### AFFILIATED INSTITUTIONS
ANNA UNIVERSITY. CHENNAI
REGULATIONS - 2009
CURRICULUM II TO IV SEMESTERS (FULL TIME)
M.E. COMPUTER AND COMMUNICATION

#### SEMESTER II

<table>
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<tr>
<th>SL. NO</th>
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Total no. of credits to be earned for the award of degree 21+20+15+12 =68
# List of Electives

**M.E. Computer and Communication**

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

UNIT II  OPTICAL TRANSMITTERS, RECEIVERS AND AMPLIFIERS  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, Broad band 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

1. G.P. Agarwal, Fiber optic communication systems, 2nd Ed, John Wiley & Sons, New 
   York, 2002.
3. Franz & Jain, Optical communication, Systems and components, Narosa 
4. Rajiv Ramaswami and Kumar Sivarajan, Optical Networks : A practical perspective”, 
5. Harold Kolimbiris, Fiber Optic Communication, Education Asia, Delhi, 2004
AP9222      COMPUTER ARCHITECTURE AND PARALLEL PROCESSING       LT  P   C
                      3  0  0  3

UNIT I      THEORY OF PARALLELISM
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
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 TECHNOLOGIES
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 organisations, shared
memory organisations, sequential and weak consistency models.

UNIT IV     PIPELINING AND SUPERSCALAR TECHNOLOGIES
Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and
SIMD computers, Scalable, Multithreaded and data flow architectures.

UNIT V      SOFTWARE AND PARALLEL PROGRAMMING
Parallel models, Languages and compilers, Parallel program development and
environments, UNIX, MACH and OSF/1 for parallel computers.

TOTAL: 45PERIODS

REFERENCES
2. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer architecture – A
7. Barry, Wilkinson, Michael, Allen “Parallel Programming”, Pearson Education Asia ,
2002
Education , 2003
UNIT I  WIRELESS LOCAL AREA NETWORKS  9
Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer - MAC sublayer -
MAC Management Sublayer - Wireless ATM - HIPERLAN - HIPERLAN-2, WiMax

UNIT II  3G OVERVIEW & 2.5G EVOLUTION  9
Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview - Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III  ADHOC & SENSOR NETWORKS  9
Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks - Classification, MAC and Routing protocols.

UNIT IV  INTERWORKING BETWEEN WLANS AND 3G WWANS  9
Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution system.

UNIT V  4G & BEYOND  9
4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

TOTAL: 45 PERIODS

REFERENCES

UNIT I  INTRODUCTION
9
Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C)
Introduction to HyperText Markup Language - Editing HTML - Common Elements –
Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists - HTML
Tables-Basic HTML Forms

UNIT II  DYNAMIC HTML
9
Dynamic HTML Object Model and Collections, Event Model, Filters and Transitions,
Data Binding with Tabular Data Control, Dynamic HTML-Structured Graphics ActiveX
Controls, Dynamic HTML-Path, Sequencer and Sprite ActiveX Controls.

UNIT III  JAVASCRIPT
9
JavaScript, Introduction to Scripting, Control Statements, Functions, Arrays, Objects.

UNIT IV  XML
9
Creating Markup with XML-Parsers and Well-formed XML Documents -Parsing an XML
Document with msxml - Document Type Definition (DTD) - Document Type Declaration -
Element Type Declarations - Attribute Declarations - Document Object Model - DOM
Implementations - -- DOM Components - path - XSL: Extensible Stylesheet Language
Transformations (XSLT)

UNIT V  PERL, CGI AND PHP
9
Perl - String Processing and Regular Expressions - Form Processing and Business
Logic - Server-Side Includes - Verifying a Username and Password - Using DBI to
Connect to a Database -PHP - Form Processing and Business Logic --Connecting to a
Database - Dynamic Content in PHP.

TOTAL : 45 PERIODS

REFERENCES
1. Deitel & Deitel  Internet & World Wide Web How to Program, Pearson Education
   India -Third Edition -2004
   2003.
1. DC characteristics of PIN PD and APD.
2. P-I characteristics of LED and LASER.
3. Optical link simulation using simulator packages.
4. Web design with HTML.
5. Web design with JAVA.
7. Simulation and Implementation of ATM congestion control algorithm.
   (using free ATM network simulator software)

TOTAL : 60 PERIODS

UNIT I THE WIRELESS CHANNEL
Overview of wireless systems – Physical modeling for wireless channels – Time and Frequency coherence – Statistical channel models – 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 – Capacity with Receiver diversity – Capacity comparisons – Capacity of Frequency Selective Fading channels

UNIT II PERFORMANCE OF DIGITAL MODULATION OVER WIRELESS CHANNELS

UNIT III DIVERSITY

UNIT IV MULTICARRIER MODULATION
Data Transmission using Multiple Carriers – Multicarrier Modulation with Overlapping Subchannels – Mitigation of Subcarrier Fading – Discrete Implementation of Multicarrier Modulation – Peak to average Power Ratio- Frequency and Timing offset – Case study IEEE 802.11a.

UNIT V SPREAD SPECTRUM

TOTAL : 45 PERIODS

REFERENCES

CP9252  MICROWAVE CIRCUITS  LT P C
3 0 0 3

UNIT I  CIRCUIT REPRESENTATION AND IMPEDANCE MATCHING  9

UNIT II  NOISE AND DISTORTION IN MICROWAVE CIRCUITS  9

UNIT III  FILTERS  9
Filter design by Insertion loss method, Butterworth and Tchebycheff Low pass filters. Impedance and frequency scaling for low pass filters – Band pass and band stop transformation – Design examples – Filters using transmission line stubs – stepped impedance low pass filters – Band pass filters using transmission line resonators – capacitively coupled quarter wave resonators-Micro strip filters-Coupled resonator band pass filters

UNIT IV  AMPLIFIERS  9
FET and Bipolar Transistor models, two port power gain. Derivation of stability circles and stability criteria – unconditionally stable configuration and simultaneous conjugate matching – Amplifier design using S parameters – constant Noise figure circles – Design for maximum gain power amplifiers, LNA Design.

UNIT V  OSCILLATORS AND MIXERS  9

REFERENCES:

TOTAL : 45 PERIODS

AP9251 DIGITAL IMAGE PROCESSING LT P C 3 0 0 3

UNIT I DIGITAL IMAGE FUNDAMENTALS
Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries.

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

UNIT III IMAGE ENHANCEMENT AND RESTORATION
Histogram modification, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters . Design of 2D FIR filters.

UNIT IV IMAGE SEGMENTATION AND RECOGNITION
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 COMPRESSION
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding, Transform coding, JPEG standard, JPEG 2000, EZW, SPIHT, MPEG.

TOTAL : 45 PERIODS

REFERENCES

AP9252 NEURAL NETWORKS AND ITS APPLICATIONS LT P C 3 0 0 3

UNIT I BASIC LEARNING ALGORITHMS 9

UNIT II RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES: RADIAL BASIS FUNCTION NETWORKS 9
Support Vector Machines:

UNIT III COMMITTEE MACHINES 9

NEURODYNAMICS SYSTEMS

UNIT IV ATTRACTOR NEURAL NETWORKS 9
Associative Learning – Attractor Neural Network Associative Memory – Linear
Associative Memory – Hopfield Network – Content Addressable Memory – Strange
Attractors and Chaos - Error Performance of Hopfield Networks - Applications of
Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional
Associative Memory – BAM Stability Analysis – Error Correction in BAMs - Memory
Annihilation of Structured Maps in BAMS – Continuous BAMs – Adaptive BAMs –
Applications

ADAPTIVE RESONANCE THEORY
Noise-Saturation Dilemma - Solving Noise-Saturation Dilemma – Recurrent On-center –
Off-surround Networks – Building Blocks of Adaptive Resonance – Substrate of
Resonance Structural Details of Resonance Model – Adaptive Resonance Theory –
Applications

UNIT V SELF ORGANISING MAPS
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.

REFERENCES
Thomson Learning, New Delhi, 2003.
4. James A. Freeman and David M. Skapura, “Neural Networks Algorithms,
Applications, and Programming Techniques, Pearson Education (Singapore) Private
Limited, Delhi, 2003.

TOTAL: 45 PERIODS

VL9261 ASIC DESIGN 3003
UNIT I INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC
LIBRARY DESIGN 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 ASICS, PROGRAMMABLE ASIC LOGIC CELLS
AND PROGRAMMABLE ASIC I/O CELLS 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, PROGRAMMABLE ASIC DESIGN SOFTWARE AND LOW LEVEL DESIGN ENTRY 9

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, FLOOR PLANNING, PLACEMENT AND ROUTING 9
System partition - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow –global routing - detailed routing - special routing - circuit extraction - DRC.

REFERENCES

TOTAL : 45 PERIODS

AP9224 EMBEDDED SYSTEMS LT P C 3 0 0 3

UNIT I EMBEDDED PROCESSORS 9

UNIT II EMBEDDED PROCESSOR AND COMPUTING PLATFORM 9
Data operations, Flow of Control, SHARC processor- Memory organization, Data operations, Flow of Control, parallelism with instructions, CPU Bus configuration, ARM Bus, SHARC Bus, Memory devices, Input/output devices, Component interfacing, designing with microprocessor development and debugging, Design Example: Alarm Clock. Hybrid Architecture

UNIT III NETWORKS
Distributed Embedded Architecture- Hardware and Software Architectures, Networks for embedded systems- I2C, CAN Bus, SHARC link supports, Ethernet, Myrinet, Internet, Network-Based design- Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller.

UNIT IV REAL-TIME CHARACTERISTICS

UNIT V SYSTEM DESIGN TECHNIQUES

REFERENCES:

TOTAL : 45 PERIODS

CP9253 HIGH SPEED SWITCHING ARCHITECTURES LT P C
3 0 0 3

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

UNIT III QUEUES IN ATM SWITCHES 9
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  9
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  9
Addressing model, IP Switching types - flow driven and topology driven solutions, IP
Over ATM address and next hop resolution, multicasting, Ipv6 over ATM.

REFERENCES
   ATM networks ”, John Wiley & Sons Ltd, New York. 1998
4. Rainer Handel, Manfred N Huber, Stefan Schröder, “ATM Networks - Concepts

UNIT V APPLICATIONS OF SOLITONS

REFERENCES


VL9264 DIGITAL SPEECH SIGNAL PROCESSING

UNIT I MECHANICS OF SPEECH

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING
Short Time Fourier analysis – Filter bank analysis – Formant extraction – Pitch Extraction – Analysis by Synthesis- Analysis synthesis systems- Phase vocoder—Channel Vocoder.

HOMOMORPHIC SPEECH ANALYSIS:
UNIT IV   LINEAR PREDICTIVE ANALYSIS OF SPEECH  10

UNIT V   APPLICATION OF SPEECH SIGNAL PROCESSING  10

REFERENCES

CU9257   COMMUNICATION NETWORK SECURITY   LT P C
3 0 0 3

UNIT I   INTRODUCTION ON SECURITY  9

UNIT II   SYMMETRIC & ASYMMETRIC KEY ALGORITHMS  9
Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers, Data Encryption Standards (DES), Advanced Encryption Standard (AES), RC4, principle of asymmetric key algorithms, RSA Cryptosystem

UNIT III   INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT  9

UNIT IV   NETWORK SECURITY, FIREWALLS AND WEB SECURITY  9
UNIT V  WIRELESS NETWORK SECURITY

TOTAL: 45 PERIODS

REFERENCES

NE9254 SOFTWARE ENGINEERING METHODOLOGIES

UNIT I
Definition – systems approach – modeling the process and lifecycle – meaning of process – software process models – tools and techniques – practical process modeling – information systems – planning and managing the project – project personnel – effort estimation – risk management – project plan – process models and project management

UNIT II

UNIT III
UNIT IV
Testing the program – faults – failures – issues – unit testing – Integration testing –
testing OO systems – test planning – automated testing tools - testing the system –
principles – function testing – performance testing – reliability, availability and
maintainability – acceptance testing – installation testing – automated system testing –
test documentation – testing safety critical systems – delivering the system – training –
documentation

UNIT V
System maintenance – the changing system – nature of maintenance – problems –
measuring maintenance characteristics – techniques and tools – software rejuvenation –
evaluation approaches – selection – assessment vs. prediction - evaluating products,
processes and resources – improving predictions, products, processes and resources –
guidelines – decision making in software engineering – licensing – certification and
ethics

REFERENCES
1. Shari Lawrence Pfleeger, Joanne M. Atlee, Software Engineering: Theory and
   Practice, Prentice Hall, 2006
2. Carlo Ghezzi, Mehdiz Jazayeri, Dino Mandrioli, Fundamentals of Software
   Engineering, Prentice Hall, 2002

TOTAL: 45 PERIODS
UNIT V  XML AND CONTENT MANAGEMENT  9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CS9221  DATABASE TECHNOLOGY  LT P C  3 0 0 3

UNIT I  DISTRIBUTED DATABASES  5

UNIT II  OBJECT ORIENTED DATABASES  10

UNIT III  EMERGING SYSTEMS  10
Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

UNIT IV  DATABASE DESIGN ISSUES  10

UNIT V  CURRENT ISSUES  10
Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases – Multimedia Databases – Image Databases – Text Database

TOTAL : 45 PERIODS
REFERENCES:


CU9222 MULTIMEDIA COMPRESSION TECHNIQUES LT P C
3 0 0 3

UNIT I INTRODUCTION

UNIT II TEXT COMPRESSION

UNIT III AUDIO COMPRESSION

UNIT IV IMAGE COMPRESSION
UNIT V  VIDEO COMPRESSION  9

TOTAL: 45 PERIODS

REFERENCES

CP9259  WIRELESS SENSOR NETWORKS  LT P C 3 0 0 3

UNIT I  OVERVIEW OF WIRELESS SENSOR NETWORKS  8

UNIT II  ARCHITECTURES  9

UNIT III  NETWORKING OF SENSORS  10

UNIT IV  INFRASTRUCTURE ESTABLISHMENT  9
Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.
UNIT V  SENSOR NETWORK PLATFORMS AND TOOLS  9
Motes, Programming Challenges, Node-level software platforms, Node-level Simulators,
State-centric programming.

TOTAL : 45 PERIODS

REFERENCES
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information
7. Wayne Tomasi, “Introduction To Data Communication And Networking”, Pearson

CP9260  OPERATING SYSTEM DESIGN  LT P C
300 3

UNIT I  OPERATING SYSTEMS OVERVIEW  9
Operating system – Types of Computer Systems - Computer-system operation – I/O
structure – Hardware Protection - System components – System calls – System
programs – System structure - Process concept – Process scheduling – Operations on
processes – Cooperating processes – Interprocess communication – Communication in

UNIT II  PROCESS MANAGEMENT  10
Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time
scheduling – Algorithm Evaluation – Process Scheduling Models - The critical-section
problem – Synchronization hardware – Semaphores – Classic problems of
synchronization – critical regions – Monitors - System model – Deadlock characterization
– Methods for handling deadlocks – Recovery from deadlock
UNIT III STORAGE MANAGEMENT

UNIT IV I/O SYSTEMS

UNIT V CASE STUDY

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CP9267 VISUAL PROGRAMMING LT P C
3 0 0 3

UNIT I WINDOWS PROGRAMMING

UNIT II VISUAL BASIC PROGRAMMING
UNIT III VISUAL C++ PROGRAMMING

UNIT IV CONTROLS

UNIT V ADVANCED CONCEPTS

TOTAL :45 PERIODS

TEXT BOOKS

REFERENCES
3. Herbert Sheildt, “MFC from the Ground Up”.

CS9263 AD-HOC NETWORKS L T P C
3 0 0 3

UNIT I AD-HOC MAC

UNIT II AD-HOC NETWORK ROUTING & TCP

UNIT III WSN -MAC
9

UNIT IV  WSN ROUTING, LOCALIZATION & QOS  9

UNIT V  MESH NETWORKS  9

TOTAL : 45 PERIODS

REFERENCES
UNIT IV  FAULT TOLERANCE AND CONSENSUS  7

UNIT V  CASE STUDIES  8
Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

TOTAL: 45 PERIODS

REFERENCES
REFERENCES:

CP9254 SOFT COMPUTING L T P C
3 0 0 3

UNIT I  INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II  GENETIC ALGORITHMS 9
Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition

UNIT III  NEURAL NETWORKS 9

UNIT IV  FUZZY LOGIC 9

UNIT V  NEURO-FUZZY MODELING 9

TOTAL : 45 PERIODS

TEXT BOOKS:
REFERENCES: