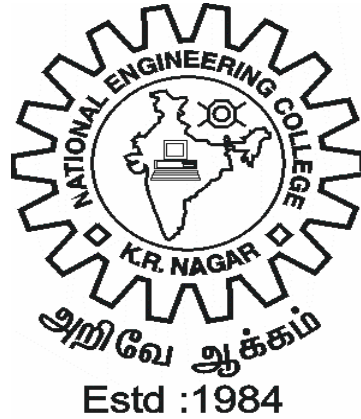


# **NATIONAL ENGINEERING COLLEGE**

(An Autonomous Institution Affiliated to Anna University of Technology Tirunelveli)

**K.R.NAGAR, KOVILPATTI – 628 503**

## **REGULATIONS - 2011**



**DEPARTMENT OF  
INFORMATION TECHNOLOGY**

**CURRICULUM AND SYLLABI OF  
M.E. – COMPUTER AND COMMUNICATION  
I - YEAR**

# NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University of Technology Tirunelveli)

## M.E. (COMPUTER AND COMMUNICATION) - SEMESTER I

SL NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	MMA103	Applied mathematics for communication Engineers	3	1	0	4
2.	MCE102	Modern Digital Communication Techniques	3	0	0	3
3.	MCE103	Advanced Digital Signal Processing	3	0	0	3
4.	MCC101	High Performance Computer Networks	3	0	0	3
5.	MCC102	System Programming and Operating System	3	0	0	3
6.		Elective I	3	0	0	3
<b>PRACTICAL</b>						
7.	MCC131	Computer and Communication Laboratory I	0	0	4	2
<b>TOTAL</b>			<b>18</b>	<b>1</b>	<b>4</b>	<b>21</b>

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	MCE016	Optical Fiber Communication and Networking	3	0	0	3
2	MCC201	Computer Architecture and Parallel Processing	3	0	0	3
3	MCC202	Wireless Networks	3	0	0	3
4	MCC203	Internet and Java Programming	3	0	0	3
5		Elective II	3	0	0	3
6		Elective III	3	0	0	3
<b>PRACTICAL</b>						
7	MCC231	Computer and Communication Laboratory II	0	0	4	2
<b>TOTAL</b>			<b>1</b>	<b>0</b>	<b>4</b>	<b>20</b>

Approved by

**Chairman of BOS**  
**Dept. of Info. Tech**  
Dr.D.Manimegalai

**Dean (Academic)**  
Dr.B.sankaragomathi

**Chairman of Academic**  
**Council & Principal**  
Dr.P.Subburaj

**LIST OF ELECTIVES**  
**M.E. COMPUTER AND COMMUNICATION**

<b>SL. NO</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1.	MCE201	Wireless Mobile Communication	3	0	0	3
2.	MCC001	Microwave Circuits	3	0	0	3
3.	MCS017	Digital Imaging	3	0	0	3
4.	MCC002	Neural Networks and Its Applications	3	0	0	3
5.	MCE014	ASIC Design	3	0	0	3
6.	MCE010	Embedded Systems	3	0	0	3
7.	MCE011	High Speed Switching Architectures	3	0	0	3
8.	MCE015	Non linear Fiber Optics	3	0	0	3
9.	MCE004	Digital Speech Signal Processing	3	0	0	3
10.	MCE001	Communication Network Security	3	0	0	3
11.	MCC003	Software Engineering Methodologies	3	0	0	3
12.	MCS001	XML and Web Services	3	0	0	3
13.	MCS201	Data Base Technology	3	0	0	3
14.	MCE202	Multimedia Compression Techniques	3	0	0	3
15.	MCC004	Wireless Sensor Networks	3	0	0	3
16.	MCC005	Operating System Design	3	0	0	3
17.	MCC006	Visual Programming	3	0	0	3
18.	MCC007	Adhoc Networks	3	0	0	3
19.	MCS002	Distributed Computing	3	0	0	3
20.	MCC008	Object Oriented System Design	3	0	0	3
21.	MCS007	Mobile Computing	3	0	0	3
22.	MCS011	Software Project Management	3	0	0	3
23.	MCS012	Grid Computing	3	0	0	3
24.	MCS006	Soft Computing	3	0	0	3
25.	MCS019	Data Warehousing and Data Mining	3	0	0	3
26.	MCC009	Cloud Computing	3	0	0	3
27.	MCS016	Pervasive Computing	3	0	0	3
28.	MCC010	Data Mining Algorithm Analysis and Parallelization	3	0	0	3

**OBJECTIVE:**

- To provide students the knowledge and understanding of advanced mathematical computation techniques with special emphasis on recent trends in communications.
- To be trained in expert usage of random variables
- To know more about various queuing models

**UNIT I SPECIAL FUNCTIONS 9**

Bessel's equation – Bessel function – Recurrence relations - Generating function and orthogonal property for Bessel functions of first kind – Fourier-Bessel expansion.

**UNIT II MATRIX THEORY 9**

Some important matrix factorizations – The Cholesky decomposition – QR factorization – Least squares method – Singular value decomposition - Toeplitz matrices and some applications.

**UNIT III ONE DIMENSIONAL RANDOM VARIABLES 9**

Random variables - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a Random Variable.

**UNIT IV TWO DIMENSIONAL RANDOM VARIABLES 9**

Joint distributions – Marginal and Conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

**UNIT V QUEUEING MODELS 9**

Poisson Process – Markovian queues – Single and Multi-server Models – Little's formula - Machine Interference Model – Steady State analysis – Self Service queue.

**TOTAL PERIODS = 45****REFERENCES:**

1. Grewal, B.S., "Numerical methods in Engineering and Science", 40<sup>th</sup> edition, Khanna Publishers, 2007.
2. Richard Johnson, Miller & Freund, "Probability and Statistics for Engineers", 7<sup>th</sup> Edition, Prentice – Hall of India, Private Ltd., New Delhi 2007
3. Ramin S. Esfandiari, "Applied Mathematics for Engineers", Fourth Edition 2007
4. [Erwin Kreyszig](#) "[Advanced Engineering Mathematics](#)", 3<sup>rd</sup> Edition 2010
5. [K. A. Stroud](#) and [Dexter J. Booth](#) "[Advanced Engineering Mathematics](#)", 2011
6. [J. O. Bird](#) "[Basic Engineering Mathematics](#)", [Fifth Edition](#) 2010
7. [Dennis G. Zill](#) and Warren S. Wright "[Advanced Engineering Mathematics](#)", [Fourth Edition](#) 2009
8. [J. O. Bird](#) "[Engineering Mathematics](#)", [Sixth Edition](#) ,2010
9. [Stan Gibilisco](#) and Norman Crowhurst, "[Mastering Technical Mathematics](#)", [Third Edition](#), (2007)
10. Moon, T.K., Sterling, W.C., Mathematical methods and algorithms for signal processing, Pearson Education, 2000.
11. Taha, H.A., Operations Research, An introduction, 7th edition, Pearson education editions, Asia, New Delhi, 2002.
12. Donald Gross and Carl M. Harris, Fundamentals of Queuing theory, 2nd edition, John Wiley and Sons, New York (1985)

**OBJECTIVES:**

- To provide students the knowledge of advanced digital communication techniques with special emphasis on digital and wireless communications.
- To gain more knowledge on various frequency modulation techniques.
- To be familiar with advanced coding techniques.
- To know more about various equalization techniques

**UNIT I CONSTANT ENVELOPE MODULATION 9**

Advantages of Constant Envelope Modulation; Binary Frequency Shift Keying-Coherent and Non-coherent Detection of BFSK; Minimum Shift Keying-; Gaussian Minimum Shift Keying; M-ary Phase Shift Keying; M-ary Quadrature Amplitude Modulation; M-ary Frequency Shift Keying.

**UNIT II OFDM 9**

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

**UNIT III BLOCK CODED DIGITAL COMMUNICATION 9**

Architecture and performance – Binary block codes; Orthogonal; Biorthogonal; Transorthogonal – Shannon’s channel coding theorem; Channel capacity; Matched filter; Concepts of Spread spectrum communication – Coded BPSK and DPSK demodulators – Linear block codes; Hamming; Golay; Cyclic; BCH ; Reed – Solomon codes.

**UNIT IV 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 V 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.

**TOTAL PERIODS = 45****REFERENCES:**

1. M.K.Simon, S.M.Hinedi and W.C.Lindsey, “Digital communication techniques; Signalling and detection”, Prentice Hall India, New Delhi. 1995.
2. John G. Proakis and Masoud Salehi, “Digital Communications”, 5th ed., McGraw-Hill International Editions, 2008.
3. S. Haykins, “Communication Systems”, 5th ed., John wiley, 2008.
4. M. K. Simon and M. S. Alouini,” Digital Communication over Fading Channels”, 2000.
5. R. G. Gallager, “Principles of Digital Communication”, Cambridge University Press, 2008.
6. A. Lapidoth, “A Foundation in Digital Communication”, Cambridge, 2009.
7. Stephen G. Wilson., “Digital Modulation and Coding”, First Indian Reprint, Pearson Education, 2003.
8. Richard Van Nee & Ramjee Prasad., “OFDM for Multimedia Communications” Artech House Publication, 2001.



**OBJECTIVE:**

- To learn about multimedia networks and related services
- To brief about the VPN networks and advanced networking principles
- To discuss about network modeling and performance in VPN networks
- To learn about the network security, security standards and network management

**UNIT I INTRODUCTION 9**

Review of OSI, TCP/IP; Multiplexing, Modes of Communication, Switching, Routing. SONET – DWDM – DSL – ISDN – BISDN, ATM.

**UNIT II MULTIMEDIA NETWORKING APPLICATIONS 9**

Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Beyond best effort – scheduling and policing mechanism – integrated services – RSVP- differentiated services.

**UNIT III ADVANCED NETWORKS CONCEPTS: 10**

VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

**UNIT IV TRAFFIC MODELLING: 7**

Little's theorem, Need for modeling, Poisson modeling and its failure, Non- poisson models, Network performance evaluation.

**UNIT V NETWORK SECURITY AND MANAGEMENT: 10**

Principles of cryptography – Authentication – integrity – key distribution and certification – Access control and: fire walls – attacks and counter measures – security in many layers. Infrastructure for network management – The internet standard management framework – SMI, MIB, SNMP, Security and administration – ASN.1

**TOTAL PERIODS = 45****REFERENCES:**

1. J.F. Kurose & K.W. Ross, "Computer Networking- A top down approach featuring the internet", Pearson, 2nd edition, 2003.
2. Walrand .J. Varatya, High performance communication network, Morgan Kanffman – Harcourt Asia Pvt. Ltd. 2nd Edition, 2000.
3. LEOM-GarCIA, WIDJAJA, "Communication networks", TMH seventh reprint 2002.
4. Aunurag kumar, D. MANjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers, 1ed 2004.
5. Hersent Gurle & petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearson education 2003.
6. Fred Halsall and Lingana Gouda Kulkarni, Computer Networking and the Internet, fifth edition, pearson education
7. Nader F.Mir ,Computer and Communication Networks, first edition.
8. Larry I.Peterson&Bruce S.David, "Computer Networks: A System Approach"- 1996

**OBJECTIVE:**

- To learn the fundamentals of Language processing
- To gain knowledge about Assemblers, Macros and Macro processors
- To learn the functionalities of Compilers and interpreters
- To study the functions of Operating System
- To discuss about CPU scheduling and storage Management

**UNIT I 9**

Language processors: Introduction, Language processing Activities, Fundamentals of language Processing - Data Structures, Search data structures, Allocation data structures, scanning and parsing.

**UNIT II 9**

Assemblers: Elements of assembly language programming, simple assembly scheme, pass structure of Assemblers, Design of two pass Assemblers. Macros and Macro Processor: Macro definition and call, Macro expansion, nested Macro calls, Advanced Macro facilities, Design of a Macro preprocessor

**UNIT III 9**

Compilers and Interpreters: Aspects of Compilation, Memory allocation, Compilation of expressions, Compilation of control structures, Code optimization, Interpreters Linkers: Relocation and Linking concept, design of a Linker, Self Relocating Programs

**UNIT IV 9**

Introduction to OS: Types of OS, I/O Structure, Storage structure, Network Structure, System calls. Process Management: Process concept, Multithreading models, CPU Scheduling criteria, algorithms, Multiple processor Scheduling, Real Time Scheduling, Algorithm Evaluation, Critical Section problem, Synchronization hardware, Semaphores, Monitors, Classical Problems of Synchronization. Deadlock characterization, Prevention, Avoidance, Detection and Recovery.

**UNIT V 9**

Storage Management: Swapping, Memory Allocation – Contiguous and noncontiguous-Paging, Segmentation, Virtual Memory, demand paging, Page replacement, Allocation of frames, Thrashing, File concept, Access methods, File system structure. I/O Systems- I/O hardware, Disk - Structure, Scheduling, Disk Management and swap space management.

**TOTAL PERIODS = 45**

**REFERENCES**

1. Systems Programming and Operating Systems- D.M.Dhamdhere, Second revised Edition, Tata McGraw- Hill Publishing Company limited, New Delhi 2003.
2. Operating System Concepts – Silberschatz, Galvin, Gagne, 6th Edition, John Wiley & Sons (Asia) Pt. Lt , Singapore, 2003.
3. Operating System Design and Implementation– Andrew S. Tanenbaum, Albert S, WoodHull, 2nd Edition, PHI
4. Operating Systems – William stallings- 2nd Edition PHI, 6th print.

1. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Packages.
2. Implementation of Linear and Cyclic Codes
3. Implementation of Adaptive Filters, periodogram and multistage multirate system in DSP Processor
4. Simulation of QMF using Simulation Packages.
5. System design using PIC Microcontroller
6. Implementation of Lexical analyzer.
7. Implementation of Semaphores and monitors in classical problems of synchronization.
8. Usage of System Calls.

## SEMESTER II

<b>SL. NO</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>						
1	MCE016	Optical Fiber Communication and Networking	3	0	0	3
2	MCC201	Computer Architecture and Parallel Processing	3	0	0	3
3	MCC202	Wireless Networks	3	0	0	3
4	MCC203	Internet and Java Programming	3	0	0	3
5		Elective II	3	0	0	3
6		Elective III	3	0	0	3
<b>PRACTICAL</b>						
7	MCC231	Computer and Communication Laboratory II	0	0	4	2
<b>TOTAL</b>			<b>1</b>	<b>0</b>	<b>4</b>	<b>20</b>

**OBJECTIVE:**

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration
- To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

**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 PERIODS = 45****REFERENCES:**

1. G.P. Agarwal, Fiber optic communication systems, 2<sup>nd</sup> Ed, John Wiley & Sons, New York, 2002.
2. G. Keiser, Optical fiber communications. 4<sup>th</sup> ed Tata McGraw-Hill, New Delhi, 2008.
3. Franz & Jain, Optical communication, Systems and components, Narosa Publications, New Delhi, 2000. .
4. Rajiv Ramaswami and Kumar Sivarajan, Optical Networks: A practical perspective”, Academic press, London, 2002.
5. Harold Kolimbiris, Fiber Optic Communication, Education Asia, Delhi, ,2004
6. Biswanath Mukherjee, Optical WDM Networks”, Springer publications, 2006
7. Ulysees Black, ”Optical Networks”, Pearson Education, 2007.

**UNIT I THEORY OF PARALLELISM 9**

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**

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 9**

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 9**

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

**UNIT V SOFTWARE AND PARALLEL PROGRAMMING 9**

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

**TOTAL PERIODS = 45****REFERENCES:**

1. Kai Hwang, " Advanced Computer Architecture ", McGraw Hill International, 2001.
2. Dezsó Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer architecture A design Space Approach" , Pearson Education , 2003.
3. John P. Shen, "Modern processor design . Fundamentals of super scalar processors", Tata McGraw Hill 2003.
4. Kai Hwang, "Scalable parallel computing", Tata McGraw Hill 1998.
5. William Stallings, " Computer Organization and Architecture", Macmillan Publishing Company, 1990.
6. M.J. Quinn, " Designing Efficient Algorithms for Parallel Computers", McGraw Hill International, 1994.
7. Barry, Wilkinson, Michael, Allen "Parallel Programming", Pearson Education Asia , 2002
7. Harry F. Jordan Gita Alaghband, " Fundamentals of parallel Processing", Pearson Education , 2003
8. Richard Y. Kain, " Advanced computer architecture –A systems Design Approach", PHI, 2003.

**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

**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 PERIODS = 45****REFERENCES:**

1. Clint Smith. P.E., and Daniel Collins, "3G Wireless Networks", 2nd Edition, Tata McGraw Hill, 2007.
2. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, <http://books.elsevier.com/9780123735805>., 2007.
3. Kaveth Pahlavan,. K. Prashanth Krishnamuorthy, "Principles of Wireless Networks", Prentice Hall of India, 2006.
4. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.
5. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.
6. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
7. Sumit Kasera and Nishit Narang, " 3G Networks – Architecture, Protocols and Procedures", Tata McGraw Hill, 2007.

**OBJECTIVE:**

- To learn about java .HTML,DHTML concepts
- To know about server side programming
- Knowledge of xml and its applications

**UNIT I INTRODUCTION 9**

Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C)  
History of the Internet History of the World Wide Web - History of SGML –XML  
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 PERIODS = 45**

**REFERENCES:**

1. Deitel & Deitel Internet & World Wide Web How to Program, Pearson Education  
1. India -Third Edition -2004
2. Deitel & Deitel XML How to Program, Pearson Education,2001
3. Robert W.Sebesta , “ Programming withWorld Wide Web”,Pearson Education ,  
2009
4. Negrino and Smith Javascript for the World Wide Web, 5th Edition, Peachpit  
Press 2003.
5. Deitel & Deitel Perl How to Program, Pearson Education, 2001
6. Benoit Marchal, XML by Example, 2nd Edition, Que/Sams 2002.

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.
6. Simulation of ATM switches.
7. Simulation and Implementation of ATM congestion control algorithm.  
(Using free ATM network simulator software)

**OBJECTIVE:**

- To learn the basic of wireless channel and channel capacity models
- To discuss the performance of wireless channels and diversity techniques
- To study the multiple access capabilities of spread spectrum and multicarrier modulation techniques
- To learn the spread spectrum technologies.

**UNIT I THE WIRELESS CHANNEL 9**

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 8**

Fading– Outage Probability– Average Probability of Error — Combined Outage and Average Error Probability – Doppler Spread – Intersymbol Interference.

**UNIT III DIVERSITY 9**

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 10**

Data Transmission using Multiple Carriers – Multi carrier Modulation with Overlapping Sub channels – Mitigation of Sub carrier fading – Discrete Implementation of Multi carrier Modulation – Peak to average Power Ratio- Frequency and Timing offset – Case study IEEE 802.11a.

**UNIT V SPREAD SPECTRUM 9**

Spread Spectrum Principles – Direct Sequence Spread Spectrum – Spreading Code synchronization- RAKE receivers- Frequency Hopping Spread Spectrum – Multi-user DSSS Systems – Multi-user FHSS Systems.

**TOTAL PERIODS = 45****REFERENCES:**

1. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2005
2. David Tse and Pramod Viswanath, Fundamentals of Wireless Communication, Cambridge University Press, 2005.
3. W.C.Y.Lee, Mobile Communication Engineering, Mc Graw Hill, 2000
4. A.Paulraj, R.Nabar, D.Gore, Introduction to Space-Time Wireless Communication, Cambridge University Press, 2003.
5. T.S. Rappaport, Wireless Communications, Pearson Education, 2003

**OBJECTIVE:**

- To learn about impedance, matrix allocation and circuit matching principles.
- To discuss about filters and noise variations, distortions available in microwave circuits
- To learn the principles and designs implemented in amplifiers, oscillators and mixers with its applications

**UNIT I CIRCUIT REPRESENTATION AND IMPEDANCE MATCHING 9**

Low Frequency Parameters- Impedance matrix, Admittance matrix, ABCD matrix. High Frequency Parameters-S MATRIX, Formulation, Signal Flow Graphs. Smith Chart (ZY), Selection of Matching, Networks, Design of Matching Networks using lumped and distributed elements, using Smith Chart, FOSTERS REACTANCE Theorem

**UNIT II NOISE AND DISTORTION IN MICROWAVE CIRCUITS 9**

Review of Random Process - Thermal noise – available noise power and noise voltage – Auto correlation and Power spectral density in linear systems – Gaussian white noise – Mixing of noise – Narrow band representation of noise – probability of error for threshold detection – Noise Temperature, Noise factor and Noise figure, Equivalent noise temperature of non thermal sources. Noise temperature of cascaded networks. Noise figure of passive two port networks. Dynamic range and intermodulation distortion – Gain compression – third order intercept point. Intercept point of cascaded network.

**UNIT III FILTERS 9**

Filter design by Insertion loss method, Butterworth and Tchebychef 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**

Oscillator using common emitter BJT and common Gate FET – Practical consideration- Voltage Controlled Oscillators , Negative Resistance Oscillators – Dielectric resonator Oscillators – Frequency synthesis methods – PLL Analysis, Oscillator Phase Noise. Mixer characteristics – Image Frequency - Conversion Loss – Noise figure – Intermediate Distortion – Single ended Diode Mixer – Balanced Mixer – Small signal Analysis – Image Reject Mixer.

**TOTAL PERIODS = 45**

## REFERENCES:

1. Collins, R.E, "Foundations for Microwave Engineering", II edition, The IEEE Press Series on Electromagnetic wave theory, 2002.
2. Mathew M.Radmanesh,"Radio Frequency and Micro wave Electronics", Pearson Education, 2002
3. David M. Pozar, "Microwave and RF Design of Wireless systems" , John Wiley & sons, 2001.
4. Thomas H.Lee" Planat Microwave Engineering" Cambridge University press,2004

**OBJECTIVE:**

1. To study the fundamentals of image processing
2. To study the various image enhancement techniques
3. To know the various image compression standards
4. To know the applications of image processing

**UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9**

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

**UNIT II IMAGE ENHANCEMENT 9**

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

**UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9**

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological Watersheds – Motion Segmentation, Feature Analysis and Extraction.

**UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9**

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

**UNIT V APPLICATIONS OF IMAGE PROCESSING 9**

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing.

**REFERENCES:**

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing” Second Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thomson Learning, 2001
3. Anil K.Jain, “Fundamentals of Digital Image Processing”, Person Educaiton, 2003.
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, “Software Quality Theory and Management”, Cengage Learning, Second edition, 2003

**OBJECTIVE:**

- To learn about basic neural models and learning algorithms
- To gain 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**

Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback – Learning Process: Error Correction Learning –Memory Based Learning – Hebbian Learning – Competitive Learning- Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks: Pattern Space – Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering - Beamforming – Memory – Adaptation - Statistical Learning Theory – Single Layer Perceptron – Perceptron Learning Algorithm – Perceptron Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perceptron – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm.

**UNIT II RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES:RADIAL BASIS FUNCTION NETWORKS: 9**

Cover's Theorem on the Separability of Patterns - Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks- Learning in Radial Basis Function Networks - Applications: XOR Problem – Image Classification.

Support Vector Machine:

Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem - -insensitive Loss Function – Support Vector Machines for Nonlinear Regression

**UNIT III COMMITTEE MACHINES: 9**

Ensemble Averaging - Boosting – Associative Gaussian Mixture Model – Hierarchical Mixture of Experts Model (HME) – Model Selection using a Standard Decision Tree – A Priori and Postpriori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model - EM Algorithm – Applications of EM Algorithm to HME Model

**NEURO DYNAMICS STEMS:**

Dynamical Systems – Attractors and Stability – Non-linear Dynamical Systems- Lyapunov Stability – Neurodynamical Systems – The Cohen-Grossberg

**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: 9**

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 PERIODS = 45**

## **REFERENCES:**

1. Satish Kumar, “Neural Networks: A Classroom Approach”, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2004.
2. Simon Haykin, “Neural Networks: A Comprehensive Foundation”, 2ed., Addison Wesley Longman (Singapore) Private Limited, Delhi, 2001.
3. Martin T.Hagan, Howard B. Demuth, and Mark Beale, “Neural Network Design”, 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.

**OBJECTIVE:**

- To present an overview of FPGAs and ASICs that are suitable for tasks which cannot be executed efficiently by a general-purpose microprocessor
- To learn about Xilinx design software and low level designs
- To provide an in-depth idea using FPGAs that will involve architectural tradeoffs and simulation.
- To reinforce the hands on experience using computer-aided design tools(ASIC constructions, floor planning and placement).

**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**

Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - 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, 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.

**TOTAL PERIODS = 45**

**REFERENCES**

1. M.J.S .Smith, "Application Specific Integrated Circuits, Addison -Wesley Longman Inc., 1997.
2. Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Prentice Hall PTR, 2003.
3. Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.
4. R. Rajsuman, System-on-a-Chip Design and Test. Santa Clara, CA: Artech House Publishers, 2000.
5. F. Nekoogar. Timing Verification of Application-Specific Integrated Circuits (ASICs). Prentice Hall PTR, 1999.
6. Elaine Rhodes, "ASIC basics:An introduction to developing Application Specific Integrated Circuits", Lulu Publications,2008.

**OBJECTIVE:**

- To learn various embedded processors and integrated designs
- To discuss about real time systems and networks with their architecture
- To learn about system design techniques.

**UNIT I EMBEDDED PROCESSORS 9**

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process- Requirements, Specification, Architectural Design, Designing Hardware and Software Components, System Integration, Formalism for System Design- Structural Description, Behavioral Description, Design Example: Model Train Controller, ARM processor and memory organization.

**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 9**

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 9**

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

**UNIT V SYSTEM DESIGN TECHNIQUES 9**

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design, Quality Assurance, Design Example: Telephone PBX- System Architecture, Ink jet printer- Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

**TOTAL PERIODS = 45****REFERENCES:**

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", Morgan Kaufman Publishers.
2. Jane.W.S. Liu, "Real-Time systems", Pearson Education Asia.
3. C. M. Krishna and K. G. Shin, "Real-Time Systems" , McGraw-Hill, 1997
4. Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction" , John Wiley & Sons.
5. Raj Kamal Embedded Systems: "Architecture, Programming and Design", 2nd Edition (Volume 2) , 2009)
6. Dimitris Gizopoulos, A. Paschalis and Yervant Zorian," Embedded Processor-Based Self-Test (Frontiers in Electronic Testing)", 2011.

# MCE011 HIGH SPEED SWITCHING ARCHITECTURES

L T P C  
3 0 0 3

## OBJECTIVE:

- To understand the types of switch fabrics for high-speed applications
- To get a clear idea about the traffic and Queuing systems
- To illustrate packet switching and IP switching techniques

## UNIT I LAN SWITCHING TECHNOLOGY 9

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

## UNIT II ATM SWITCHING ARCHITECTURE 9

Blocking networks - basic - and- enhanced banyan networks, sorting networks – merge sorting, re-arrangable 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 9

Internal Queuing -Input, output and shared queuing, multiple queuing networks – combined Input, output and shared queuing - 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.

**TOTAL PERIODS = 45**

## REFERENCES:

1. Achille Pattavina, “Switching Theory: Architectures and performance in Broadband ATM networks ”, John Wiley & Sons Ltd, New York. 1998
2. Elhanany M. Hamdi, “High Performance Packet Switching architectures”, Springer Publications, 2007..
3. Itamar Elhanany and Mounir Hamdi, “High-performance Packet Switching Architectures”, 2011
4. Rich Seifert and James Edwards,” The All-New Switch Book: The Complete Guide to LAN Switching Technology”, 2008
5. Chris Hellberg, Dylan Greene and Truman Boyes, “Broadband Network architectures: Designing and Deploying Triple-Play Services” , 2007

**OBJECTIVE:**

- To introduce the fundamentals of nonlinear optics and applications in integrated devices
- To present the dispersion techniques and modulation techniques in optical networks
- To introduce and teach the optical solutions used in modern optical systems
- To broaden the perception of the role of optical engineering and applications

**UNIT I FIBER NONLINEARITIES 9**

Introduction - Nonlinear Refraction - Maxwell's Equations - Fiber Modes - Eigen value Equations - Single Mode Condition - Nonlinear pulse Propagation - Higher Order Nonlinear Effects.

**UNIT II GROUP VELOCITY DISPERSION AND PHASE MODULATION 10**

Gaussian Pulse - Chirped Gaussian Pulse - Higher Order Dispersions - Changes in Pulse Shape – Self Phase Modulation (SPM) induced Spectral Broadening - Non-linear Phase Shift - Effect of Group Velocity Dispersion - Self Steepening - Application of SPM Cross Phase Modulation (XPM) - Coupling between Waves of Different Frequencies - Non-linear Birefringence - Optical Kerr Effect - Pulse Shaping.

**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 (Qualitative treatment) – Demerits - Dispersion Managed Solitons (DMS).

**UNIT IV SOLITON LASERS 8**

Non-linear Fiber Loop Mirrors - Soliton Lasers - Fiber Raman Lasers - Fiber Raman Amplifiers - Fiber Raman Solitons - Erbium doped fiber amplifiers.

**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 PERIODS = 45****REFERENCES**

1. Govind P. Agrawal, 'Nonlinear Fiber Optics', Academic Press, New York (1995).
2. A.Hasegawa and M. Matsumoto, 'Optical Solitons in Fibers', Springer, Berlin (2003).
3. Govind P. Agrawal, 'Applications of Nonlinear Fiber Optics', Academic Press, New York (2001).
4. M. Lakshmanan and S. Rajasekar, 'Nonlinear Dynamics: Integrability, Chaos and Patterns', Springer, Berlin (2003).
5. Y. S. Kivshar and Govind Agrawal, 'Optical Solitons : From Fibers to Photonic Crystals', Academic Press, New York (2003).
6. Agrawal G.P, "Non-linear fiber optics", Elsevier India, 4<sup>th</sup> Edition, 2008.
7. <http://www.optics.rochester.edu/workgroups/agrawal/grouphomepage>

**OBJECTIVE:**

- To learn about speech mechanism
- To learn time domain and frequency domain methodologies for speech processing
- To learn about linear predictive analysis and applications of speech signal processing

**UNIT I MECHANICS OF SPEECH 8**

Speech production mechanism – Nature of Speech signal – Discrete time modelling 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 8**

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

**UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING 9**

Short Time Fourier analysis – Filter bank analysis – Formant extraction – Pitch 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 10**

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 10**

Algorithms: Spectral Estimation, dynamic time warping, hidden Markov model – Music analysis – Pitch Detection – Feature analysis for recognition – Automatic Speech Recognition – Feature Extraction for ASR – Deterministic sequence recognition – Statistical Sequence recognition – ASR systems – Speaker identification and verification – Voice response system – Speech Synthesis: Text to speech, voice over IP.

**REFERENCES:**

1. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", John Wiley and Sons Inc., Singapore, 2004.
2. Quatieri – "Discrete-time Speech Signal Processing" Prentice Hall, 2001.
3. Lawrence Rabiner and Ronald Schafer, "Theory and Applications of Digital Speech Processing", 2010
4. A. Nejat Ince Digital Speech Processing:: "Speech Coding, Synthesis and Recognition" (The Springer International Series in Engineering and Computer Science) 2010

**OBJECTIVE:**

- To learn about basic security issues
- Description of modeling issues and mathematical analysis using various encryption schemes
- To discuss the basic fire walls and layer security issues

**UNIT I INTRODUCTION ON SECURITY 9**

Security Goals, Types of Attacks: Passive attack, active attack, attacks on confidentiality, attacks on Integrity and availability. Security services and mechanisms, Techniques Cryptography, Steganography, Revision on Mathematics for Cryptography.

**UNIT II SYMMETRIC & ASYMMETRIC KEY ALGORITHMS 9**

Substitutional 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**

Message Integrity, Hash functions : SHA, Digital signatures : Digital signature standards. Authentication : Entity Authentication: Biometrics, Key management Techniques.

**UNIT IV NETWORK SECURITY, FIREWALLS AND WEB SECURITY 9**

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**

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 PERIODS = 45**

**REFERENCES:**

1. Behrouz A. Fourcuzan ,” Cryptography and Network security” Tata McGraw-Hill, 2008
2. William Stallings, "Cryptography and Network Security", 3rd Edition, Pearson Education, New Delhi, 2003
3. Tom Karygiannis, Les Owens, "Wireless Network Security 802.11, Bluetooth and Handheld Devices", National Institute of Standards and Technology, US Dept. of Commerce Special Publication 800-48, 2002
4. B.A. Forouzan, "Cryptography & Network Security", TaTa McGrawHill, 2007
5. Eric Cole “Network Security Bible” , 2009
6. Mark D. Ciampa,“Security+ Guide to Network Security Fundamentals” , 2008.
7. William Stallings “Network Security Essentials: Applications and Standards” 4th Edition, 2010
8. Stuart McClure, Joel Scambray and George Kurtz “Hacking Exposed: Network Security Secrets and Solutions”, Sixth Edition 2009
9. Chris McNab Network Security Assessment: Know Your Network 2007
10. Fahim Hussain Yusuf Bhajji “Network Security Technologies and Solutions” CCIE Professional Development Series, 2008

**OBJECTIVE:**

This course introduces the students to

- Understand Project planning and management
- Identify Client management and project definition.
- Understand testing based approach to development
- Team management and ongoing schedule tracking

**UNIT I****9**

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 – tracking project – project personnel – effort estimation – risk management – project plan – process models and project management

**UNIT II****9**

Capturing the requirements – requirements process – requirements elicitation – types – characteristics – modeling notations – specification languages – prototyping – documentation – validation and verification – measures – specification techniques – designing the system – decomposition and modularity – architectural styles and strategies – issues – characteristics – improvement techniques – design evaluation, validation – documentation

**UNIT III****8**

Considering objects – object orientation – OO development – use cases – representing OO – OO system design – program design – OO measurement – writing programs – standards – procedures – guidelines – documentation – programming process

**UNIT IV****9**

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****10**

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

**TOTAL PERIODS = 45****REFERENCES:**

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

**OBJECTIVE:**

1. To introduce the XML technology
2. To study and understand the web services technology
3. To implement XML in E-business
4. To know how to secure web services

**UNIT I XML TECHNOLOGY FAMILY 9**

XML – Benefits – Advantages of XML over HTML – EDI – Databases – XML Based standards– Structuring with schemas – DTD – XML schemas – XML processing – DOM –SAX–Presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT–XLINK–XPath–Xquery

**UNITII ARCHITECTING WEB SERVICES 9**

Business motivations for web services – B2B – B2C – Technical motivations – Limitations of CORBA and DCOM – Service Oriented Architecture (SOA) – Architecting web services – Implementation view– Web services technology stack – Logical view–Composition of web services–Deployment view From application server to peer to peer–Process view–Life in the runtime.

**UNITIII WEB SERVICES BUILDING BLOCKS 9**

Transport protocols for web services – Messaging with web services – Protocols – SOAP –Describing web services – WSDL – Anatomy of WSDL – Manipulating WSDL – Web service policy–Discovering web services – UDDI – Anatomy of UDDI – Web service inspection–Adhoc discovery–Securing web services.

**UNITIV IMPLEMENTING XML IN E-BUSINESS 9**

B2B – B2C applications – Different types of B2B interaction – Components of E – Business XML systems – EBXML – RosettaNet – Applied XML in vertical industry – Web services for mobile devices.

**UNITV XML CONTENT MANAGEMENT AND SECURITY 9**

Semantic web – Role of meta data in web content – Resource description framework – RDFschema–Architecture of semantic web – Content management workflow – XLANG –WSFL–Securing web services.

**TEXTBOOKS**

1. Ron Schmelzer and Travis Vandersypen, “XML and Web Services unleashed”, Pearson Education, 2002.
2. Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education,2003.

**REFERENCES**

1. David Chappell, “Understanding .NET A Tutorial and Analysis”, Addison Wesley, 2002.
2. Kennard Scibner and Mark C. Stiver, “Understanding SOAP”, SAMS Publishing, 2000.
3. Alexander Nakhimovsky and Tom Myers, “XML Programming: Web Applications and Web Services with JSP and ASP”, Apress, 2002.



**OBJECTIVE:**

- To learn about compression and storage techniques
- To learn the various compression coding techniques
- To study about the recent mpeg, audio and video techniques
- To learn about the emerging video standards and audio standards.

**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**

Compaction techniques – Huffmann coding – Adaptive Huffmann Coding – Arithmetic coding – Shannon-Fano coding – Dictionary techniques – LZW family algorithms.

**UNIT III AUDIO COMPRESSION 9**

Audio compression techniques -  $\mu$ - 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**

Predictive techniques – DM, PCM, DPCM: Optimal Predictors and Optimal Quantization – Contour based compression – Transform Coding – JPEG Standard – Sub-band coding algorithms: Design of Filter banks – Wavelet based compression: Implementation using filters – EZW, SPIHT coders – JPEG 2000 standards - JBIG, JBIG2 standards.

**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 PERIODS = 45****REFERENCES:**

1. Khalid Sayood : Introduction to Data Compression, Morgan Kauffman Harcourt India, 2nd Edition, 2000.
2. David Salomon : Data Compression – The Complete Reference, Springer Verlag New York Inc., 2nd Edition, 2001.
3. Yun Q.Shi, Huifang Sun : Image and Video Compression for Multimedia Engineering Fundamentals, Algorithms & Standards, CRC press, 2003.
4. Peter Symes : Digital Video Compression, McGraw Hill Pub., 2004.
5. Mark Nelson : Data compression, BPB Publishers, New Delhi, 1998.
6. Mark S.Drew, Ze-Nian Li : Fundamentals of Multimedia, PHI, 1st Edition, 2003.
7. Watkinson,J : Compression in Video and Audio, Focal press, London. 1995.
8. Jan Vozer : Video Compression for Multimedia, AP Profes, New York, 1995

**OBJECTIVE:**

- To discuss about the adhoc networks and applications of sensor networks
- To implement the network architecture,operating systems and optimization goals.
- To study about the protocols and sensors for wireless networks
- To learn the topology control and platforms of sensor networks

**UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS****8**

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

**UNIT II ARCHITECTURES****9**

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

**UNIT III NETWORKING OF SENSORS****10**

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

**UNIT IV INFRASTRUCTURE ESTABLISHMENT****9**

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

**UNIT V SENSOR NETWORK PLATFORMS AND TOOLS****9**

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

**TOTAL PERIODS = 45****REFERENCES :**

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.
5. Bhaskar Krishnamachari, "Networking Wireless Sensors", Cambridge Press,2005.
6. Mohammad Ilyas And Imad Mahgaob,"Handbook Of Sensor Networks: Compact Wireless And Wired Sensing Systems", CRC Press,2005.
7. Wayne Tomasi, "Introduction To Data Communication And Networking", Pearson Education, 2007.

**OBJECTIVE:**

- To study the system overview of operating system
- To study the process management and storage process
- To learn about the memory management and to manage the file allocation and future needs in operating system

**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 client-server systems - Multithreading models – Threading issues – Pthreads.

**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****9**

Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

**UNIT IV I/O SYSTEMS****9**

File concept – Access methods – Directory structure – File-system mounting – Protection - Directory implementation – Allocation methods – Free-space management - Disk scheduling – Disk management – Swap-space management.

**UNIT V CASE STUDY****8**

The Linux System - History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 2000 – History – Design Principles – System Components – Environmental subsystems – File system – Networking.

**TOTAL PERIODS = 45****TEXT BOOKS**

Silberschatz, Galvin and Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons Inc 2002.

**REFERENCES**

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
2. Gary Nutt, “Operating Systems”, Second Edition, Addison Wesley, 2001.
3. H M Deital, P J Deital and D R Choffnes, “Operating Systems” , Pearson Education, 2004.

**OBJECTIVE:**

- To learn the basics of Windows Programming
- To study the Visual Basic, Visual C++ programming
- To learn about the basic controls, Active X documents and Socket programming
- To discuss the advanced concepts of visual database

**UNIT I WINDOWS PROGRAMMING 8**

The windows programming Model – Event driven programming – GUI concepts – Overview of Windows programming – Creating and displaying the window – Message Loop – windows procedure – WM\_PAINT message – WM\_DESTROY message – Data types – Resources – An Introduction to GDI – Device context – Text output – Scroll Bars – Keyboard – Mouse – Menus.

**UNIT II VISUAL BASIC PROGRAMMING 10**

Visual Basic Applications – Form and properties – Variables and Constants – Variant type – Procedure scope – Main – Control statements – control arrays – Creating and using Controls – Menus and Dialogs – Programming fundamentals – Objects and instances – Debugging – Responding to mouse events – Drag and Drag drop events Responding to keyboard events – keypress, keyup, keydown events – Using grid control – Graphics controls – shape and line control – File system controls – Common dialog controls – Processing files – Accessing databases with the data controls.

**UNIT III VISUAL C++ PROGRAMMING 9**

Visual C++ components – Introduction to Microsoft Foundation Classes Library – Getting started with AppWizard – Class Wizard – Event handling – Keyboard and Mouse events - WM\_SIZE, WM\_CHAR messages - Graphics Device Interface - Pen, Brush, Colors, Fonts - Single and Multiple document interface - Reading and Writing documents - Resources – Bitmaps creation, usage of BMP and displaying a file existing as a BMP.

**UNIT IV CONTROLS 9**

Dialog Based Applications, controls – Animate control, image list, CRect tracker – Tree control – CtabControl – Dynamic controls – slider control – progress control – Inheriting CTreeView – CRicheditView – Modal Dialog, – Modeless Dialog – CColorDialog – CfileDialog.

**UNIT V ADVANCED CONCEPTS 9**

Domain Name System – Email – World Wide Web (HTTP) – Simple Status bars – Splitter windows and multiple views – Dynamic Link Library – Data base Management with ODBC – TCP/IP – Winsock and WinInet, – ActiveX control – creation and usage – Container class.

**TOTAL PERIODS = 45****TEXT BOOKS:**

1. Charles Petzold, “Windows Programming”, Microsoft press, 1996.
2. J. David Kruglirski, “Programming Microsoft Visual C++”, Fifth Edition, Microsoft press, 1998.
3. Marion Cottingham “Visual Basic”, Peachpit Press, 1999.

**REFERENCES:**

1. Steve Holzner, “Visual C++ 6 programming”, Wiley Dreamtech India Private Ltd., 2003.
2. Kate Gregory “Using Visual C++”, Prentice Hall of India Pvt., Ltd., 1999.
3. Herbert Sheildt, “MFC from the Ground Up”.
4. Deitel , “ Visual Basic 6.0 How To Program”, Pearson Education, 1999.

**OBJECTIVE:**

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

**UNIT I AD-HOC MAC****9**

Introduction – Issues in AdHoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

**UNIT II AD-HOC NETWORK ROUTING & TCP****9**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

**UNIT III WSN –MAC****9**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

**UNIT IV WSN ROUTING, LOCALIZATION & QOS****9**

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

**UNIT V MESH NETWORKS****9**

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

**TOTAL PERIODS = 45****REFERENCES:**

1. C.Siva Ram Murthy and B.Smanoj, “ Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
3. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007.

**OBJECTIVE:**

1. To introduce the various paradigms in distributed environment
2. To know about distributed operating systems
3. To study the file systems.
4. To understand the concepts of fault tolerance system.

**UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8**

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

**UNIT II DISTRIBUTED OPERATING SYSTEMS 12**

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms – Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols .

**UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10**

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

**UNIT IV FAULT TOLERANCE AND CONSENSUS 7**

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

**UNIT V CASE STUDIES 8**

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

**REFERENCES:**

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.
3. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGrawHill Series in Computer Science, 1994.
4. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
5. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

**OBJECTIVE:**

- To learn about the object oriented system concepts
- To learn and discuss about the UML tools and mapping functions
- To learn about packages and design patterns

**UNIT I****10**

Introduction to System Concepts - Managing Complex Software — Properties – Object Oriented Systems Development – Object Basics – Systems Development Life Cycle - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology – Unified Process

**UNIT II****8**

Unified Approach – Unified Modeling Language – Static behavior diagrams – Dynamic behavior diagrams – Object Constraint Language

**UNIT III****9**

Inception – Evolutionary Requirements – Domain Models – Operation Contracts - Requirements to Design – Design Axioms – Logical Architecture - Designing Objects with Responsibilities – Object Design – Designing for Visibility

**UNIT IV****9**

Patterns – Analysis and Design patterns – GoF Patterns - Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

**UNIT V****9**

More Patterns – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design – Persistence framework with patterns

**TOTAL PERIODS = 45****REFERENCES:**

1. Craig Larman. “Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd ed, Pearson Education, 2005.
2. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
3. Michael Blaha and James Rumbaugh, “Object-oriented modeling and design with UML”, Prentice-Hall of India, 2005.
4. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education. 2000.
5. Ali Bahrami, “ Object Oriented Systems Development”, Tata McGrawHill

**OBJECTIVE:**

1. To know the fundamentals of wireless communication
2. To understand the telecommunication systems
3. To study the different network layers
4. To study about various protocols

**UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9**

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

**UNIT II TELECOMMUNICATION SYSTEMS 11**

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

**UNIT III WIRELESS NETWORKS 9**

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Adhoc Network – Blue Tooth.

**UNIT IV NETWORK LAYER 9**

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

**UNIT V TRANSPORT AND APPLICATION LAYERS 7**

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA.

**TEXT BOOKS:**

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

**REFERENCES:**

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
4. Burkhardt, “Pervasive Computing”, First Edition, Pearson Education, 2003.

# **MCS011 SOFTWARE PROJECT MANAGEMENT**

**L T P C**  
**3 0 0 3**

## **OBJECTIVES:**

1. To study the product life cycle
2. To understand the emerging models relevance to project management
3. To know the engineering and people issues in project management

**UNIT I BASIC CONCEPTS 9**  
Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

**UNIT II FORMAT PROCESS MODELS AND THEIR USE 9**  
Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

**UNIT III UMBRELLA ACTIVITIES IN PROJECTS 9**  
Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

**UNIT IV IN STREAM ACTIVITIES IN PROJECTS 9**  
Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

**UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT 9**  
Phases (Requirements, Design, Development, Testing, Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

## **REFERENCES:**

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Humphrey, Watts, "Managing the Software Process", Addison Wesley, 1986.
3. Pressman, Roger, "Software Engineering", A Practitioner's approach. McGraw Hill, 1997.
4. Bob Hughes and Mike Cotterell, "Software Project Management". Fourth Edition, Tata McGraw Hill, 2005
5. Wheelwright and Clark, "Revolutionising product development", The Free Press, 1993

**OBJECTIVE:**

1. To introduce the grid computing
2. To study the technologies and tool kit for grid computing
3. To know the high level grid services

**UNIT I INTRODUCTION TO GRID COMPUTING 7**

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

**UNIT II GRID COMPUTING ARCHITECTURE 8**

Grid Computing anatomy – Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

**UNIT III GRID COMPUTING TECHNOLOGIES 11**

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF – OGSA Basic Services – Security standards for grid computing.

**UNIT IV GRID COMPUTING TOOL KIT 10**

Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

**UNIT V HIGH LEVEL GRID SERVICES 9**

High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

**TEXT BOOKS:**

Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson/PHI PTR-2003.

**REFERENCES:**

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a reality “, John Wiley and sons,2003.
2. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications”, Charles River media, 2003.

**OBJECTIVES:**

1. To introduce soft computing constituents
2. To study the applications of Genetic algorithms
3. To study the different classifications of neural networks
4. To understand the fuzzy logic

**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**

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

**UNIT IV FUZZY LOGIC 9**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

**UNIT V NEURO-FUZZY MODELING 9**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

**REFERENCES:**

1. Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Prentice hall New Jersey,1998
2. Timothy J.Ross:Fuzzy Logic Engineering Applications. McGraw Hill,NewYork,1997.
3. Laurene Fauseett: Fundamentals of Neural Networks. Prentice Hall India, New Delhi,1994.
4. George J.Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall Inc., New Jersey,1995
5. Nih.J. Ndssen Artificial Intelligence, Harcourt Asia Ltd.,Singapore,1998.
6. Colin R. Tosh and Graeme D. Ruxton “Modelling Perception with Artificial Neural Networks”, 2010
7. Principles of Artificial Neural Networks (Advanced Series in Circuits and Systems) by Daniel Graupe (Apr 5, 2007)
8. Yaochu Jin “Advanced Fuzzy Systems Design and Applications”, 2011
9. S. N. Sivanandam and S. N. Deepa “Introduction to Genetic Algorithms” 2010

**OBJECTIVES:**

1. To introduce the basics of data warehousing
2. To know the data mining functionalities
3. To study the various classification methods
4. To understand the concept of cluster analysis

**UNIT I****9**

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

**UNIT II****9**

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint- Based Association Mining.

**UNIT III****9**

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

**UNIT IV****9**

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint- Based Cluster Analysis – Outlier Analysis.

**UNIT V****9**

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

**TOTAL : 45 PERIODS****REFERENCES**

1. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.

**OBJECTIVE:**

- To Understand the fundamentals of cloud computing
- To study about the web based applications in cloud
- To know about the use of cloud computing

**UNIT I UNDERSTANDING CLOUD COMPUTING 6**

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

**UNIT II DEVELOPING CLOUD SERVICES 10**

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

**UNIT III CLOUD COMPUTING FOR EVERYONE 10**

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

**UNIT IV USING CLOUD SERVICES 10**

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files

**UNIT V OTHER WAYS TO COLLABORATE ONLINE 9**

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

**Total=45****REFERENCES**

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

**OBJECTIVE:**

1. To introduce the pervasive computing devices and interfaces
2. To know the voice standards and speech applications
3. To know the issues in pervasive computing

**UNIT I****9**

Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols

**UNIT II****9**

Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction

**UNIT III****9**

Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security

**UNIT IV****9**

PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

**UNIT V****9**

User Interface Issues in Pervasive Computing, Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture

**TEXT BOOKS**

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff. Pervasive Computing Technology and Architecture of Mobile Internet Applications, Addison Wesley, Reading, 2002.
2. Uwe Hansman, Lothar Merk, Martin S Nicklous & Thomas Stober: Principles of Mobile Computing, Second Edition, Springer- Verlag, New Delhi, 2003. Reference Books

**REFERENCES**

1. Rahul Banerjee: Internetworking Technologies: An Engineering Perspective, Prentice –Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5)
2. Rahul Banerjee: Lecture Notes in Pervasive Computing, Outline Notes, BITS-Pilani, 2003.

# **MCC010 DATA MINING ALGORITHMS, ANALYSIS AND PARALLELIZATION**

**L T P C**  
**3 0 0 3**

## **OBJECTIVE:**

- To understand the basics and various techniques of data mining.
- To know about mining of various types of data.
- To know about how to parallelize data mining algorithms.

## **UNIT I MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS 9**

Introduction to data mining algorithms, Basic Concepts and a Road Map, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint Based Association Mining.

## **UNIT II CLASSIFICATION AND PREDICTION 9**

Classification & Prediction – Definitions, Issues Regarding Classification & Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Backpropagation, Support Vector Machines, Classification by Association Rule Analysis, Lazy Learners, Genetic Algorithms, Rough Set & Fuzzy Set Approaches, Prediction Techniques, Evaluating the Accuracy of a Classifier or Predictor.

## **UNIT III CLUSTER ANALYSIS 9**

Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis.

## **UNIT IV MINING STREAM, TIME-SERIES AND SEQUENCE DATA 9**

Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining : Methods for Mining Frequent Subgraphs, Mining Variant and Constrained Substructure Patterns, Applications.

## **UNIT V PARALLELIZATION OF DATA MINING ALGORITHMS 9**

Parallelization of Association Rule Mining : Eclat, Maxclat, Clique, Maxclique, MLFPT. Parallel K Means Clustering, Parallel Hierarchical Clustering, Parallel Formulations of decision tree algorithms.

## **TOTAL: 45 PERIODS**

### **REFERENCES:**

1. Han J and Kamber M, “Data Mining : Concepts and Techniques” (Morgan Kaufmann Publishers, 2nd Edition 2006).
2. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, Pearson Education 2004.
3. Timothy J.Ross, “Fuzzy Logic with Engineering Application”, McGraw Hill, 1977.
4. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning” Addison Wesley, N.Y., 1989.
5. Stuart Russell and Peter Norvig, “Artificial Intelligence - A Modern Approach”, 2<sup>nd</sup> Edition, Prentice Hall, 2002.

6. Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Prentice Hall, 1994.
7. Srivastava, E. Han, V. Kumar, and V. Singh. "Parallel formulations of decision- tree classification algorithms." *Data Mining and Knowledge Discovery*, Vol. 3, no3, pp 237-261, September 1999.
8. Bundit et al., "Parallel Association Rule Mining based on FI Growth Algorithm", *icpads*, pp.1-8, 13th International Conference on Parallel and Distributed Systems – Volume 1 (ICPADS'07), 2007.
9. Li et al., "Parallel Data Mining Algorithms for Association Rules and Clustering", CRC Press, LLC pp1-1 1-25, 2006.
10. Mohammed J. Zaki, "Scalable Algorithms for Association Mining," *IEEE Transactions on Knowledge and Data Engineering*, Vol. 12, No. 3, pp 372-390 May/June 2000.
11. Osmar R. Zaiane, Mohammad El-Hajj, and Paul Lu. "Fast parallel association rule mining without candidacy generation." In *Proc. of the IEEE Int'l Conf. on Data Mining*, pp 665 – 668 November 2001.
12. Richard et al., "ParaKMeans: Implementation of a Parallelized KMeans Algorithm Suitable for general Laboratory use", *BMC Bioinformatics*.2008;9:200. Published . online 2008 April 16.
13. Sanguthevar Rajasekaran, "Efficient Parallel Hierarchical Clustering Algorithms", *IEEE Transactions On Parallel And Distributed Systems*, Vol. 16, No. 6, pp 497 – 502 June 2005.
14. Z. Li et al. "An Adaptive Parallel Hierarchical Clustering Algorithm", *HPCC 2007*, LNCS 4782, pp. 97–107, 2007. Springer-Verlag Berlin Heidelberg 2007.