REGULATIONS - 2013

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI OF
M.E. – COMMUNICATION SYSTEMS
# REGULATIONS - 2013
## Curriculum and Syllabi of Full Time
### M.E. - COMMUNICATION SYSTEMS

#### SEMESTER I

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<td>CSE3N</td>
<td>Medical Image Processing</td>
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<td>14</td>
<td>CSE3P</td>
<td>Design and Deployment of Wireless Sensor Networks</td>
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<td>CSE3Q</td>
<td>IPTV Technologies</td>
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<td>16</td>
<td>CSE3R</td>
<td>Vehicular Adhoc Networks</td>
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CSC11 APPLIED MATHEMATICS FOR COMMUNICATION ENGINEERS (Common to M.E CS and M.E CC) 

OBJECTIVES:
- To understand the concepts and properties of Bessel’s functions and Fourier-Bessel expansion.
- To enrich the knowledge about matrix decomposition, generalized eigenvectors and Pseudo inverse.
- To acquire the knowledge about properties of moment generating functions and some theoretical distributions.
- To understand the concepts of two dimensional random variables and their joint distributions and to know the methods of correlation and regression.
- To learn the various queuing models and to apply them in practical problems.

UNIT I SPECIAL FUNCTIONS
Bessel’s equation — Bessel function — Recurrence relations — Generating function and orthogonal property for Bessel functions of first kind — Fourier-Bessel expansion.

UNIT II ADVANCED MATRIX THEORY
Eigen-values using QR transformations — Generalized eigen vectors — Canonical forms — Singular value decomposition and applications — Pseudo inverse — Least square approximations.

UNIT III ONE DIMENSIONAL RANDOM VARIABLES
Random variables — Probability function — moments — moment generating functions and their properties — Binomial, Poisson, Uniform, Exponential, Gamma and Normal distributions.

UNIT IV TWO DIMENSIONAL RANDOM VARIABLES
Joint distributions — Marginal and Conditional distributions — Correlation and Regression, Regression Curve for means.

UNIT V QUEUEING MODELS

TUTORIAL: 15 PERIODS

TOTAL: 60 PERIODS

REFERENCES:
CSC12  ADVANCED DIGITAL SIGNAL PROCESSING  L  T  P  C
(Common to M.E CS, M.E CC, M.E HVE and M.E C&I)  3  0  0  3

OBJECTIVES:
• Understand the basic concepts and to apply in discrete random signal processing.
• Estimate the spectrum using parametric methods and non parametric methods.
• Estimation and prediction using wiener FIR & IIR filters.
• Study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
• Apply multirate signal processing fundamentals.

UNIT I  DISCRETE RANDOM SIGNAL PROCESSING  9

UNIT II  SPECTRAL ESTIMATION  9
Estimation of spectra from finite duration signals, Nonparametric methods, Periodogram, Modified periodogram, Bartlett, Welch and Blackman-Tukey methods, Parametric methods, ARMA, AR and MA model based spectral estimation, Yule-Walker equations, Solution using Levinson-Durbin algorithm.

UNIT III  LINEAR ESTIMATION AND PREDICTION  9
Linear prediction, Forward and Backward prediction, Signal modeling, Solution of Prony’s normal equations, Least mean-squared error criterion, Wiener filter for filtering and prediction, FIR and IIR Wiener filters, Discrete Kalman filter.

UNIT IV  ADAPTIVE FILTERS  9

UNIT V  MULTIRATE DIGITAL SIGNAL PROCESSING  9
Up sampling and down sampling, Interpolation and Decimation, Sampling rate conversion by a rational factor, Polyphase filter structures, Multistage implementation of multirate system, Application to subband coding.

TOTAL: 45 PERIODS

REFERENCES:
**CSC13  ADVANCED NETWORK SECURITY**  
(Common to CSE and CS)  
\[ L \quad T \quad P \quad C \quad 3 \quad 0 \quad 0 \quad 3 \]

**OBJECTIVES**
- To know about various network attacks and challenges.
- To study the security algorithms.
- To learn web security and wireless security.

**UNIT I  INTRODUCTION ON SECURITY**  

**UNIT II  SYMMETRIC AND ASYMMETRIC KEY ALGORITHMS**  

**UNIT III  INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT**  

**UNIT IV  NETWORK SECURITY, FIREWALLS AND WEB SECURITY**  

**UNIT V  WIRELESS NETWORK SECURITY**  

**REFERENCES**
CSC14 MODERN DIGITAL COMMUNICATION TECHNIQUES L T P C 3 0 0 3

OBJECTIVES:
- To explore Representation of Signal.
- To study about Coding theory and Modulation.
- To learn about M-ary signaling.

UNIT I CONSTANT ENVELOPE MODULATION 9

UNIT II BLOCK CODED DIGITAL COMMUNICATION 9
Architecture and performance, Binary block codes, Orthogonal, Biorthogonal, Transorthogonal, Shannon’s channel coding theorem, Channel capacity, Coded BPSK and DPSK demodulators, Linear block codes, Hamming, Golay, Cyclic, BCH, Reed - Solomon codes.

UNIT III CONVOLUTIONAL CODED DIGITAL COMMUNICATION 9
Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram, Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods, Error probability performance for BPSK and Viterbi algorithm, Turbo Coding.

UNIT IV PULSE SHAPING AND EQUALIZATION TECHNIQUES 9
Band Limited Channels, ISI, Nyquist Criterion, Controlled ISI, Partial Response signals, Equalization algorithms, Viterbi Algorithm, Linear equalizer, Decision feedback equalization, Adaptive Equalization algorithms.

UNIT V OFDM 9
Generation of sub-carriers using the IFFT, Guard Time and Cyclic Extension, Windowing, OFDM signal processing, Peak Power Problem: PAPR reduction schemes, Clipping, Filtering, Coding and Scrambling.

TOTAL: 45 PERIODS

REFERENCES:
CSC15  OPTICAL COMMUNICATION NETWORKS  L T P C
3 0 0 3

OBJECTIVES:
• To study the Optical network components for Optical Network communication.
• To study various Network architecture and topologies for optical networks.
• To study the issues in the network design and operation for wavelength routing in optical networks.

UNIT I  OPTICAL SYSTEM COMPONENTS  9

UNIT II  OPTICAL NETWORK ARCHITECTURES  9
Introduction to Optical Networks; SONET / SDH, Metropolitan Area Networks, Layered Architecture; Broadcast and Select Networks, Topologies for Broadcast Networks, Media-Access Control Protocols, Test beds 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 Test beds, Architectural variations.

UNIT IV  PACKET SWITCHING AND ACCESS NETWORKS  9

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

REFERENCES:
CSC16 HIGH PERFORMANCE COMPUTER NETWORKS 3 0 0 3

OBJECTIVES:
- To study the OSI and IP models for packet switched networks.
- To study the ISDN and broadband ISDN architecture and protocols.
- To study the ATM backbone and advanced network architecture for high performance communication networks.

UNIT I INTRODUCTION 9

UNIT II MULTIMEDIA NETWORKING APPLICATIONS 9
Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Providing Multiple Classes of Service – Providing Quality of Service Guarantees.

UNIT III ADVANCED NETWORKS CONCEPTS 10

UNIT IV TRAFFIC MODELLING 7

UNIT V NETWORK SECURITY AND MANAGEMENT 10

TOTAL: 45 PERIODS

REFERENCES:
CSC17    COMMUNICATION SYSTEM LABORATORY -I    L  T  P  C
         0  0  4  2

1. Channel equalizer design using MATLAB (LMS, RLS)
2. Transform based compression techniques
3. Design of Adaptive filters
4. Implementation of Polyphase filter structures
5. Performance Evaluation of digital modulation schemes using MATLAB and Lab view
6. Implementation of Linear and Cyclic Codes
7. OFDM transceiver design using MATLAB
8. Performance evaluation of Digital Data Transmission through Fiber Optic Link
9. Fiber optic characterization using OTDR
CSC21 ADVANCED WIRELESS COMMUNICATION  
(Common to M.E CS & M.E CC)  
L T P C  
3 0 0 3

OBJECTIVES:
• To learn the basics of Wireless voice and data communications technologies.
• To build working knowledge on various telephone and satellite networks.
• To study the working principles of wireless LAN and its standards.
• To build knowledge on various Mobile Computing algorithms.
• To build skills in working with Wireless application Protocols to develop mobile content applications.

UNIT I THE WIRELESS CHANNEL  
Overview of wireless systems, Physical modeling for wireless channels, Time and Frequency coherence, Statistical channel models, Fading, Capacity of wireless Channel, Capacity of Flat Fading Channel, Channel Distribution Information known, Channel Side Information at Receiver, Channel Side Information at Transmitter and Receiver.

UNIT II PERFORMANCE OF DIGITAL MODULATION OVER WIRELESS CHANNELS  

UNIT III DIVERSITY  
Realization of Independent Fading Paths, Receiver Diversity, Selection Combining, Threshold Combining, Maximal-Ratio Combining, Equal Gain Combining, Transmitter Diversity, Channel known at Transmitter, Channel unknown at Transmitter, The Alamouti Scheme.

UNIT IV MULTICARRIER MODULATION  
Data Transmission using Multiple Carriers, Multicarrier Modulation with Overlapping Sub channels, Mitigation of Subcarrier Fading, Space-time Multiplexing, Peak to Average Power Ratio- Frequency and Timing offset, Case study IEEE 802.11a.

UNIT V SPREAD SPECTRUM  

TOTAL: 45 PERIODS

REFERENCES:
CSC22  WIRELESS NETWORKS  
(Common to CC & CS)  3 1 0 4

OBJECTIVES:
- To Study about Wireless transmission basics and Protocols.
- To know about Wireless LAN and ATM.
- To understand the Mobile Application Architecture, Messaging and Security.
- To understand the concepts of 4G technologies.

UNIT I  WIRELESS LOCAL AREA NETWORKS  12
Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer - MAC Management Sublayer- Wireless ATM - HIPERLAN- HIPERLAN-2, WiMax

UNIT II  3G OVERVIEW AND 2.5G EVOLUTION  12
Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview- Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III  ADHOC AND SENSOR NETWORKS  12
Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT IV  INTERWORKING BETWEEN WLANS AND 3G WWANS  12
Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution system.

UNIT V  4G AND BEYOND  12
4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

L:45 T:15 TOTAL: 60 PERIODS

REFERENCES:
CSC23  MULTIMEDIA COMPRESSION TECHNIQUES  L T P C
(Common to M.E CS & M.E CC)  3 0 0 3

OBJECTIVES:
- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

UNIT I  INTRODUCTION  9
Special features of Multimedia, Graphics and Image Data Representations, Fundamental Concepts in Video and Digital Audio, Storage requirements for multimedia applications, Need for Compression, Taxonomy of compression techniques, Overview of source coding, source models, scalar and vector quantization theory, Evaluation techniques, Error analysis and methodologies.

UNIT II  TEXT COMPRESSION  9
Compression techniques, Huffman coding, Adaptive Huffman Coding, Arithmetic coding, Shannon-Fano coding, Dictionary techniques, LZW family algorithms

UNIT III  AUDIO COMPRESSION  9
Audio compression techniques - µ- Law and A- Law companding, Frequency domain and filtering, Basic sub-band coding, Application to speech coding, G.722, Application to audio coding, MPEG audio, progressive encoding for audio, silence compression, speech compression techniques, Formant and CELP Vocoders.

UNIT IV  IMAGE COMPRESSION  9

UNIT V  VIDEO COMPRESSION  9
Video compression techniques and standards, MPEG Video Coding I: MPEG - 1 and 2, MPEG Video Coding II: MPEG – 4 and 7, Motion estimation and compensation techniques, H.261 Standard, DVI technology, PLV performance, DVI real time compression, Packet Video.

TOTAL: 45 PERIODS

REFERENCES:
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<tr>
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<tr>
<td>CSC24</td>
<td>COMMUNICATION SYSTEM LABORATORY -II</td>
<td>2</td>
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1. Simulation of Audio and speech compression algorithms
2. Simulation of EZW / SPIHT Image coding algorithm
3. Simulation of Microstrip Antennas
4. S-parameter estimation of Microwave devices
5. Study of Global Positioning System
6. Performance evaluation of simulated CDMA System
7. Design and testing of a Microstrip coupler
8. Characteristics of $\lambda/4$ and $\lambda/2$ transmission lines
9. Antenna Radiation Pattern measurement
10. Design of Digital Receiver in AWGN and Fading channels
CSE2A      ADVANCED RADIATION SYSTEMS   L  T  P  C
            3  0  0  3

OBJECTIVES:
- To study the concepts of radiation from a current element.
- To study Antenna arrays.
- To study various antenna synthesis methods.
- To study horn, microstrip, reflector antennas and various types of antennas.

UNIT I      ANTENNA FUNDAMENTALS  9
Antenna fundamental parameters, Radiation integrals, Radiation from surface and line current
distributions, dipole, monopole, loop antenna; Mobile phone antenna, base station, hand set antenna;
Image, Induction, reciprocity theorem, Broadband antennas and matching techniques, Balance to
unbalance transformer, Introduction to numerical techniques.

UNIT II     RADIATION FROM APERTURES  9
Field equivalence principle, Radiation from Rectangular and Circular apertures, Uniform aperture
distribution on an infinite ground plane; Slot antenna; Horn antenna; Reflector antenna, aperture
blockage, and design consideration.

UNIT III    ARRAY ANTENNA      9
Linear array, uniform array, end fire and broad side array, gain, beam width, side lobe level; Two
dimensional uniform array; Phased array, beam scanning, grating lobe, feed network, Linear array
synthesis techniques, Binomial and Chebyshev distributions.

UNIT IV     MICRO STRIP ANTENNA  9
Radiation Mechanism from patch; Excitation techniques; Microstrip dipole; Rectangular patch,
Circular patch, and Ring antenna, radiation analysis from cavity model; input impedance of
rectangular and circular patch antenna; Microstrip array and feed network; Application of microstrip
array antenna.

UNIT V      EMI/EMC AND ANTENNA MEASUREMENTS  9
Concept of EMI/EMC; Rx and Tx antenna factors; Log periodic dipole, Biconical, Ridge guide, Multi
turn loop; Antenna measurement and instrumentation, Gain, Impedance and antenna factor
measurement; Antenna test range Design.

TOTAL: 45 PERIODS

REFERENCES:
   science, 2005.
CSE2B DSP ARCHITECTURE AND PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:
- To study DSP system design & CMOS technologies, DFT & FFT computation.
- To study the digital filters and finite word length.
- To introduce the architecture of synthesis of DSP.

UNIT I FUNDAMENTALS OF PROGRAMMABLE DSP 9
Basic Architectural features-DSP computation building blocks-Bus architecture-Data Addressing Capabilities-Address generation unit-Speed issues-Features for external interfacing-Basic DSP algorithms-Q Notation-FIR filters-Interpolation Filters-Decimation Filters-Adaptive filters-2D Signal Processing.

UNIT II TMS 320C6474 MULTICORE DIGITAL SIGNAL PROCESSOR 9
Functional Block Diagram-Device overview-Device configuration-System interconnect-C64x’ mega module-Peripherals-Mapping an Application to a Multicore Processor-Interprocess Communication-Data transfer Engines-DSP code and Data images-Memory Management-Simple Programs using TMS 320C6474.

UNIT III OMAP FAMILY DSP PROCESSORS 9
OMAP 35x Family Introduction-Memory mapping-MPU subsystem-Power and clock management -Interprocessor communication-DMA-Interrupt Controller-Memory subsystem-Timers-Display subsystem—Serial interfaces like UART, USB, Multichannel buffered serial port-MMC/SD Card interface-Simple programs using OMAP 3530.

UNIT IV SHARC PROCESSOR 9
ADSP 21363 Family core architecture: Independent parallel computation unit, Data register file, Instruction cache, Data address generators-Memory and I/O interface features: On chip memory, DMA controller, serial ports, Digital audio interface, Parallel port, PWM, Timers, Development tools.

UNIT V BLACKFIN PROCESSOR 9
ADSP - BF534 Processor block diagram - Memory architecture - DMA support - System interrupts -External bus interface - Ethernet MAC-CAN module - SPORT controller – Timers - RTC Simple programs.

TOTAL: 45 PERIODS

REFERENCES:
CSE2C       OPTICAL FIBER COMMUNICATION AND NETWORKING  L T P C  3 0 0 3
(Common to M.E CS and M.E CC)

OBJECTIVES:
• To study the Optical network components for Optical Network communication.
• To study various Network architecture and topologies for optical networks.
• To study the issues in the network design and operation for wavelength routing in optical networks.

UNIT I   FIBER OPTIC WAVE GUIDES  9
Light wave generation systems, system components, optical fibers, SI, GI, fibers, modes, Dispersion in fibers, limitations due to dispersion, Fiber loss, non linear effects. Dispersion shifted and Dispersion flattened fibers.

UNIT II  OPTICAL TRANSCEIVER  9
Basic concepts, LED’s structure, spectral distribution, semiconductor lasers, gain coefficients, modes, SLM and STM operation, Transmitter design, Receiver PIN and APD diodes design, noise sensitivity and degradation, Receiver amplifier design, Basic concepts of Semiconductor Optical amplifiers and EDFA operation.

UNIT III LIGHT WAVE SYSTEM  9
Coherent, homodyne and heterodyne keying formats, BER in synchronous and asynchronous receivers, Multichannel, WDM, multiple access networks, WDM components, TDM, Subcarrier and Code division multiplexing.

UNIT IV  DISPERSION COMPENSATION  9
Limitations, Post and Pre compensation techniques, Equalizing filters, fiber based gratings, Broadband compensation, Soliton communication system, fiber Soliton, Soliton based communication system design, High capacity and WDM Soliton system.

UNIT V   PRINCIPLES OF OPTICAL NETWORKS  9
First and second generation optical networks: system network evaluation. SONET / SDH, MAN layered architecture broadcast and select networks MAC protocols, test beds, wavelength routing networks.

TOTAL: 45 PERIODS

REFERENCES:
CSE2D                                 ADHOC NETWORKS                                             L T P C
(Common to CSE, CS and CC)                                                                  3 0 0 3

OBJECTIVES

• To learn the MAC address spoofing concepts and basics of networks.
• To learn the routing principles and Adhoc network types.
• To learn the IEEE standards, MESH networks and its heterogeneous models.

UNIT I         ADHOC MAC              9
MAC protocols – Multi channel MAC and Power control MAC protocol.

UNIT II        ADHOC NETWORK ROUTING AND TCP                       9
Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing –
Classifications, Tree based, Mesh based. Adhoc Transport Layer Issues. TCP Over Adhoc – Feedback
based, TCP with explicit link, TCP-BuS, Adhoc TCP, and Split TCP.

UNIT III       WSN - MAC              9
Self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IV        WSN ROUTING, LOCALIZATION AND QoS                     9
Issues in WSN routing – OLSR, AODV, DSR, DSDV. Localization – Indoor and Sensor Network
Localization. QoS in WSN.

UNIT V         MESH NETWORKS
Necessity for Mesh Networks – MAC enhancements – IEEE 802.11’s Architecture – Opportunistic
routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous
Mesh Networks – Vehicular Mesh Networks.

TOTAL: 45

REFERENCES

6. Azzedine Boukerche, “Handbook of algorithms for wireless Networking and Mobile
CSE2E   WAVELETS AND MULTIRESOLUTION ANALYSIS   L T P C
(23)
(Common to M.E CS and M.E CSE)
3 0 0 3

OBJECTIVES:
- To study the mathematical background for the wavelets.
- To study the Multiresolution Analysis.
- To study the Continuous and Discrete wavelet transforms.

UNIT I  INTRODUCTION  9
Vector Spaces, properties, dot product, basis, dimension, orthogonality and orthonormality, relationship between vectors and signals, Signal spaces, concept of Convergence, Hilbert spaces for energy signals, Generalized Fourier Expansion.

UNIT II  CONTINUOUS WAVELET TRANSFORMS  9
Wavelet Transform, definition and properties, concept of scale and its relation with frequency, Continuous Wavelet Transform (CWT), Scaling function and wavelet functions (Daubechies, Coiflet, Mexican Hat, Sinc, Gaussian, Bi-Orthogonal), Tiling of time scale plane for CWT.

UNIT III  MULTI RESOLUTION ANALYSIS  9
Definition of Multi Resolution Analysis (MRA), Haar basis, Construction of general ortho normal MRA, Wavelet basis for MRA, Continuous time MRA interpretation for the DTWT, Discrete time MRA, Basis functions for the DTWT, PRQMF filter banks.

UNIT IV  DISCRETE WAVELET TRANSFORMS  9
Filter Bank and sub band coding principles, Wavelet Filters, Inverse DWT computation by Filter banks, Basic Properties of Filter coefficients, Choice of wavelet function coefficients, Derivations of Daubechies Wavelets, Mallat's algorithm for DWT, Multiband Wavelet transforms.

UNIT V  APPLICATIONS  9

REFERENCES

TOTAL: 45 PERIODS
CSE2F    SOFT COMPUTING                                   L T P C
(Common to CSE, CS and CC)  3 0 0 3

OBJECTIVES

• To understand the concept of soft computing.
• To learn fuzzy logic concepts.
• To learn the different classifications of neural networks.
• To study the concepts of Genetic algorithm and its applications.

UNIT I  SOFTCOMPUTING AND CONVENTIONAL AI                              9
Evolution of Computing – Soft Computing Constituents – From Conventional AI to Computational
Intelligence – Derivative based optimization: Descent Methods, Newton’s method – Step size
determination – Derivative free optimization.

UNIT II  FUZZY SYSTEMS                         9
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions – Fuzzy Rules and

UNIT III  ARTIFICIAL NEURAL NETWORKS                      9
Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised
Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning –
Unsupervised Learning Neural Networks.

UNIT IV  NEURO - FUZZY MODELING                       9
Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and
Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – ANFIS
Applications.

UNIT V  GENETIC ALGORITHMS                        9
Evolutionary Computation – Genetic Algorithms – Terminologies and Operators of GA –
Classification of GA: Simple GA, Parallel and Distributed GA, Adaptive GA – Ant Colony
Optimization – Particle Swarm Optimization – Application of GA: Machine Learning, Image
Processing, Data Mining and Wireless networks.

TOTAL: 45

REFERENCES

   2008.
5. S.N.Sivanandam, S.Sumathi and S.N.Deepa, “Introduction to Fuzzy Logic using MATLAB”, 1st
6. James A.Freeman and David M.Skapura, “Neural Networks Algorithms, Applications, and
CSE2G  DIGITAL COMMUNICATION RECEIVERS  L T P C
3 0 0 3

OBJECTIVES:
• To review the digital communication techniques for the optimum receiver design for AWGN channels and Fading channels.
• To study the synchronization techniques and adaptive equalization techniques in the receiver design.

UNIT I  DEMODULATION  9
Gaussian basics, Hypothesis testing basics, Signal space concepts - Geometrical representation of signals, Receiver structure and sufficient statistics, Decision region, Optimal reception in AWGN, Performance analysis of ML reception, Link budget analysis.

UNIT II  SYNCHRONIZATION  9
Receiver design requirements, Parameter estimation basics, Parameter estimation for synchronization, Carrier phase estimation, Symbol timing estimation, Joint carrier phase and symbol timing estimation.

UNIT III  PARAMETER SYNCHRONIZATION FOR FADING CHANNELS  9
Data aided and non data aided flat fading channel estimation and detection, Data aided and non data aided selective fading channel estimation and detection

UNIT IV  RECEIVER STRUCTURE FOR FADING CHANNELS  9
Outer and inner receiver for fading channels, Inner receiver for frequency selective and flat fading channels, Rake receivers, Non-coherent communication – Hypothesis testing, Optimal demodulation, Differential modulation and demodulation, Performance.

UNIT V  CHANNEL EQUALIZATION  9
The channel model, Receiver front end, Eye Diagrams, Maximum likelihood sequence estimation, Geometrical model for suboptimal equalizer design, Linear equalization, Decision feedback equalization, Performance analysis of MLSE, Adaptive equalization.

TOTAL: 45 PERIODS

REFERENCES:
CSE2H ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY TECHNIQUES

OBJECTIVES:
• To study the EMI Environment and its coupling principles.
• To study the EMI / EMC standards and measurements for the test procedures.
• To design the PCBs with EMC compliance.

UNIT I EMI/EMC CONCEPTS
EMI-EMC definitions and Units of parameters, Sources and victim of EMI, Conducted and Radiated EMI Emission and Susceptibility, Transient EMI, ESD, Radiation Hazards.

UNIT II EMI COUPLING PRINCIPLES
Conducted, radiated and transient coupling, Common ground impedance coupling, Common mode and ground loop coupling, Differential mode coupling, near field cable to cable coupling, cross talk, Field to cable coupling, Power mains and Power supply coupling.

UNIT III EMI CONTROL TECHNIQUES
Shielding, Filtering, Grounding, Bonding, Isolation transformer, Transient suppressors, Cable routing, Signal control.

UNIT IV EMC DESIGN OF PCBs
Component selection and mounting, PCB trace impedance, Routing, Cross talk control, Power distribution decoupling, Zoning, Grounding, VIAs connection, Terminations.

UNIT V EMI MEASUREMENTS
Open area test site, TEM cell, EMI test shielded chamber and shielded ferrite lined anechoic chamber, Tx /Rx Antennas, Sensors, Injectors / Couplers, and coupling factors, EMI Rx and spectrum analyzer.

TOTAL: 45 PERIODS

REFERENCES:
CSE2J  GLOBAL POSITIONING SYSTEMS  L T P C
3 0 0 3

OBJECTIVES:
• To study the History of GPS and its various segments.
• To Study the co-ordinate system for the GPS systems.
• To study the navigational aids and signal processing for GPS systems.
• To Study the propagation media for the GPS.
• To learn the Inter disciplinary applications for GPS.

UNIT I  HISTORY OF GPS  9
History of GPS, BC-4 System, HIRAN, NNSS, NAVSTAR GLONASS and GNSS Systems, GPS Constellation, Space Segment, Control Segment, User Segment, Single and Dual Frequency, Point Relative, Differential GPS, Static and Kinematic Positioning, 2D and 3D, reporting Anti Spoofing (AS); Selective Availability (SA), DOP Factors.

UNIT II  COORDINATE SYSTEMS  9

UNIT III  C/A CODE  9
C/A code; P-code; Y-code; L1, L2 Carrier frequencies, Code Pseudo Ranges, Carrier Phases, Pseudo Ranges, Satellite Signal Signature, Navigation Messages and Formats, Undifferenced and Differenced Range Models, Delta Ranges, Signal Processing and Processing Techniques, Tracking Networks, Ephemerides, Data Combination: Narrow Lane; Wide Lane, OTF Ambiguity.

UNIT IV  PROPAGATION MEDIA  9

UNIT V  INTER DISCIPLINARY APPLICATIONS  9
Inter Disciplinary Applications, Crystal Dynamics, Gravity Field Mapping, Atmospheric Occulation, Surveying, Geophysics, Air borne GPS, Ground Transportation, Space borne GPS Metrological and Climate Research using GPS.

TOTAL: 45 PERIODS

REFERENCES:
CSE2K    SPEECH SIGNAL PROCESSING    L  T  P  C
(Common to M.E CS and M.E CC)    3  0  0  3

OBJECTIVES:
• To study the fundamental mechanics of speech production and the nature of the speech signals.
• To study the time domain and frequency domain methods for speech processing.
• To study the Predictive analysis of speech and the algorithm for estimation and detection.

UNIT I    MECHANICS OF SPEECH
Speech production mechanism, Nature of Speech signal, Discrete time modeling of Speech production, Representation of Speech signals, Classification of Speech sounds, Phones, Phonemes, Phonetic and Phonemic alphabets, Articulatory features. Music production, auditory perception, Anatomical pathways from the ear to the perception of sound, peripheral auditory system, Psycho acoustics.

UNIT II    TIME DOMAIN METHODS FOR SPEECH PROCESSING
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

UNIT IV    LINEAR PREDICTIVE ANALYSIS OF SPEECH
Formulation of Linear Prediction problem in Time Domain, Basic Principle, Auto correlation method, Covariance method, Solution of LPC equations, Cholesky method, Durbin’s Recursive algorithm, lattice formation and solutions, Comparison of different methods, Application of LPC parameters, Pitch detection using LPC parameters, Formant analysis, VELP, CELP.

UNIT V    APPLICATION OF SPEECH SIGNAL PROCESSING

TOTAL: 45 PERIODS

REFERENCES:
CSE2L  ADVANCED MICROPROCESSORS AND MICROCONTROLLERS  L T P C
3 0 0 3

OBJECTIVES:

- To introduce the architecture and programming of various 16 bit microprocessors and microcontrollers.
- To introduce the concepts and architecture of RISC processor and ARM processors.
- To study Motorola 68HC11 Microcontrollers and PIC Micro Controller architecture and programming

UNIT I  MICROPROCESSOR ARCHITECTURE  9

UNIT II  HIGH PERFORMANCE RISC ARCHITECTURE – ARM  9
Organization of CPU – Bus architecture –Memory management unit: virtual memory to physical memory address translation, TLB, Domains and memory access permission, cache and write buffer, single stage and two stage cache accessing, significance of coprocessor 15 Fast Context Switch Extension - ARM instruction set-addressing modes – Programming.

UNIT III  MOTOROLA 68HC11 MICROCONTROLLERS  9
Organization of CPU- Architecture -Block diagram -Instruction set -addressing modes operating modes-I/O Ports-Registers structures- Interrupt system- RTC-Serial Communication Interface – A/D Converter- PWM and UART.

UNIT IV  MSP430 MICRO CONTROLLERS  9
MSP430 RISC CPU architecture, Compiler-friendly features, Instruction set, Clock system, Memory subsystem. Key differentiating factors between different MSP430 families. Digital I/O - I/O ports programming using C and assembly, Understanding the multiplexing scheme of the MSP430 pins.

UNIT V  MSP430 ON CHIP PERIPHERALS AND INTERFACING  9
On-chip peripherals. Watchdog Timer, Comparator, Op-Amp, Basic Timer, Real Time Clock (RTC), ADC, DAC, SD16, LCD, DMA. Using the Low-power features of MSP430. Clock system; low-power modes, Clock request feature, Low-power programming and Interrupt. Interfacing LED, LCD, External memory. Seven segment LED modules interfacing. Example - Real-time clock.

TOTAL: 45 PERIODS

REFERENCES:
CSE2M  LOW POWER VLSI DESIGN  L T P C
3 0 0 3

OBJECTIVES:
• To learn principles of design, analysis, modeling and optimization of Low Power VLSI.
• To study the approaches for power consumption estimation and different methods to reduce the power consumption, low power architectures and algorithmic level analysis for low power optimization.

UNIT I  POWER DISSIPATION IN CMOS  9
Hierarchy of limits of power, Sources of power consumption, Physics of power dissipation in CMOS FET devices, Basic principle of low power design.

UNIT II  POWER OPTIMIZATION  9
Logic level power optimization, Circuit level low power design, circuit techniques for reducing power consumption in adders and multipliers.

UNIT III  DESIGN OF LOW POWER CMOS CIRCUITS  9
Computer arithmetic techniques for low power system, reducing power consumption in memories, low power clock, Inter connect and layout design, advanced techniques, Special techniques.

UNIT IV  POWER ESTIMATION  9
Power Estimation technique, logic power estimation, Simulation power analysis, Probabilistic power analysis.

UNIT V  SYNTHESIS AND SOFTWARE DESIGN FOR LOW POWER  9
Synthesis for low power, Behavioral level transforms, software design for low power.

TOTAL: 45 PERIODS

REFERENCES:
CSE2N  SATELLITE COMMUNICATION  L T P C  3 0 0 3

OBJECTIVES:
- To study the orbital mechanics and space craft sub systems and earth station.
- To study space links for the satellite link design.
- To study the various multiple access techniques and network aspects for Space services and applications.

UNIT I  ELEMENTS OF SATELLITE COMMUNICATION  8

UNIT II  TRANSMISSION, MULTIPLEXING, MODULATION, MULTIPLE ACCESS AND CODING  12
Different modulation, coding and Multiplexing Schemes, Multiple Access Techniques – FDMA, TDMA, CDMA, and DAMA.

UNIT III  SATELLITE LINK DESIGN  9
Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse.

UNIT IV  SATELLITE NAVIGATION AND GLOBAL POSITIONING SYSTEM  8
Radio and Satellite Navigation, GPS Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Receiver Operation and Differential GPS

UNIT V  APPLICATIONS  8

TOTAL: 45 PERIODS

REFERENCES:
CSE2P MICROWAVE INTEGRATED CIRCUITS

OBJECTIVES:
- To study the Microstrip lines and its field analysis.
- To study the waveguide systems using the equivalent circuit theory concepts.
- To study the design and analysis of microwave solid state amplifiers
- To learn integrated antennas and measurement techniques

UNIT I INTRODUCTION TO MICROWAVE INTEGRATED CIRCUITS 7
MMIC- technology, advantages and applications, Active device technologies, design approaches, multichip module technology, substrates.

UNIT II PASSIVE COMPONENTS 10
Inductors, capacitors, resistors, microstrip components, coplanar circuits, multilayer techniques, micro machined passive components, switches & attenuators, filter design.

UNIT III AMPLIFIERS 10
Stability & gain analysis, matching techniques, reactively matched amplifier design, LNA

UNIT IV OSCILLATORS 9
Design principles, active device CAD techniques for large signal oscillators design, phase noise, MMIC VCO, mixers.

UNIT V INTEGRATED ANTENNAS AND MEASUREMENT TECHNIQUES 9
Integrated antenna selection, photonic band gap antennas, micro machined antenna, micro electro mechanical system antennas, test fixture measurements, probe station measurements, thermal and cryogenic measurements, experimental field probing techniques.

TOTAL: 45 PERIODS

REFERENCES:
CSE2Q  DIGITAL IMAGE PROCESSING  L T P C
                                             3 0 0 3

OBJECTIVES:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement and restoration techniques.
- To study the image segmentation and recognition techniques.
- To study the image compression procedures.

UNIT I  DIGITAL IMAGE FUNDAMENTALS  9
Elements of digital image processing systems, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries, Basic Principles of Tomography, Tomography Projection, Image Reconstruction, Radon Transform, Central Slice Theorem.

UNIT II  IMAGE TRANSFORMS  9
1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.

UNIT III  IMAGE ENHANCEMENT AND RESTORATION  9

UNIT IV  IMAGE SEGMENTATION AND RECOGNITION  9
Image segmentation, Edge detection, Edge linking and boundary detection, Region growing, Region splitting and Merging, Image Recognition, Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation, Neural networks, Back propagation network and training, Neural network to recognize shapes.

UNIT V  IMAGE REGISTRATION AND VISUALIZATION  9
Notation and terminology in Image Registration, Classification of Image Registration techniques, Types of Transformation, Non Rigid Registration - Registration Using Basis Functions -Registration Using Splines -Thin-Plate Splines – B-Splines -Elastic Registration - Fluid Registration - Role of Registration in Clinical Applications and Remote Sensing - Image Registration in Nuclear Medicine. Image visualization - Rigid body visualization - 2D display methods, 3D display methods, Virtual Reality based interactive visualization.

TOTAL: 45 PERIODS

REFERENCES:
CSE3A                                EMBEDDED SYSTEMS                         L    T    P    C
(            3  0  0  3
(Common to M.E CS, M.E CSE and M.E CC)

OBJECTIVES:
• To study the Embedded processor and its architecture.
• To study the Real-time characteristics and its system design techniques.

UNIT I       EMBEDDED SYSTEM BASICS          9
Embedded Computers, Characteristics of Embedded Computing Applications, and Challenges in Embedded Computing system design, Embedded system design process, Overview of embedded system development-embedded system IDE- ARM Family-Core Types,-Memory Mapping-and ARM Based embedded development system.

UNIT II      ARM ARCHITECTURE               9
Organization of CPU – Bus architecture –Memory management unit: virtual memory to physical memory address translation, TLB, Domains and memory access permission ,cache and write buffer, single stage and two stage cache accessing, significance of co-processor 15 Fast Context Switch Extension.

UNIT III    EMBEDDED PROGRAMMING AND COMPUTING PLATFORM      9
Embedded software development based on ARM including: ARM basic instruction set, Thumb instruction set- assembly programming- ARM processor mode switching-embedded C programming- C and assembly language mix programming.

UNIT IV      ARM BASIC PERIPHERAL INTERFACING       9
I/O interface concepts-interrupts-types of interrupts-ARM interrupts-serial communication real-time clock and simple digital LED interface - LCD display interfacing- GLCD display interfacing – TFT display interfacing -the keyboard interfacing-the touch screen interfacing.

UNIT V       ARM COMMUNICATION INTERFACING AND DEVELOPMENT TOOLS         9
Synchronous and asynchronous data transfer- UART based communication-I^2C Protocol basics -serial communication using I^2C bus: RTC Interfacing, EEPROM data transfer Ethernet communication – I^2S voice bus interface communication. Basic Embedded system Development Tools-Embest embedded IDE for ARM, Study of S3C3V40 based University Teaching Kit – Keil C and Unet ICE JTAG emulator

TOTAL: 45 PERIODS

REFERENCES:
CSE3B PATTERN RECOGNITION  L T P C  
(Common to CSE and CS)  3 0 0 3

OBJECTIVES

• To learn the different approaches for pattern recognition.
• To study various mathematical models in pattern recognition.
• To study the non parametric and clustering techniques.

UNIT I INTRODUCTION  8

UNIT II STATISTICAL PATTERN RECOGNITION  7
Statistical Pattern Recognition: Bayesian Decision Theory – Classifiers – Normal density and discriminant functions.

UNIT III MODELS  10

UNIT IV NON PARAMETRIC TECHNIQUES  10

UNIT V CLUSTERING TECHNIQUES  10

TOTAL: 45

REFERENCES

CSE3C EVOLUTIONARY COMPUTING (Common to HVE, CSE, CS and CC)

L T P C
3 0 0 3

OBJECTIVES:
- To know the fundamentals of evolutionary computations.
- To understand the Genetic Algorithms.
- To study the various hybrid systems.
- To study various Applications on Evolutionary Computations.

UNIT I INTRODUCTION TO EVOLUTIONARY COMPUTATION

UNIT II REPRESENTATION, SELECTION AND SEARCH OPERATORS

UNIT III FITNESS EVALUATION AND CONSTRAINT HANDLING

UNIT IV HYBRID SYSTEM
Self-adaptation – Meta evolutionary approaches – Neural – Evolutionary systems – New areas for evolutionary computation research in evolutionary systems – fuzzy-Evolutionary Systems – Combination with Other Optimization Methods – Combination with local search – Combination with dynamic programming – Simulated annealing and tabu search – Comparison with existing optimization.

UNIT V PARAMETER SETTING AND APPLICATIONS

Total = 45 Periods

REFERENCES:
CSE3D MOBILE COMPUTING (Common to CSE and CS) L T P C 3 0 0 3

OBJECTIVES

• To know the fundamentals of wireless communication.
• To understand the telecommunication systems.
• To study the different network layers.
• To study various protocols and their uses.

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

UNIT II TELECOMMUNICATION SYSTEMS 9

UNIT III WIRELESS NETWORKS 9

UNIT IV NETWORK LAYER 9

UNIT V TRANSPORT AND APPLICATION LAYERS 9

TOTAL: 45

REFERENCES

CSE3E SECURITY IN WIRELESS SENSOR NETWORKS  L T P C
(Common to CSE, CS and CC)  3 0 0 3

OBJECTIVES

- To know about the threats and vulnerabilities of communication architecture in WSN.
- To discuss about the various key management and authentication techniques in WSN.
- To study about the operations of existing well known secure routing protocols in WSN.
- To have an idea about the different secured data aggregation mechanisms in WSN.

UNIT I INTRODUCTION  9

UNIT II KEY MANAGEMENT PROTOCOLS AND BROADCAST AUTHENTICATION  9
Key distribution – classifications: deterministic and probabilistic; protocols: LEAP, BROS, IOS/DMBS, PIKE, SKEW; Broadcast authentication: μTesla, Certificate-Based Authentication Scheme, Basic Merkle Hash Tree Based Authentication Scheme, Enhanced Merkle Hash Tree Based Authentication Scheme, ID-Based Authentication Scheme.

UNIT III SECURE ROUTING PROTOCOLS  9
EAR, PRSA, R-LEACH, S-SPIN, Secure-SPIN, Segment transmission secure routing protocol, SONS, SS-LEACH, INSENS

UNIT IV DATA AGGREGATION, INTRUSION DETECTION AND AUTOCONFIGURATION  9
Data Aggregation – plain text based secure data aggregation – SIA, SINP, ESPDA, SSDA, WDA; cipher based secure data aggregation – CDA, HSC, Secure hierarchical data aggregation; Intrusion Detection: IHOP, SEF, DIDS, Decentralized intrusion detection; Auto Configuration – LEADS, PDAA, Dynamic address allocation.

UNIT V TRUST MANAGEMENT  9
Trust model - Certificate based - Behavior based, Combinational approach; Trust based routing protocols-secure routing based on multiple criteria decision, LEACH -TM, TRANS; Trust based node selection algorithm- cross layer trust model, reliable sensor selection algorithm, novel sensor node selection algorithm.

TOTAL: 45

REFERENCES

### CSE3F  HIGH SPEED SWITCHING ARCHITECTURES

(Non-R Prim of M.E. (CS and M.E (CC))

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**OBJECTIVES:**
- Introduction to Various high speed networks and its standards.
- To study the LAN and ATM switching architecture.
- To study the packet switching architectures and IP switching.

**UNIT I  LAN SWITCHING TECHNOLOGY**

Switching Concepts, switch forwarding techniques, switch path control, LAN Switching, cut through forwarding, store and forward, virtual LANs.

**UNIT II  ATM SWITCHING ARCHITECTURE**

Blocking networks, basic and enhanced banyan networks, sorting networks, merge sorting, re-arrange networks, full and partial connection networks, non-blocking networks - Recursive network construction, comparison of non-blocking network, Switching with deflection routing, shuffle switch, tandem banyan switch.

**UNIT III  QUEUES IN ATM SWITCHES**

Internal Queueing, Input, output and shared queueing, multiple queueing networks, combined Input, output and shared queueing, performance analysis of Queued switches.

**UNIT IV  PACKET SWITCHING ARCHITECTURES**

Architectures of Internet Switches and Routers, Bufferless and buffered Crossbar switches, Multi-stage switching, Optical Packet switching, switching fabric on a chip, internally buffered Crossbars.

**UNIT V  IP SWITCHING**

Addressing model, IP Switching types, flow driven and topology driven solutions, IP over ATM address and next hop resolution, multicasting, IPV6 over ATM.

**TOTAL: 45 PERIODS**

**REFERENCES:**
OBJECTIVES:
- To learn about basic neural models and learning algorithms.
- To impart knowledge about vector machines and basic function networks.
- To learn about EM ALGORITHMS & non linear dynamical systems.
- To learn about various neuron models.

UNIT I BASIC LEARNING ALGORITHMS 9

UNIT II RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES: 9
Radial Basis Function Networks:

Support Vector Machine:

UNIT III COMMITTEE MACHINES: 9


UNIT IV ATTRACTOR NEURAL NETWORKS 10

ADAPTIVE RESONANCE THEORY:
UNIT V  SELF ORGANISING MAPS:  8
Self-organizing Map – Maximal Eigenvector Filtering – Sanger’s Rule – Generalized Learning
Law – Competitive Learning - Vector Quantization – Mexican Hat Networks - Self-organizing
Feature Maps – Applications

PULSED NEURON MODELS:
Spiking Neuron Model – Integrate-and-Fire Neurons – Conductance Based Models –
Computing with Spiking Neurons.

TOTAL: 45 PERIODS

TEXT BOOKS:
   Company Limited, New Delhi, Reprint 2007.

REFERENCES:
   Learning, New Delhi, 2003.
CSE3H  RF SYSTEM DESIGN  L T P C  3 0 0 3

OBJECTIVES:
- To learn the fundamentals of RF design and its parameters.
- To study the RF filter design and implementations.
- To analyze and design active RF components.

UNIT I  CMOS PHYSICS, TRANSCEIVER SPECIFICATIONS AND ARCHITECTURES  9

UNIT II  IMPEDANCE MATCHING AND AMPLIFIERS  9
S-parameters with Smith chart, Passive IC components, Impedance matching networks Amplifiers: Common Gate, Common Source Amplifiers, OC Time constants in bandwidth estimation and enhancement, High frequency amplifier design, Low Noise Amplifiers: Power match and Noise match, Single ended and Differential LNAs, Terminated with Resistors and Source Degeneration LNAs.

UNIT III  RF POWER AMPLIFIERS AND FEEDBACK SYSTEMS  9
Feedback Systems: Stability of feedback systems: Gain and phase margin, Root-locus techniques, Time and Frequency domain considerations, Compensation Power Amplifiers: General model, Class D, E, F and S amplifiers, Linearization Techniques , Efficiency boosting techniques, ACPR metric, Design considerations

UNIT IV  PLL AND FREQUENCY SYNTHESIZERS  9
PLL: Linearized Model, Noise properties, Phase detectors, Loop filters and Charge Pumps Frequency Synthesizers: Integer-N frequency synthesizers, Direct Digital Frequency synthesizers

UNIT V  MIXERS AND OSCILLATORS  9
Mixer: characteristics, Non-linear based mixers: Quadratic mixers, Multiplier based mixers: Single balanced and double balanced mixers, subsampling mixers, Oscillators: Describing Functions, Colpitts oscillators, Resonators, Tuned Oscillators, Negative resistance oscillators, Phase noise

TOTAL: 45 PERIODS

REFERENCES:
CSE3J  COMMUNICATION PROTOCOL ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:
- To study the network reference model for the communication Protocol engineering process.
- To study the Protocol specifications, verification and Validation process.
- To study the performance testing, synthesis and implementation of the Protocols.

UNIT I  NETWORK REFERENCE MODEL  9
Communication model, software, subsystems, protocol, protocol development methods, Protocol engineering process, Layered architecture, Network services and Interfaces, Protocol functions, OSI model, TCP/IP protocol suite.

UNIT II  PROTOCOL SPECIFICATIONS  9
Components of protocol, Specifications of Communication service, Protocol entity, Interface, Interactions, Multimedia protocol, Internet protocol, SDL, SDL based protocol, other protocol specification languages.

UNIT III  PROTOCOL VERIFICATION/VALIDATION  9
Protocol verification, Verification of a protocol using finite state machines, Protocol validation, protocol design errors, Protocol validation approaches, SDL based protocol verification and validation.

UNIT IV  PROTOCOL CONFORMANCE/PERFORMANCE TESTING  9
Conformance testing methodology and frame work, Conformance test architectures, Test sequence generation methods, Distributed architecture by local methods, Conformance testing with TTCN, systems with semi controllable interfaces - RIP, SDL based tools for conformance testing, SDL based conformance testing of MPLS Performance testing, SDL based performance testing of TCP and OSPF, Interoperability testing, SDL based interoperability testing of CSMA/CD and CSMA/CA protocol using Bridge, Scalability testing.

UNIT V  PROTOCOL SYNTHESIS AND IMPLEMENTATION  9

TOTAL: 45 PERIODS

REFERENCES:
CSE3K    ASIC DESIGN    L T P C
                      3 0 0 3

OBJECTIVES:

- To understand capabilities and limitations of CMOS logic and adjust designs to best use
  CMOS ASIC technologies.
- To demonstrate an understanding of verilog and logic synthesis.
- To perform an ASIC design from requirements to timing verification.

UNIT I     INTRODUCTION TO ASIC    9
Types of ASICs, Design flow, CMOS transistors, CMOS Design rules, Combinational Logic Cell,
Sequential logic cell, Data path logic cell, Transistors as Resistors, Transistor Parasitic Capacitance,
Logical effort, Library cell design, Library architecture.

UNIT II   PROGRAMMABLE ASIC    9
Anti fuse, static RAM, EPROM and EEPROM technology, PREP benchmarks, Actel, Xilinx LCA,
Altera FLEX, Altera MAX DC & AC inputs and outputs, Clock & Power inputs, Xilinx I/O blocks.

UNIT III   PROGRAMMABLE ASIC INTERCONNECT    9
Actel ACT, Xilinx EPLD, Altera MAX 9000, Altera FLEX Design systems, Logic Synthesis, Half
gate ASIC, Schematic entry, Low level design language, PLA tools, EDIF, CFI design representation.

UNIT IV    LOGIC SYNTHESIS, SIMULATION AND TESTING    9
Verilog and logic synthesis, VHDL and logic synthesis, types of simulation, boundary scan test, fault
simulation, automatic test pattern generation.

UNIT V    ASIC CONSTRUCTION    9
System partition, FPGA partitioning, partitioning methods, floor planning, placement, physical design
flow, global routing, detailed routing, special routing, circuit extraction, DRC.

TOTAL: 45 PERIODS

REFERENCES
2. Farzad Nekoogar and Faranak Nekoogar, “From ASICs to SOCs: A Practical Approach”, 3rd
CSE3L               NONLINEAR FIBER OPTICS                     L T P C
                                      3 0 0 3

OBJECTIVES:
- To learn about the basics of fiber Nonlinearities, Gaussian Pulse.
- To impart knowledge about Soliton Lasers.
- To study various applications of Soliton Lasers.

UNIT I  FIBER NONLINEARITIES                  9

UNIT II  GROUP VELOCITY DISPERSION AND PHASE MODULATION        10

UNIT III  OPTICAL SOLITONS AND DISPERSION MANAGEMENT              9
Soliton Characteristics, Soliton Stability, Dark Solitons, Other kinds of Solitons, Effect of Birefringence in Solitons, Solitons based Fiber Optic Communication System, Demerits, Dispersion Managed Solitons (DMS).

UNIT IV  SOLITON LASERS              8

UNIT V  APPLICATIONS OF SOLITONS                        9
DMS for single channel transmission, WDM transmission, Fiber Gratings, Fiber Couplers, Fiber Interferometers, Pulse Compression, Soliton Switching, Soliton light wave systems.

TOTAL: 45 PERIODS

REFERENCES
CSE3M  

VLSI SIGNAL PROCESSING  

L T P C  

3 0 0 3  

OBJECTIVES:  

- To introduce the basic approaches and methodologies for VLSI design of signal processing and communication systems.  
- To design high-speed, low-area, and low-power VLSI systems for a broad range of DSP applications.  
- To present real-life case studies of architectures at the implementation level, and presents several approaches to analysis, estimation, and reduction of power consumption.  

UNIT I  

INTRODUCTION TO DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING OF FIR FILTERS  

Introduction to DSP systems, Typical DSP algorithms, Data flow and Dependence graphs, critical path, Loop bound, iteration bound, longest path matrix algorithm, Pipelining and Parallel processing of FIR filters, Pipelining and Parallel processing for low power.  

UNIT II  

RETIMING, ALGORITHMIC STRENGTH REDUCTION  


UNIT III  

FAST CONVOLUTION, PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS  


UNIT IV  

NUMERICAL STRENGTH REDUCTION, SYNCHRONOUS, WAVE AND ASYNCHRONOUS PIPELINING  

Numerical strength reduction, sub expression elimination, multiple constant multiplication, iterative matching, synchronous pipelining and clocking styles, clock skew in edge-triggered single phase clocking, two-phase clocking, wave pipelining, Asynchronous pipelining bundled data versus dual rail protocol.  

UNIT V  

SCALING, ROUND-OFF NOISE, BIT-LEVEL ARITHMETIC ARCHITECTURES  

Scaling and round-off noise, scaling operation, round-off noise, state variable description of digital filters, scaling and round-off noise computation, round-off noise in pipelined IIR filters, Bit-level arithmetic architectures, parallel multipliers with sign extension, parallel carry-ripple and carry-save multipliers, Design of Lyon’s bit-serial multipliers using Horner’s rule, bit-serial FIR filter, CSD representation, CSD multiplication using Horner’s rule for precision improvement, Distributed Arithmetic fundamentals and FIR filters  

TOTAL: 45 PERIODS  

REFERENCES:  

CSE3N                    MEDICAL IMAGE PROCESSING                L T P C
                        3 0 0 3

OBJECTIVES:
• To learn about the computational and mathematical methods in medical image processing.
• To impart knowledge about main sources of medical imaging data (CT, MRI, PET, and ultrasound).
• To study various methods used to enhance and extract useful information from medical images.

UNIT I  IMAGE FUNDAMENTALS                                        9
Image Perception, MTF of the visual system, Image Fidelity criteria, Image model, Image sampling and quantization – two dimensional sampling theory, Image quantization, Optimum mean square quantizer, Image transforms – 2D- DFT and other transforms

UNIT II  IMAGE PREPROCESSING                                      9
Image enhancement – point operation, Histogram modeling, spatial operations, Transform operations, Image restoration- Image degradation model, Inverse and Weiner filtering, Image Compression- Spatial and Transform methods

UNIT III  IMAGE RECONSTRUCTION IN MEDICAL IMAGING MODALITIES      9
Mathematical preliminaries and basic reconstruction methods, Image reconstruction in CT scanners, MRI, Nuclear Medicine Imaging Modalities, Ultra sound imaging, 3D Ultra sound imaging

UNIT IV  IMAGE ANALYSIS AND CLASSIFICATION                        9
Image segmentation- pixel based, edge based, region based segmentation, Image representation and analysis, Feature extraction and representation, Statistical Shape, Texture, feature and Image classification- Statistical, Rule based, Neural Network approaches

UNIT V  IMAGE REGISTRATIONS AND VISUALIZATION                     9
Rigid body visualization, Principal axis registration, Interactive principal axis registration, Feature based registration, Elastic deformation based registration, Image visualization- 2D display methods, 3D display methods, virtual reality based interactive visualization

TOTAL: 45 PERIODS

REFERENCES
CSE3P  DESIGN AND DEPLOYMENT OF WIRELESS SENSOR NETWORKS  L  T  P  C  3  0  0  3

OBJECTIVES
• To provide an overview about sensor deployment and clustering in networks.
• To study the coverage control concept in Wireless sensor Networks.
• To understand the concept of existing solution in Wireless sensor Networks.

UNIT I  DEPLOYMENT MECHANISMS AND CLUSTERING TECHNIQUES  9


UNIT II  COVERAGE CONTROL AND TARGET COVERAGE PROBLEMS  9


UNIT III  AREA COVERAGE PROBLEMS  9

UNIT IV  BARRIER COVERAGE PROBLEMS AND ENERGY EFFICIENCY  9
Barrier Coverage Problems: Build in Intrusion Barriers – Find the Penetration Paths.


UNIT V  CASE STUDIES  9
Volcano Monitoring: Addressing Data Quality through Iterative Deployment - VoxNet: Reducing Latency in High Data Rate Applications - Failure Is Inevitable: The Trade-off between Missing Data and Maintenance, Glacier Monitoring: Deploying Custom Hardware in Harsh Environments.


TOTAL: 45 PERIODS

REFERENCES
CSE3Q  IPTV TECHNOLOGIES  L  T  P  C
3  0  0  3

OBJECTIVES
• To know the fundamentals of IPTV.
• To understand the Digital Rights Management and IPTV Encoding Techniques.
• To study IPTV on different networks.
• To study various Security Threats on IPTV.

UNIT I  NEXT GENERATION TV NETWORK

UNIT II  DIGITAL RIGHTS MANAGEMENT

UNIT III  SERVICES AND TECHNOLOGIES

UNIT IV  IPTV SECURITY

UNIT V  CASE STUDY

TOTAL: 45 PERIODS
REFERENCES

CSE3R  VEHICULAR ADHOC NETWORKS  L  T  P  C
3  0  0  3

OBJECTIVES

• To brief about the basic principles and challenges of VANET.
• To study and discuss about link layer protocols and wireless access technologies.
• To build working knowledge on various routing protocols and connectivity techniques.
• To learn about emerging security issues, Description of modeling issues and mathematical analysis using various encryption schemes techniques in VANET.
• To study various mobility models and simulation techniques of VANET in wireless Environment.

UNIT I  INTRODUCTION TO VANET  9

UNIT II  VANET LINK LAYER PROTOCOLS  9

UNIT III  RESEARCH CHALLENGES IN VANET  9

UNIT IV  DATA SECURITY IN VANET  9

UNIT V  MOBILITY MODELS AND SIMULATION TECHNIQUES IN VANET  9

TOTAL: 45 PERIODS

REFERENCES