, attacks on confidentiality, attacks on Integrity and availability. Security services and mechanisms, Techniques: Cryptography, Steganography , Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers.

UNIT- II SYMMETRIC & ASYMMETRIC KEY ALGORITHM 9 Hrs

Data Encryption Standards (DES), Advanced Encryption Standard (AES), RC4, Principle of asymmetric key algorithms, RSA Cryptosystem, **Case Study**: Cracking RSA public key cryptography, Kitaev's version, Message Integrity, Hash functions : SHA, Digital signatures : Digital signature standards.

UNIT -III INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT 9 Hrs

Authentication Entity Authentication: Biometrics, Key management Techniques. Introduction to Quantum Cryptography. BB84, B92 protocols. Introduction to security proofs for these protocols

UNIT- IV NETWORK SECURITY, FIREWALLS AND WEB SECURITY 9 Hrs

Introduction on Firewalls, Types of Firewalls, Firewall Configuration and Limitation of Firewall. IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management. Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature

UNIT- V WIRELESS NETWORK SECURITY 9 Hrs

Security Attack issues specific to Wireless systems: Worm hole, Tunneling, DoS.WEP for Wi-Fi network, Security for 4G networks: Secure Ad hoc Network, Secure Sensor Network

Total No. of Hrs: 45

REFERENCES:

1. Behrouz A. Fouruzan , "*Cryptography and Network security*" Tata McGraw- Hill, 2008
2. William Stallings," *Cryptography and Network security: principles and practice*", 2nd Edition, Prentice Hall of India, New Delhi,2002
3. Atul Kahate , "*Cryptography and Network security*", 2nd Edition, Tata McGraw- Hill, 2008
4. R.K. Nichols and P.C. Lekkas ,""*Wireless Security*", Mc Graw-Hill Professional, New York, NY, USA, 2001
5. H. Yang et al., "*Security in Mobile Ad Hoc Networks: Challenges and Solution*", IEEE Wireless Communications, Feb. 2004.
6. Securing Ad Hoc Networks," *IEEE Network Magazine*", vol. 13, no. 6, pp. 24-30, December 1999.

MEC13V005 EMBEDDED SYSTEMS 3 0 0 3

OBJECTIVES

To enable the students to learn the design issues in microcontrollers and their performance metrics

UNIT – I 68HC11 AND 8051 MICROCONTROLLER 9 Hrs

Embedded Computer systems: - Applications, Software issues, Memory Mapped Architecture, 68HC11 Architecture and Different Addressing Modes, Study of Intel 8051 Microcontroller Architecture and Instruction Set

UNIT – II PIC MICROCONTROLLER 9 Hrs

Programming of PIC Micro Controllers. Architecture of PIC Micro Controllers. Instruction Set of PIC Micro Controllers. Simple Assembly language and C Program for PIC Microcontroller

UNIT – III SOFTWARE DEVELOPMENT 9 Hrs

Software Development: - Quality Programming, Memory Allocation, Self-Documenting Code, Abstraction, Modular Software Development Device Drivers, Threads Recursion

UNIT – IV 9 Hrs

Interfacing method.

Blind Cycle Counting Synchronization, Gadfly Synchronization, Printer Interfacing

Interrupt Synchronization:

Reentrant programming, FIFO Queue, 6811 Interrupts Polled Versus Vectored Interrupts

Timing Generation and Measurements

MC8811 Input Capture, Period Measurements, Output Compare, Square Wave Generation Frequency Measurements.

UNIT – V 9 Hrs

Serial I/O devices: RS232 Specifications, Communication Protocols, MC6811 SCI ad SPI. **Parallel port Interfaces:** Input Switches and Keyboard, output LED, Stepper Motor. **Memory Interfacing:** Address Switching, Memory Interface, examples for MC6H16, Introduction to High speed I/O Interfacing.

References: **Total No. of Periods: 45**

1. Jonathan.W.Valvano, *"Embedded Microcomputer system"*, Brooks/COLE Thomson learning series
2. John B Peatman "*Design with PIC Microcontroller*" Latest Edison.
3. Myke Predko TMH. "*Programming and customizing the Microcontroller*"

MEC13A001 ADVANCED DIGITAL SIGNAL PROCESSING 3 0 0 3

OBJECTIVES

- To enable the students to get the fundamentals of parametric and non-parametric analysis
- To enable the students to design adaptive filters using different methodologies

UNIT – I DISCRETE RANDOM SIGNAL PROCESSING 9 Hrs

Discrete Random Process, Expectation, Variance, Co-Variance, Scalar Product, Energy of Discrete Signal-Parseval's Theorem, Wiener Khintchine Relation-Power Spectral Density –Periodogram – Sample Autocorrelation-Sum Decomposition Theorem, Spectral Factorization Theorem – Discrete Random Signal Processing by Linear Systems-Simulation of White Noise – Low Pass Filtering of White Noise.

UNIT – II SPECTRUM ESTIMATION 9 Hrs

Non-Parametric Methods-Correlation Method – Co-Variance Estimator – Performance Analysis of Estimators – Unbiased, Consistent Estimators – Periodogram Estimator – Barlett Spectrum Estimation – Welch Estimation – Model based Approach – AR, MA, ARMA Signal Modeling – Parameter Estimation using Yule-Walker Method.

UNIT – III LINEAR ESTIMATION AND PREDICTION 9 Hrs

Maximum likelihood criterion-efficiency f estimator – Least mean squared error criterion – Wiener filter – Discrete Wiener Hoff equations – Recursive estimators-Kalman filter – Linear prediction, prediction error-whitening filter, inverse filter – Levinson recursion, Lattice realization, and Levinson recursion algorithm for solving Teoplitz system of equations.

UNIT – IV ADAPTIVE FILTERS 9 Hrs

FIR adaptive filters – Newton's steepest descent method-adaptive filter based on steepest descent method – Widrow Hoff LMS adaptive algorithm – Adaptive channel equalizations – Adaptive echo chancellor – Adaptive noise cancellation – RLS adaptive filters –Exponentially weighted RLS – sliding window RLS – Simplified IIR LMs adaptive filter

UNIT – V MULTI RATE DIGITAL SIGNAL PROCESSING 9 Hrs

Mathematical description of change of sampling rate – Interpolation and Decimation –continuous time model – Direct digital domain approach -Decimation by an integer factor – Interpolation by an integer factor – single and multistage realization - Poly phase realization – Application to sub band coding – Wavelet transform and filter bank implementation of wavelet expansion of signals.

Total No. of Hours: 45

REFERENCES:

1. Monson H. Hayes," *Statistical Digital Signal Processing and Modeling*", John Wiley and Sons, Inc., New York, 1996
1. John G. Proakis, Dimitris G. Manolakis," *Digital Signal Processing*" Prentice Hall of India, 1995.
2. Sopocles J. Orfanidis, "*Optimum Signal Processing*", McGraw Hill, 1990.

MEC13C006 SPREAD SPECTRUM COMMUNICATION 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of spread spectrum systems and their performance metrics

UNIT – I INTRODUCTION: **9 Hrs**

Communication in the presence of pulse noise jamming - Low probability detection scheme - Director Sequence Spread Spectrum (DSSS) and Frequency Hop Spread Spectrum Systems and examples of Spread Spectrum Systems

UNIT – II PERFORMANCE CHARACTERIZATION OF DIGITAL DATA TRANSMISSION 9 Hrs

Detection of binary signals in AWGN - Quadrature multiplexed signalling schemes - Signalling through band limited channels - Equalization of digital data transmission system - Realization imperfections – Degradations in performance.

UNIT – III SPREAD SPECTRUM SYSTEMS: **9 Hrs**

Direct sequence spread spectrum methods employing BPSK, QPSK and MSK - Frequency Hop spread spectrum methods - Coherent slow frequency Hop technique - Non coherent slow and fast frequency Hop spread spectrum techniques - Hybrid DS/FH spread spectrum - Complex envelope representation of spread spectrum systems.

UNIT – IV BINARY SHIFT REGISTER SEQUENCES FOR SPREAD SPECTRUM SYSTEMS: 9 Hrs

Definition - PN sequence generator fundamentals - Maximal length sequences - Properties, Power spectrum and Polynomial tables for maximal length sequences - Gold codes - Rapid Acquisition systems - Non-linear code generators.

UNIT – V SYNCHRONIZATION OF SPREAD SPECTRUM SYSTEMS: **9 Hrs**

Optimal tracking of wideband signals - Early-late tracking loops - Code tracking loops for FHSS - Optimum synchronization techniques - Multiple dwell and sequential detectors - Synchronization using a matched filter - Synchronization by estimating the received spreading code.

Total No of Periods: 45

REFERENCES:

1. Ziemer, R.E & Peterson, R.L., "*Digital Communication and Spread Spectrum Systems*", Mac millan Publishing Co., 1985.
2. Holms, J.K., "*Coherent Spread Spectrum systems*", Wiley Interscience, 1982.
3. Dixon, R.C., "*Spread Spectrum Systems*", Wiley Interscience, 1976.
4. Charles E Cook.,etal, "*Spread-Spectrum Communications*", IEEE Press, Inc, New York,

MEC13C007 SATELLITE COMMUNICATION SYSTEMS 3 0 0 3

OBJECTIVES

- To enable the students to have the in-depth concepts of satellite systems and their services.

UNIT – I ORBITAL ASPECTS: **9 Hrs**

Brief history and current state of Satellite Communications - The Equations of the Orbit - Locating the Satellite in the Orbit - Orbital elements - Look angle - Elevation and Azimuth calculations - Geostationary orbit - Visibility - Orbital perturbations - Orbital effects in Communication system performance.

UNIT – II SPACE CRAFT: **9 Hrs**

Space craft subsystems - Altitude and Orbit Control System - Telemetry, Tracking and Command (TT&C) - Power systems - Description of communication system - Transponder - Implementations - Transmission Impairments - Space Craft Antennas - Equipment reliability.

UNIT – III SATELLITE LINK: **9 Hrs**

Basic Transmission Theory - System noise temperature and G/T ratio - Calculation of system noise temperature - Noise figure - Downlinks and Uplinks - Limits on link performance - Design of Satellite links for specified (C/N) - Rain attenuation model.

UNIT –IV MODULATION AND MULTIPLEXING: **9 Hrs**

Modulation, Encoding and Decoding- Analog Modulation-Analog FM Carriers-Spestral Shaping-Digital Decoding-Error correction encoding-Block wave form encoding-Digital Throughput.

UNIT – V SATELLITE SERVICES: **9 Hrs**

MSAT service, BSAT service, RADARSAT service, SAR SAT service, INTELSAT service, INMART SAT service, VSAT service. Earth Station: Earth station design for Low system noise temperature –Antenna types for satellite communication

Total No. of Hours: 45

REFERENCES:

1. Coolen .M "*Satellite Communication*", IEEE Publication, 1999
2. Ha .W.A, "*Digital Satillite Communications*", PHI, 1999
3. Timothy Pratt and Charles W Boostain, "*Satellite Communications*", John Wiley and Sons, New York, 1986.
4. Wilbur L Pritchard and Joseph A Scuilli, "*Satellite Communication Systems Engineering*", Prentice Hall Inc, Eagle Wood Cliffs, NewJersey, 1986.
5. Emanuel Fthenakis, "*Manual of Satellite Communications*", Mc Graw Hill Book Company, New York, 1984.
6. Robert .M. Gagliardi "Satellite *Communication*" CBS Publishers & Distributers, 1980

MEC13CL02 CADENCE & ARM PROCESSOR LABORATORY 0 0 3 2

OBJECTIVES:

- To enable the students to learn the basic concepts of Cadence and ARM processor tools

A) Cadence

1. Differential Amplifier.
2. Common Source, Common Drain Amplifier.
3. Operational Amplifier.
4. SAR Based ADC
5. R-2R DAC
6. Combinational Circuits (Full Adder, Mux)

B) ARM Processor

1. 7 –Segment LED
2. 4x4 Keyboard Interface
3. Configure and Blink LED's
4. Serial Port Interface.

MEC13C008 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY IN SYSTEM DESIGN

3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of EMI design, measurements and control techniques

UNIT – I EMI ENVIRONMENT **9 Hrs**

Sources of EMI conducted and radiated EMI, Transient EMI, EMI-EMC definitions and units of parameters. EMI Specification / Standards / Limits**:** Units of specification, Civilian standards Military standards.

UNIT – II EMI COUPLING PRINCIPLES **9 Hrs**

Conducted, Radiated and Transient Coupling, Common impedance Ground Coupling, Radiated Common Mode and Ground Loop coupling, Radiated Differential Mode Coupling, Near Field Cable to cable coupling, Power mains and Power supply Coupling.

UNIT – III EMI MEASUREMENTS **9 Hrs**

EMI Test Instruments Systems., EMI Test, EMI shielded Chamber, Open Area Test Site, TEM Cell Antennas, Conductors Sensors / Injectors / Couplers,. Military Test Method and Procedures, Calibration Procedures.

UNIT – IV EMI CONTROL TECHINQUES **9 Hrs**

Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting.

UNIT – V EMI DESIGN OF PCBs **9 Hrs**

Pcb Traces Cross Talk, Impedance Control, Power Distribution Decoupling, Zoning Motherboard Design and Propagation Delay Performance Models.

Total No. of Periods: 45

References:

1. P.Kodali, "*Engineering EMC Principles, Measurements and Technologies*", IEEE Press, 1996.
2. Henry W.Ott, "*Noise Reduction Techniques in Electronic Systems*", John Wiley and Sons, New York, 1988.
3. Bernhard Keiser." *Principles of Electromagnetic compatibility*", Artech House, #rd Ed, 1986.

MEC13C009 SOFT COMPUTING 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of fuzzy algorithms and its applications in neural networks and artificial intelligent systems.

UNIT-I FUZZY SET THEORY 9 Hrs

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 9 Hrs

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

UNIT- III NEURAL NETWORKS 9 Hrs

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

UNIT -IV NEURO FUZZY MODELING 9 Hrs

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 9 Hrs

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

Total No. of periods: 45

Reference books:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "*Neuro-Fuzzy and Soft Computing*", PHI, 2004, Pearson Education 2004.
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.

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UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MEC13CE01 MULTIMEDIA COMPRESSION TECHNIQUES 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of audio, video, image and text compression

UNIT – I INTRODUCTION 9 Hrs

Brief history of data compression applications,Overview of information theory,redundancy.Overview of Human audio,Visual systems,Taxonomy of compression techniques.Overview of source coding,,source models,scalar quantisation theory,rate distribution theory,vector quantisation,structure quanitizers.Evaluation techniques-error analysis and methodologies.

UNIT – II TEXT COMPRESSION 9Hrs

Compact techniques- Huffman coding – arithmetic coding – Shannon Fano Coding and dictionary techniques – LZW family algorithms. Entropy measures of performance – Quality measures.

UNIT – III AUDIO COMPRESSION 9 Hrs

Audio compression techniques-frequency domain and filtering-basic subband coding-application to speech coding-G.722-application to audio coding-MPEG audio,progressive encoding for audio—silence compression,speech compression techniques-Vocoders

UNIT – IV IMAGE COMPRESSION 9 Hrs

Predictive techniques-PCM,DPCM,DM.Contour based compression- quadtrees,EPIC,SPIHT,Transform coding,JPEG,JPEG-2000,JBIG

UNIT – V VIDEO COMPRESSION 9 Hrs

Video signal representation, Video compression techniques-MPEG,Motion estimation technioques-H.261.Overview of Wavelet based compression and DVI technology,Motion video compression,PLV performance,DVI real time compression

Total No of Hrs : 45

REFERENCES:

1. Mark Nelson, "*Data Compression Book*", BPB Publishers, New Delhi, 1998.
2. Sayood Khaleed, "*Introduction to Data Compression"*, Morgan Kauffman, London, 1995.
3. Warkinson, J. "*Compression in Video and Audio"*, Facol press, London. 1995
4. Jan Vozer, "*Video Compression for Multimedia*", AP profes, Newyork, 1995

MEC13A008 NEURAL NETWORKS AND ITS APPLICATIONS 3 0 0 3

OBJECTIVES

- To equip the students with the design of neural networks using various algorithms and their applications

UNIT –I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS 9 Hrs

Neuro – physiology – General Processing Element – ADALINE – LMS learning rule – MADALINE – perception Networks

UNIT – II BPN AND BAM 9 Hrs

Back Propagation Network – Updating of output and hidden layer weights – Application of BPN – Associative memory – Bi-directional Associative Memory - Hop field memory – Traveling sales man problem

UNIT – III SIMULATED ANNEALING AND CPN 9 Hrs

Annealing, Boltzmann machine – Learning – Application – Counter Propagation network – Architecture – Training – Application.

UNIT – IV SOM, ART & NEOCOGNITRON 9 Hrs

Self-organizing map – Learning algorithm – Feature map classifier – Applications – Architecture of Adaptive Resonance theory – Pattern matching in ART network. Neocognitron: Architecture of Neocognitron – Data processing and performance of architecture of Spacio – Temporal networks for speech recognition

UNIT – V CASE STUDY: 9 Hrs

a. Implementation of BPN algorithm in a computer language
b. Application of Neural Networks for Pattern recognition, data comparison
c. Hop field networks for an nbit A/D converter

Total No. of Periods: 45

REFERENCES:

1. J.A. Freeman and B.M. Skapura, "*Neural Networks, Algorithms Applications and Programming Techniques*", Addison-Wesley, 1990.

2. Laurence Fausett, "F*undamentals of Neural Networks: Architecture, Algorithms and Applications*", Prentice Hall, 1994.

MEC13CE02 INTERNETWORKING MULTIMEDIA 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of multimedia systems and their real-time applications

UNIT – I INTRODUCTION **9 Hrs**

Digital sound, video and graphics, basic multimedia networking, multimedia characteristics, evolution of Internet services model, network requirements for audio / video transform, multimedia coding and compression for text, image, audio and video.

UNIT – II SUBNETWORK TECHNOLOGY **9 Hrs**

Broadband services, ATM and IP, IPV6, High speed switching, resource reservation, Buffer management, traffic shaping, caching, scheduling and policing, throughput, delay and jitter performance.

UNIT – III MULTICAST AND TRANSPORT PROTOCOL **9 Hrs**

Multicast over shared media network, multicast routing and addressing, scaping multicast and NBMS networks, Reliable transport protocols, TCP adaptation algorithm, RTP, RTCP.

UNIT – IV MEDIA – ON – DEMAND **9 Hrs**

Storage and media serves, voice and video over IP, MPED – 2 over ATM/IP, indexing synchronization of requests, recording and remote control.

UNIT – V APPLICATION **9 Hrs**

MIME, Peer-to-peer computing, shared application, video conferencing, centralized and distributed virtual reality, lightweight session philosophy.

Total No. of periods: 45

REFERENCES:

1. Tay Vaughan, "*Multimedia Making"* it to Work, 4ed, Tata McGraw Hill, NewDelhi, 2000.
2. B.O. Szuprowicz, "*Multimedia Networking*" McGraw Hill, Newyork, 1995
3. Jon Crow Croft, Mark Handley Ian Wake Man, "*Internetworking Multimedia*", Harcourt Asia Pvt.Ltd,. Singapore

MEC13A004 MICROCONTROLLER BASED SYSTEM DESIGN 3 0 0 3

OBJECTIVES

- To enable the students to design microcontroller based embedded systems
- To enable the students to develop real-time peripheral applications

UNIT – I 8051 MICROCONTROLLER 9 Hrs

Intel 8051 Architecture – Hardware – I/O ports – External Memory – Counters and Timer – Serial data I/O – Interrupts, Assembly language, Addressing Modes, Instruction Set - Simple Programs, 8051 Interfacing to LCD, ADC, DAC and Stepper Motors.

UNIT- II 68HC11 MICROCONTROLLER 9 Hrs

Motorola 68HC11 Architecture – Input / Output Ports – Resets and Self Protection – Interrupt Timing – A/D, D/Converters.

UNIT – III 8096 MICROCONTROLLER 9 Hrs

Intel 8096 CPU Structure, I/O Ports – Register File – Assembly Language – Addressing modes – Instruction set – Simple Programs.

UNIT – IV REAL TIME CONTROL PROGRAMMING 9 Hrs

Interrupt Structure – Programmable Timers – Real Time Clock Latency – Interrupt Density and Interval Consideration, Shared Resources and Critical Regions.

UNIT – V SOFTWARE AND EXPANSION METHODS 9 Hrs

Queues – Table and Strings – Program Organization – State Machines – Key Switch Parsing – Timing Consideration – UART Ports – I/P O/P Serial Ports Programmable Controllers.

Total Number of Hours: 45

References:

1. Kenneth J.Ayala, "*The 8051 Microcontroller Architecture, Programming & Applications*" – Penram International publishing (India), Second Edition, 1996.
2. Muhammed Ali Mazidi, Janice Gillies Pie Mazidi, "*The 8051 Microcontroller and Embedded Systems*"– Pearson EducationAsia.
3. PEATMAN J.B, "*Design with Microcontrollers*" – McGraw Hill Book International Ltd, Singapore, 1989.
4. Intel Manual on 16 – bit *"Embedded controllers*", Santa Clara, 1991.

MEC13AE04 BIOMEDICAL INSTRUMENTATION 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of biomedical instruments and their applications**.**

UNIT – I FUNDAMENTALS OF MEDICAL INSTRUMENTATION 9 Hrs

Anatomy and physiology-Physiological system of the body-Sources of biomedical signals-
Basic medical instrumentation system-Performance requirements of medical instrumentation system-Intelligent medical instrumentation system

UNIT – II BIOMEDICAL RECORDERS 9 Hrs

ECG-VCG-PCG-EEG-EMG-Other biomedical recorders-Biofeedback instrumentation

UNIT – III PHYSIOTHERAPY AND ELECTROTHERAPY EQUIPMENT 9 Hrs

High frequency heat therapy-Short wave diathermy-Microwave Diathermy-Ultrasonic therapy unit-
Pain relief through electrical stimulation-Diaphragm pacing by radiofrequency.

UNIT – IV VENTILATORS 9 Hrs

Mechanics of respiration-Artificial ventilation-Ventilators and its types –Ventilator terms –Classification of ventilators-Humidifiers-Nebulizers-Aspirators.

UNIT – V PATIENT SAFETY 9 Hrs

Electric shock hazards-Leakage currents-Safety codes for Electro medical equipment-Electrical safety analyzer-Testing of biomedical Equipment.

Total No. of Hours: 45

References:

1 KHANDPUR, "*Handbook on Bio-medical Instrumentation*"-Tata McGraw Hill Co Ltd., 1989
2 LESIS CROMWELL FRED, J.WERBELL and ERICH A.PFRAFFER, "*Bio-medical Instrumentation and measurements*"- Prentice Hall of India, 1990.

MEC13AE03 SYNTHESIS AND OPTIMIZATION OF DIGITAL CIRCUITS 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of optimization of digital circuits with various algorithms

UNIT – I CIRCUITS **AND HARDWARE MODELING 9 Hrs**

Design of Microelectronic Circuits - Computer Aided Synthesis and optimization Graph – Optimization problems and algorithms-Combinatorial optimization-Boolean Algebra and Application -Hardware Modeling Languages –Compilation and Behavioral optimization.

UNIT – II ARCHITECTURAL LEVEL SYNTHESIS AND OPTIMIZATION 9 Hrs

Circuit specification for Architectural synthesis -Fundamental Architectural synthesis Problems-Area and performance Estimation-Control unit synthesis-synthesis of pipelined circuits.

UNIT – III SCHEDULING ALGORITHMS AND RESOURCE SHARING 9 Hrs

Unconstrained Scheduling -ASAP Algorithm-ALAP Scheduling Algorithm - Scheduling with Resource Constraints-Scheduling pipelined circuits -Sharing and binding for Dominated circuits -Area Binding- Concurrent Binding –Module selection problems -Structural testability.

UNIT – IV LOGIC-LEVEL SYNTHESIS AND OPTIMIZATION 9 Hrs

Logic optimization Principles-Algorithms and logic Minimization –Encoding problems- Multiple-level optimization of logic networks -Algebraic and Boolean model -Algorithm for delay Evaluation -Rule based logic optimization.

UNIT – V CELL-LIBRARY BINDING AND STATE OF ART IN SYNTNESSIS 9 Hrs

Specific problem and algorithm for library Binding – Structural matching - Boolean matching- concurrent logic optimization and library Binding - production level synthesis systems, Research synthesis systems - System level synthesis, Hardware soft ware co-design.

REFERENCES:

1. Giovanni De Micheli, "*Synthesis and optimization of Digital Circuits*", Tata McGraw -Hill, 2003.
2. John Paul Shen, Mikko H. Lipasti, "*Modern processor Design*", Tata McGraw Hill, 2003

MEC13CE03 SPEECH SIGNAL PROCESSING 3 0 0 3

OBJECTIVES

- To enable the students to get the basics of speech signal processing techniques and their real-time applications.

UNIT- I MECHANICS OF SPEECH 9 Hrs

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 Hrs

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 Hrs

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 Hrs

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 Hrs

Algorithms: Dynamic time warping, K-means clustering 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 No of Hrs: 45

REFERENCES:

1. L. R. Rabiner and R. W. Schaffer, "*Digital Processing of Speech signals*", Prentice Hall, 1978.
2. Ben Gold and Nelson Morgan, "*Speech and Audio Signal Processing*", John Wiley and Sons Inc., Singapore, 2004.
3. Quatieri, "*Discrete-time Speech Signal Processing*", Prentice Hall, 2001.
4. L.R. Rabiner and B. H. Juang, "*Fundamentals of speech recognition*", Prentice Hall, 1993.

MEC13AE02 MICROWAVE INTEGRATED CIRCUITS 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of microwave IC's and their applications

UNIT – I MICROSTRIPS LINES, DESIGN, ANALYSIS 9 Hrs

Introduction, Types of MICs and their technology, Propagation models, Analysis of MIC conformal transformation, Numerical analysis, Hybrid mode analysis. Losses in Micro strip, Introduction to slot line and coplanar wave guide

UNIT – II COUPLED MICROSTRIP, DIRECTIONAL COUPLERS AND LUMPEDELEMENTS FOR MICS 9 Hrs

Introduction to coupled Micro strip, Even and odd mode analysis , Directional couplers, branch line Couplers, Design and Fabrication of Lumped elements for MICs, Comparison with distributed circuits.

UNIT – III NON-RECEPROCAL COMPONENTS ANDACTIVEDEVICES FOR MICS 9 Hrs

Ferromagnetic substrates and inserts, Microstrip circulators, Phase shifters, Microwave transistors, Parametric diodes and Amplifiers, PIN diodes, Transferred electron devices, UIMPATT, BARITT, Avalanche diodes, Microwave transistors circuits

UNIT – IV MICROSTRIP CIRCUI T DESIGN AND APPLICATIONS 9 Hrs

Introduction, Impedance transformers, Filters, High power circuits, Low power circuits, MICs in satellite and Radar

UNIT –V MMIC TECHNOLOGY 9 Hrs

Fabrication process of MMIC, Hybrid MICs, Configuration, Dielectric substances, thick and thin film technology, Testing methods, Encapsulation and mounting of Devices.

Total No. of Periods: 45

REFERENCES:

1. Hoffman R.K. "*Handbook of Microwave integrated circuits*", Artech House, Boston, 1987
2. Gupta .K.C and Amarjit Singh, "*Microwave integrated circuits*" John Wiley, New York, 1975.

MEC13A006 COMPUTER ARCHITECTURE AND PARALLEL PROCESSING 3 0 0 3

OBJECTIVES

- To enable the students to learn the concepts of parallel processing and their performances

UNIT –I THEORY OF PARALLELISM 9 Hrs

Parallel Computer models – the state of computing, Multiprocessors and Multicomputers and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks, Program and network properties – Conditions of parallelism.

UNIT – II PARTITIONING AND SCHEDULING 9 Hrs

Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures, Principles of scalable performance – performance matrices and measures, Parallel processing applications, speedup performance laws, scalability analysis and approaches.

UNIT –III HARDWARE TECHNOLGIES 9 Hrs

Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory – backplane bus systems, cache memory organizations, shared memory organizations, sequential and weak consistency models.

UNIT – IV PIPELINING AND SUPERSCALAR TECHNOLOGIES 9 Hrs

Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures.

UNIT – V SOFTWARE AND PARALLEL PROCESSING 9 Hrs

Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

REFERENCES: Total No of Hrs: 45

1. Kai Hwang "*Advanced Computer Architecture*". McGraw Hill International 2001.
2. Dezso Sima, Terence Fountain, Peter Kacsuk, "*Advanced computer Architecture – A design Space Approach*". Pearson Education, 2003.
3. Carl Homacher, Zvonko Vranesic, Sefwat Zaky, "*Computer Organisation*", 5th Edition, TMH, 2002.
4. David E. Culler, Jaswinder Pal Singh with Anoop Gupta *"Parallel Computer Architecture*" ,Elsevier, 2004.
5. John P. Shen. "*Modern processor design Fundamentals of super scalar processors*", Tata McGraw Hill 2003.
6. Sajjan G. Shiva "*Advanced Computer Architecture*", Taylor & Francis, 2008.
7. V.Rajaraman, C.Siva Ram Murthy, *"Parallel Computers- Architecture and Programming*", Prentice Hall India, 2008.
8. John L. Hennessy, David A. Petterson, "*Computer Architecture: A Quantitative Approach*", 4th Edition, Elsevier, 2007.
9. Harry F. Jordan Gita Alaghaband, "*Fundamentals of Parallel Processing*". Pearson Education, 2003.
10. Richard Y. Kain, "*Advanced computer architecture – A system Design Approach*", PHI, 2003.

MEC13CE04 SIMULATION OF COMMUNICATION SYSTEMS AND NETWORKS 3 0 0 3

OBJECTIVES

- To enable the students to learn the basics of simulation methods of random process and queues.

UNIT – I MODELLING OF COMMUNICAITON 9 Hrs

Model of speech and picture signals, Pseudo noise sequences, Non-Linear sequences, Analog Channel model, Noise and fading, Digital channel model-Gilbert model of bustry channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog and Digital communication systems models, Light wave system models.

UNIT – II SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS 9 Hrs

Univariate and multivariate models, Transformation of random variables, Bounds and approximation, Random process models-Markov AND -ARMA Sequences, Sampling rate for simulation, Computer generation and testing of random numbers

UNIT – III ESTIMATION OF PERFORMACNE MEASURES 9 Hrs

Quality of an estimator, estimator of SNR, Probability density functions of analog communication system, BER of digital communication systems, Montre Carlo method and Importance sampling method, estimation of power spectral density of a process

UNIT – IV COMMUNICATION NETWORKS 9 Hrs

Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I queue, Embedded Markov chain analysis fo TDM Systems, Polling, Random access systems

UNIT – V NETWORK OF QUEUES 9 Hrs

Queues in tandem, store and forward communication networks, capacity allocation, congestion and flow chart, Routing model, Network layout and Reliability

Total No. of Periods: 45

REFERENCES:

1. M.C. Jeuchim, Philip Balaban and K. David Kelton, "*Simulation Modeling and Analysis*", McGraw Hill Inc., New York, 1991
2. A.M.Law and W.David Kelton, "*Simulation Modeling and Analysis*", McGraw Hill Inc., New York, 1991
3. J.F.Hayes, "Modelling *and Analysis of Computer Communication Networks*", Plenum Press, New York, 1984.

MEC13CE11	**NETWORK MANAGEMENT**	**3**	**0**	**0**	**3**

OBJECTIVES

- To enable the students to have the basics of network management techniques and their real-time applications.

UNIT – I FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY **9Hrs**

Network Topology, LAN, Network node components – Hubs, Bridge, Gateways, Switches, WAN, ISDN – Transmission Technology, communication protocols and standards

UNIT –II OSI NETWORK MANAGEMENT **9Hrs**

OSI Network management model – Organizational model – Information model, communication model. Abstract Syntax Notation – Encoding structure, Macros Functional model CMIP / CMIS

UNIT – III INTERNET MANAGEMENT (SNMP) **9Hrs**

SNMP-Organizational model – system Overview, The information mode, communication model- Functional model, SNMP proxy server, Management information, protocol remote monitoring

UNIT – IV BROADBAND NETWORK MANAGEMENT **9 Hrs**

Broadband networks and services, ATM Technology-VP, VC, ATM Packet, Intergrated service, ATMLAN emulation, Virtual LAN. ATM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management

UNIT –V NETWROK MANAGEMENT APPLICATIONS **9 Hrs**

Configuration management, Fault management, performance management, Event Correlation Techniques security Management Service Level Management

Total No. of Periods: 45

REFERENCES:

1. Mani Subramaniyan, "*Network Management Principles and Practice*", Addison Wesly. Newyork 2000
2. Lakshmi G. Raman, "*Fundamentals of Telecommunication Network Management*", Eastern
3. Economy Edition IEEE, Press, New Delhi-1999
4. Salah Aiiarous, Thomas Plevayk, "*Telecommunications Network Management Technologies and Implementations*", eastern Economy Edition IEEE press, New Delhi. 1998

MEC13CE05 HIGH SPEED SWITCHING ARCHITECTURE 3 0 0 3

OBJECTIVES

- To equip the students with the concepts of high speed switching techniques in ATM networks

UNIT –I HIGH SPEED NETWORK **9 Hrs**

Introduction-LAN, WAN, Network evolution through ISDN to B-isdn, Transfer mode and control of B-ISDN, SDH multoplexing structure, ATM standard, ATM Adaption layers

UNIT – II LAN SWITCHING TECHNOLOGY **9 Hrs**

Switching concepts, switch forwarding techniques, switch path control, LAB switching, cut through forwarding, store and forward, virtual LANS

UNIT – III ATM SWITCHING ARCHITECTURE **9 Hrs**

Switch models, blocking networks-basic-and-enhanced banyan networks, sorting networks-merge sorting, re-arranegable networks-full-and-partial connection networks, non-blocking networks-Recursive network construction, comparison of non-blocking network, switches with deflection routing-shuffle switch, tandem banyan

UNIT –IV QUEUES IN ATM SWITCHES **9 Hrs**

Internal Queuing-Input, output and shared queuing multiple queuing networks-combined input, output and shared queuing-performance analysis of Queued Switches

UNIT-V IP SWITCHING **9 Hrs**

Addressing model, IP Switching types-flow driven and topology driven solutions, IP over ATM address and next hop resloution, multicasting, Ipv6 over ATM

Total No. of periods: 45

References:

1. Ranier Handel, Manfred N Huber, Stefan Schrodder, "*ATM Networks- Concepts, Protocols, Applications*", 3rd Edition, Addison Wesley, New York, 1999
2. Achille Pattavina, "*Switching Theory: Architecture and Performance in Broadband ATM Networks*", John Wiley & Sons Ltd., NewYork. 1998
3. Christopher Y Metz, "*Switching Protocols & Architectures*", McGraw Hill Professionals publishing, NewYork.1998

MEC13CE06 QUANTUM COMPUTING 3 0 0 3

OBJECTIVES

- To understand the building blocks of a quantum computer.
- To understand the principles, quantum information and limitation of quantum operations formalizing.
- To understand the various quantum algorithms.

UNIT-I INTRODUCTION 9Hrs

Introduction to Quantum Computing-Power of Quantum Computing-Quantum Information-Quantum Computers. The Wave and the Corpuscular Nature of Light Photon Behavior, State Description, Measurement in Multiple Bases, Superposition States.

UNIT-II QUANTUM MECHANICS 9Hrs

The Superposition Probability Rule-A Photon Coincidence Experiment-Quantum Cryptography-Quantum Mechanics-Hilbert Space-Linear Operators Tensor and Outer Products-Quantum States,Quantum Operators-Spectral Decomposition of a Quantum Operators-Double Silt Experiments.

UNIT-III QUBITS AND QUANTUM GATES 9Hrs

Qubits, Blocks Sphere Representation-Rotation Operation-The Measurement of a Single Qubits-A Pair of Qubits-Qubits-Physical Implementation-Measurement of the Spin- Qubit as Polarized Photon-Entanglement, Exchange of Information-Single Qubit Gates-Two, Three and Multiple Qubit Gates-The Toffoli Gates-Matrix Representation of Quantum Gates and Circuits.

UNIT-IV QUANTUM CIRCUITS 9Hrs

The Non-Cloning Theorem-Full Adder Circuits-Single and Multiple Qubit Controlled Operations-Universal Quantum Gate-State Transformation-Quantum Circuit for the Walsh-Hadamard Transform-Mathematical Models of Quantum Computers.

UNIT-V QUANTUM ALGORITHM 9Hrs

Classes of Quantum Algorithms-Quantum Parallelism-Deutsch's Problem-QFT (Quantum Fourier Transform)-Short's Factoring Algorithm-Simon's Algorithm-Quantum Search Algorithm-Quantum Teleportations-Dense Coding-Quantum Key Distribution-Bell States-Brief Introduction to Quantum Computing Software.

TOTAL NO. OF HRS: 45

REFERENCES:

1. Dan C. Marinesu, Gabriela M. "*Approaching Quantum Computing*", .Marinescu, Pearson Education 2008-09.
2. M.A. Neilson and I.L. Chuang '*Quantum computing and Quantum information'*, Cambridge University Press, 2009.
3. Vishal Sahni "*Introduction to Quantum Computing*"TATA McGraw-Hill Publishing Company Limited.
4. A. Yu. Kitaev, A. H. Shen, M. N. Vyalyi, Amer , *"Classical and Quantum Computation"* ,. Mathematical Society (2002)