NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution – Affiliated to Anna University, Chennai)

K.R.NAGAR, KOVILPATTI – 628 503

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REGULATIONS – 2013

DEPARTMENT OF

INFORMATION TECHNOLOGY

CURRICULUM AND SYLLABI OF

M.E. – COMMUNICATION AND NETWORKING

REGULATIONS - 2013

CURRICULUM AND SYLLABI OF FULL TIME

M.E. (COMMUNICATION AND NETWORKING)

SEMESTER I

SL NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CCC11	Applied mathematics for communication Engineers (Common to CS & CC)	3	1	0	4
2.	CCC12	Advanced Digital Signal Processing (Common to CS, CC, HVE & C&I)	3	0	0	3
3.	CCC13	Advanced Computer Architecture (Common to CSE & CC)	3	0	0	3
4.	CCC14	Principles of Operating System	3	0	0	3
5.	CCC15	Internet and Java Programming	3	0	0	3
6.	CCC16	Computer Communication Networks	3	0	0	3
PRACTICAL						
7.	CCC17	Communication and Networking Laboratory – I	0	0	4	2
		TOTAL	**18**	**1**	**4**	**21**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CCC21	Design Principles of Computer Networks	3	0	0	3
2.	CCC22	Wireless Networks (Common to CC & CS)	3	1	0	4
3.	CCC23	Optical Fiber Communication and Networking (Common to CS & CC)	3	0	0	3
4.	E1	Elective	3	0	0	3
5.	E2	Elective	3	0	0	3
6.	E3	Elective	3	0	0	3
PRACTICAL						
7.	CCC24	Communication and Networking Laboratory – II	0	0	4	2
		TOTAL	**18**	**1**	**4**	**21**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	E4	Elective	3	0	0	3
2.	E5	Elective	3	0	0	3
3.	E6	Elective	3	0	0	3
PRACTICAL						
4.	CCC31	Project Work (Phase I)	0	0	12	6
		TOTAL	**9**	**0**	**12**	**15**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1.	CCC41	Project Work (Phase II)	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL CREDITS TO BE EARNED FOR THE AWARD OF THE DEGREE – 69

LIST OF ELECTIVES FOR M.E. COMMUNICATION AND NETWORKING

List of Electives for Semester – II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1.	CCE2A	Advanced Wireless Communication (Common to CS & CC)	3	0	0	3
2.	CCE2B	Network Security	3	0	0	3
3.	CCE2C	Multimedia Compression Techniques (Common to CS & CC)	3	0	0	3
4.	CCE2D	Adhoc Networks (Common to CSE, CS & CC)	3	0	0	3
5.	CCE2E	System Modeling and Simulation	3	0	0	3
6.	CCE2F	Soft Computing (Common to CSE & CS, CC)	3	0	0	3
7.	CCE2G	Distributed Computing (Common to CSE & CC)	3	0	0	3
8.	CCE2H	Pervasive Computing (Common to CSE & CC)	3	0	0	3
9.	CCE2J	Digital Imaging (Common to CSE & CC)	3	0	0	3
10.	CCE2K	Speech Signal Processing (Common to CS & CC)	3	0	0	3

List of Electives for Semester – III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1.	CCE3A	Embedded Systems (Common to CS, CSE & CC)	3	0	0	3
2.	CCE3B	Data Mining Algorithms	3	0	0	3
3.	CCE3C	Evolutionary Computing (Common to HVE, CSE, CS & CC)	3	0	0	3
4.	CCE3D	Cloud Computing	3	0	0	3
5.	CCE3E	Security in Wireless Sensor Networks (Common to CSE, CS & CC)	3	0	0	3
6.	CCE3F	High Speed Switching Architectures (Common to CS & CC)	3	0	0	3
7.	CCE3G	Neural Networks and Its Applications (Common to CC & CS)	3	0	0	3
8.	CCE3H	Modeling and Simulation of Wireless Systems (Common to CSE & CC)	3	0	0	3
9.	CCE3J	XML and Web Services (Common to CSE & CC)	3	0	0	3
10.	CCE3K	Ophthalmology-Retina and Vitreous	3	0	0	3

CCC11 APPLIED MATHEMATICS FOR COMMUNICATION ENGINEERS L T P C
(Common to M.E CS and M.E CC) **3 1 0 4**

OBJECTIVES:

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

UNIT I SPECIAL FUNCTIONS 9

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

UNIT II ADVANCED MATRIX THEORY 9

Eigen-values using QR transformations - Generalized eigen vectors - Canonical forms - Singular value decomposition and applications - Pseudo inverse - Least square approximations.

UNIT III ONE DIMENSIONAL RANDOM VARIABLES 9

Random variables - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Uniform, Exponential, Gamma and Normal distributions**.**

UNIT IV TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions – Marginal and Conditional distributions – Correlation and Regression, Regression Curve for means.

UNIT V QUEUEING MODELS 9

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

TUTORIAL: 15 PERIODS TOTAL: 60 PERIODS

REFERENCES:

1. Taha, H.A., "Operations Research, An introduction", 7th Edition, Pearson Education Editions, Asia, New Delhi, 2002.
2. Bronson.R, "Matrix operation, Schaum's outline series", Mc Graw Hill, New York, 1989.
3. Grewal,B.S, "Higher Engineering Mathematics", 37th Edition, Khanna Publishers, 2003.
4. Ramana B.V, Higher Engineering Mathematics –Tata McGraw Hill, 2007.
5. Donald Gross and Carl M. Harris, "Fundamentals of Queuing theory", 2nd Edition, John Wiley and Sons, New York, 1985.

CCC12 ADVANCED DIGITAL SIGNAL PROCESSING L T P C
(Common to M.E CS, M.E CC, M.E HVE and M.E C&I) **3 0 0 3**

OBJECTIVES:

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

UNIT I DISCRETE RANDOM SIGNAL PROCESSING 9

Discrete Random Processes - Ensemble Averages, Stationary processes, Bias and Estimation, Auto covariance, Autocorrelation, Parseval's theorem, Wiener-Khintchine relation, White noise, Power Spectral Density, Spectral factorization, Filtering Random Processes, Special types of Random Processes, ARMA, AR, MA.

UNIT II SPECTRAL ESTIMATION 9

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

UNIT III LINEAR ESTIMATION AND PREDICTION 9

Linear prediction, Forward and Backward prediction, Signal modeling, Solution of Prony's normal equations, Least mean-squared error criterion, Wiener filter for filtering and prediction, FIR and IIR Wiener filters, Discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS 9

FIR adaptive filters, adaptive filter based on steepest descent method- Widrow-Hoff LMS algorithm, Normalized LMS algorithm, Adaptive channel equalization, Adaptive echo cancellation, Adaptive noise cancellation, RLS adaptive algorithm.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING 9

Upsampling and down sampling, Interpolation and Decimation, Sampling rate conversion by a rational factor, Polyphase filter structures, Multistage implementation of multirate system, Application to subband coding.

TOTAL: 45 PERIODS

REFERENCES:

1. Monson H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley and Sons, Inc, Singapore, 1st Edition, 2008.
2. John G. Proakis and Dimitris K Manolakis, "Digital Signal Processing", Pearson Education, 4th Edition, 2009.
3. Alan V. Oppenheim and Ronald W. Schafer, "Discrete-Time Signal Processing" 3rd Edition, Prentice Hall, 2009.
4. Emmanuel C. Ifeachor and Barrie W. Jervis, "Digital Signal Processing: A practical approach" 2nd Edition, Prentice Hall, 2002.

CCC13 ADVANCED COMPUTER ARCHITECTURE L T P C
(Common to CSE, CC) **3 0 0 3**

OBJECTIVES

- To understand quantitative and qualitative approaches and analyze various modules of modern computer systems.
- Students will learn about the efficiency of cache memory.
- Students will also learn how many processors synchronously execute instructions to improve performance of a computer system.

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING 9

Introduction – Measuring and reporting performance – Quantitative principles of computer design – Instruction set principles – Classifying ISA – Design issues – Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

UNIT II DYNAMIC APPROACHES 9

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issues – Hardware based speculation – Limitations of ILP.

UNIT III SOFTWARE APPROACHES 9

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms.

UNIT IV MEMORY AND I/O 9

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Virtual Memory – Buses – RAID – I/O performance measures – Designing an I/O system.

UNIT V MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronization issues – Models of memory consistency – Software and hardware multithreading.

TOTAL: 45 PERIODS

REFERENCES

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A quantitative approach", 5th Edition, Morgan Kaufmann Publishers, 2011.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 9th Edition, Pearson Education, 2012.
3. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A hardware / software approach", 1st Edition, Morgan Kaufmann Publishers, 1999.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2011.
5. John P. Hayes, "Computer Architecture and Organization", 3rd Edition, Tata McGraw Hill, 1997.
6. Douglas E. Comer, "Essentials of Computer Architecture", 1st International Edition, Pearson Education, 2005.

CCC14 PRINCIPLES OF OPERATING SYSTEM L T P C
3 0 0 3

OBJECTIVES:

- To learn the fundamentals of Language processing
- To learn the functionalities of Assembler and Compilers
- To study the functions of operating System
- To discuss about CPU scheduling and Storage Management

UNIT I LANGUAGE PROCESSORS 9

Language processors: Introduction, Language processing Activities, Fundamentals of language Processing - Data Structures, Search data structures, Allocation data structures, Assemblers: Elements of assembly language programming, simple assembly scheme, and pass structure of Assemblers. Compilers and Interpreters: Aspects of Compilation, Memory allocation, Compilation of control structures, Code optimization,

UNIT II INTRODUCTION TO OS 10

Introduction to OS: Types of OS, I/O Structure, Storage structure, Network Structure, CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – The critical-section problem - Semaphores – Classic problems of synchronization – critical regions – Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III MEMORY MANAGEMENT 9

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

UNIT IV FILE SYSTEM INTERFACE 9

File-System Interface: File concept – Access methods – Directory structure – File system Mounting – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – log-structured file systems.

UNIT V I/O SYSTEMS 8

I/O Systems – I/O Hardware – Application I/O interface. Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management - Case study: I/O in Linux, Process scheduling in Linux, Memory management in Linux, File system in Linux – file system in Windows XP

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, "Operating System Concepts", 9th Edition, 2012.
2. D.M.Dhamdhere, "Systems Programming and Operating Systems"- 2nd Revised Edition, Tata McGraw- Hill Publishing Company limited, New Delhi, 2003.

REFERENCE:

1. Andrew S. Tanenbaum, Albert S, WoodHull "Operating System Design and Implementation", 2nd Edition, PHI, 2006.

CCC15 INTERNET AND JAVA PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To learn about Internet and HTML.
- To know about server side programming
- To impart knowledge of XML and its applications
- To know about Mobile device programming

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 Hyper Text Markup Language - Editing HTML - Common Elements – Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists – HTML Tables-Basic HTML Forms

UNIT II 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 III SERVLETS AND JSP 9

Introduction – Servlet Overview Architecture – Handling HTTP Request – Get and post request – redirecting request – multi-tier applications – JSP – Overview – Objects – scripting – Standard Actions – Directives.

UNIT IV ENTERPRISE JAVABEANS 9

Introduction - EJB Fundamentals - Writing first Bean - Session beans - Entity Beans - Writing session bean web services.

UNIT V J2ME AND PHP 9

J2ME - J2ME Architecture - MIDlet programming – Multiple MIDlets in a MIDlet suit - PHP - Form Processing and Business Logic – Connecting to Database – Cookies – Dynamic Content in PHP

TOTAL: 45 PERIODS

TEXT BOOK:

1. Deitel & Deitel, "Internet & World Wide Web How to Program", Pearson Education India - 4th Edition, 2008

REFERENCES:

1. Ed Roman, "Mastering Enterprise JavaBeans", Wiley - 3rd Edition 2007.
2. James Keogh, "J2ME – The Complete reference", Tata McGRAW Hill 2003.
3. Robert W.Sebesta , " Programming with World Wide Web", Pearson Education, 4th Edition 2009.

CCC16 COMPUTER COMMUNICATION NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- To understand the various digital communication concepts
- To understand the basic principles of data communications and computer networks.
- To appreciate the complex trade-offs that are inherent in the design of networks.
- To provide a guided tour of network technologies from the lowest levels of data transmission up to network applications.
- To learn about current networking technologies, especially Internet protocols.

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 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 III CONVOLUTIONAL CODED DIGITAL COMMUNICATION 9

Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram – Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods – Error probability performance for BPSK and Viterbi algorithm, Turbo Coding.

UNIT IV IP NETWORKS 9

Open Data Network Model – Narrow Waist Model of the Internet – Success and Limitations of the Internet – Suggested Improvements for IP and TCP – Significance of UDP in modern Communication – Network level Solutions – End to End Solutions - Best Effort service model – Scheduling and Dropping policies for Best Effort Service model.

UNIT V ADVANCED ROUTING 9

Intra AS routing – Inter AS routing – Router Architecture – Switch Fabric – Active Queue Management – Head of Line blocking – Transition from IPv4 to IPv6 – Multicasting – Abstraction of Multicast groups – Group Management – IGMP – Group Shared Multicast Tree – Source based Multicast Tree – Multicast routing in Internet – DVMRP and MOSPF – PIM – Sparse mode and Dense mode

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Haykins, "Communication Systems", 5th Edition, John Wiley, 2008.
2. M.K.Simon, S.M.Hinedi and W.C.Lindsey, "Digital Communication Techniques; Signaling and detection", Prentice Hall India, New Delhi. 1995.

REFERENCES:

1. John G. Proakis and Masoud Salehi, "Digital Communications", 5th Edition, McGraw-Hill International Editions, 2008.
2. M. K. Simon and M. S. Alouini, "Digital Communication Over Fading Channels", 2000.
3. R. G. Gallager, "Principles of Digital Communication", Cambridge University Press, 2008.
4. Jean Warland and Pravin Vareya, "High Performance Networks", Morgan Kauffman Publishers, 2002.
5. Mahbub Hassan and Raj Jain, "High Performance TCP/IP Networking", Pearson Education, 2004.

6. William Stallings, "High Speed Networks: Performance and Quality of Service", 2nd Edition, Pearson Education, 2002.
7. Kurose and Ross, "Computer Networks : A top down Approach", Pearson Education, 2002

CCC17 COMMUNICATION AND NETWORKING LABORATORY – I

L T P C
0 0 3 2

List of Experiments:

1. Implementation of CPU scheduling algorithms.
2. Implementation of Lexical analyzer.
3. Implementation of Semaphores and monitors in classical problems of synchronization.
4. Usage of System Calls.
5. Web design with HTML
6. Web design with JAVA
7. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Packages.
8. Implementation of Linear and Cyclic Codes
9. Simulation of Adaptive Filters, periodogram and multistage multirate systems
10. Simulation of QMF using Simulation Packages.

CCC21 DESIGN PRINCIPLES OF COMPUTER NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- 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 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 9

Multimedia Networking Applications-Streaming Stored Video -Voice-Over-IP -Protocols for Real-Time Interactive Applications- Network Support for Multimedia.

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 MODELING 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-Message Integrity and Digital Signatures-End-Point Authentication, Securing E-mail- Securing TCP Connections: SSL - Network-Layer Security: IP SEC and Virtual Private Networks, Securing Wireless LANs, Operational Security: Firewalls And Intrusion Detection Systems-Infrastructure for Network Management, Internet-Standard Management Framework, ASN.1.

TOTAL: 45 PERIODS

TEXT BOOK:

1. J.F. Kurose & K.W. Ross, "Computer Networking- A top down approach featuring the Internet", Pearson, 6th Edition, 2012.

REFERENCES:

1. Nader F.Mir ,Computer and Communication Networks, 1st Edition,2003.
2. LEOM-GarCIA, WIDJAJA, "Communication networks", TMH 7th reprint, 2002.
3. Aunurag kumar, D.M.Anjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers, 1st Edition, 2004.
4. Hersent Gurle & petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearson Education, 2003.
5. Fred Halsall and Lingana Gouda Kulkarni, "Computer Networking and the Internet", 5th Edition, Pearson Education, 2006.
6. Walrand .J. Varatya, "High performance communication network", Morgan Kauffman – Harcourt Asia Pvt. Ltd. 2nd Edition, 2000.

CCC22	WIRELESS NETWORKS (Common to CC & CS)	L T P C 3 1 0 4

OBJECTIVES:

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

UNIT I WIRELESS LOCAL AREA NETWORKS 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 AND 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 AND SENSOR NETWORKS 9

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT 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 AND BEYOND 9

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

TUTORIAL: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

1. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, http://books.elsevier.com/9780123735805. 2007.
2. Kaveth Pahlavan,. K. Prashanth Krishnamoorthy, "Principles of Wireless networks", Prentice Hall of India, 2006.
3. Clint Smith. P.E., and Daniel Collins, "3G Wireless Networks", 2nd Edition, Tata McGraw Hill, 2007.

REFERENCES:

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Edition, 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Edition, 2007.
3. Sumit Kasera and Nishit Narang, "3G Networks – Architecture, Protocols and Procedures", Tata McGraw Hill, 2007.
4. Savo G.Glisic, "Advanced Wireless Networks: 4G Technologies", Kindle Editions, 2006.

CCC23 OPTICAL FIBER COMMUNICATION AND NETWORKING L T P C
(Common to M.E CS and M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I FIBER OPTIC WAVE GUIDES 9

Light wave generation systems, system components, optical fibers, SI, GI, fibers, modes, Dispersion in fibers, limitations due to dispersion, Fiber loss, non linear effects, Dispersion shifted and Dispersion flattened fibers.

UNIT II OPTICAL TRANSCEIVER 9

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

UNIT III LIGHT WAVE SYSTEM 9

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

UNIT IV DISPERSION COMPENSATION 9

Limitations, Post- and Pre- compensation techniques, Equalizing filters, fiber based gratings, Broadband compensation, Soliton communication system, fiber Soliton, Soliton based communication system design, High capacity and WDM Soliton system.

UNIT V PRINCIPLES OF OPTICAL NETWORKS 9

First and second generation optical networks: system network evaluation, SONET / SDH, MAN layered architecture broadcast and select networks MAC protocols, test beds, wavelength routing networks.

TOTAL: 45 PERIODS

REFERENCES:

1. G.P. Agarwal, " Fiber Optic Communication Systems", 2nd Edition, John Wiley & Sons, New York, 2008.
2. G. Keiser, " Optical Fiber Communications", 4th Edition, Tata McGraw-Hill, New Delhi, 2008.
3. Rajiv Ramaswami, Kumar Sivarajan and Galen Sasaki, "Optical Networks: A Practical Perspective", 3rd Edition, Morgan Kaufmann, 2009.
4. Harold Kolimbiris, "Fiber Optic Communication", 1st Edition (Reprint), Pearson Education, 2004.

CCC24 COMMUNICATION AND NETWORKING LABORATORY – II

L	T	P	C
0	0	3	2

List of Experiments:

1. DC characteristics of PIN PD and APD.
2. P-I characteristics of LED and LASER.
3. Optical link simulation using simulator packages.
4. Performance Comparison of MAC Protocols (using NS2).
5. Performance Comparison of Routing Protocols (using CISCO Packet Tracer).
6. Implementation of Chat Server using P2P Connections
7. Simulation of ATM switches.
8. Simulation and Implementation of ATM congestion control algorithm.
   (Using free ATM network simulator software)

CCE2A ADVANCED WIRELESS COMMUNICATION L T P C
(Common to M.E CS & M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I THE WIRELESS CHANNEL 9

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

UNIT II PERFORMANCE OF DIGITAL MODULATION OVER WIRELESS CHANNELS 8

Capacity with Receiver diversity, Capacity comparisons, Capacity of Frequency Selective Fading channels, 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, Multicarrier Modulation with Overlapping Sub channels, Mitigation of Subcarrier Fading, Space-time Multiplexing, Peak to Average Power Ratio- Frequency and Timing offset, Case study IEEE 802.11a.

UNIT V SPREAD SPECTRUM 9

Spread Spectrum Principles, Direct Sequence Spread Spectrum, Spreading Codes, Synchronization, RAKE receivers, Frequency Hopping Spread Spectrum, Multiuser DSSS Systems, Multi user FHSS Systems.

TOTAL: 45 PERIODS

REFERENCES:

1. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.
2. T.S. Rappaport, "Wireless Communications: Principles and Practices", 2nd Edition, Pearson Education, 2010.
3. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", 1st Edition, Cambridge University Press, 2005.
4. Andreas F. Molisch, "Wireless Communications", 2nd Edition, Wiley - IEEE, 2011.

CCE2B NETWORK SECURITY L T P C
3 0 0 3

OBJECTIVES:

- 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 - Modular arithmetic, Euclid's algorithm, Polynomial arithmetic, Groups, Rings and finite fields.

UNIT II SYMMETRIC AND ASYMMETRIC KEY ALGORITHMS 9

Substitutional Ciphers- Transposition Ciphers, Stream and Block Ciphers principles- Simplified DES-The Data Encryption Standards (DES)-Block cipher modes of operations, Advanced Encryption Standard (AES), RC5, Principle of asymmetric key algorithms, RSA Algorithm.

UNIT III INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT 9

Message Integrity- Hash functions: MD5 Message Digest algorithm- SHA, Digital signatures: Authentication protocols- Digital signature standards, Authentication: Requirements and function, Biometrics, Key management – Diffie Hellman key exchange, Techniques.

UNIT IV NETWORK SECURITY, SYSTEM SECURITY AND WEB SECURITY 9

Kerberos – X.509 authentication service – Email Security: PGO, S/MIME,
Firewalls: Design principles, Types, Trusted systems, IP Security: Architecture, authentication Header, Security payload, security associations, Web security: Requirements, SSL, TLS, Secure electronic transaction, - Intruders – Malicious Software.

UNIT V WIRELESS NETWORK SECURITY 9

Wireless Network Security: Fundamentals, Types of WNS technology, Standards, Design Issues - 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: 45 PERIODS

TEXT BOOKS:

1. Behrouz A. Fourouzan, "Cryptography and Network security", 2nd Edition, Tata McGraw-Hill, 2012
2. William Stallings, "Cryptography and Network Security", 3rd Edition, Pearson Education, New Delhi, 2003

REFERENCES:

1. 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.
2. Atul Kahate, "Cryptography & Network Security", 2nd Edition, Tata McGraw Hill, 2007.
3. Mark D. Ciampa, "Security + Guide to Network Security Fundamentals", 2008.
4. William Stallings "Network Security Essentials: Applications and Standards" 4th Edition, 2010.
5. Stuart McClure, Joel Scambray and George Kurtz "Hacking Exposed: Network Security Secrets and Solutions", 6th Edition 2009.

CCE2C MULTIMEDIA COMPRESSION TECHNIQUES L T P C
(Common to M.E CS & M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I INTRODUCTION 9

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

UNIT II TEXT COMPRESSION 9

Compression techniques, Huffman coding, Adaptive Huffman Coding, Arithmetic coding, Shannon-Fano coding, Dictionary techniques, LZW family algorithms.

UNIT III AUDIO COMPRESSION 9

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

UNIT IV IMAGE COMPRESSION 9

Predictive techniques, DM, PCM, and 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: 45 PERIODS

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, 2007.
3. Mark S.Drew, Ze-Nian Li, "Fundamentals of Multimedia", PHI, 1st Edition, 2003.
4. John F. Buford, "Multimedia Systems", 6th Edition, Pearson Education, 2009.

CCE2D	ADHOC NETWORKS	L T P C
	(Common to CSE, CS and CC)	3 0 0 3

OBJECTIVES

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

UNIT I ADHOC MAC 9

Introduction – Issues in Adhoc Wireless Networks – MAC Protocols – Issues – Classifications of MAC protocols – Multi channel MAC and Power control MAC protocol.

UNIT II ADHOC NETWORK ROUTING AND TCP 9

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

UNIT III WSN - MAC 9

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

UNIT IV WSN ROUTING, LOCALIZATION AND QoS 9

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

UNIT V MESH NETWORKS 9

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

TOTAL: 45 PERIODS

REFERENCES

1. C.Siva Ram Murthy, B.S. Manoj, "Adhoc Wireless Networks: Architectures and Protocols", 1st Edition, Pearson Education, 2004.
2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", 1st Edition, Morgan Kaufman Publishers, 2004.
3. C.K.Toh, "Adhoc Mobile Wireless Networks", 1st Edition, Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", 2nd Edition, O'Reilly Publishers, 2007.
5. C K Toh, "Adhoc mobile wireless networks, Protocols and Systems", 2nd Edition, Pearson Education, 2009.
6. Azzedine Boukerche, "Handbook of algorithms for wireless Networking and Mobile computing", 2nd Edition, CRC Press, 2006.

CCE2E SYSTEM MODELING AND SIMULATION L T P C
3 0 0 3

OBJECTIVES:

- This course provides an introduction to system modeling using both computer simulation and mathematical techniques.
- To provide an understanding of methods, techniques and tools for modeling, simulation and performance analysis of complex systems such as communication and computer networks.

UNIT I INTRODUCTION TO MODELING AND SIMULATION 9

Nature of Simulation Systems, Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling, Static and Dynamic physical models, Static and Dynamic Mathematical models, Introduction to Static and Dynamic System simulation, Advantages, Disadvantages and pitfalls of Simulation.

UNIT II SYSTEM SIMULATION AND CONTINUOUS SYSTEM SIMULATION 9

Types of System Simulation, Monte Carlo Method, Comparison of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model, Continuous System models, Analog and Hybrid computers, Digital-Analog Simulators, Continuous system simulation languages, Hybrid simulation, Real Time simulations.

UNIT III SYSTEM DYNAMICS AND PROBABILITY CONCEPTS IN SIMULATION 9

Exponential growth and decay models, logistic curves, Generalization of growth models, System dynamics diagrams, Multi segment models, Representation of Time Delays, Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

UNIT IV SIMULATION OF QUEUEING SYSTEMS AND DISCRETE SYSTEM SIMULATION 9

Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue, Application of queuing theory in computer system, Discrete Events, Generation of arrival patterns, Simulation programming tasks, Gathering statistics, Measuring occupancy and Utilization, Recording Distributions and Transit times.

UNIT V INTRODUCTION TO SIMULATION LANGUAGES AND ANALYSIS OF SIMULATION OUTPUT 9

GPSS: Action times, Succession of events, Choice of paths, Conditional transfers, program control statements.

SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements. Estimation methods, Relication of Runs, Batch Means, Regenerative techniques, Time Series Analysis, Spectral Analysis and Autoregressive Processes.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Andrew Seila, "Applied Simulation Modeling", w/CD, 1st Edition, 2009.
2. Averill M.Law, "Simulation Modeling and Analysis" 4th Edition, McGraw-Hill 2006.

REFERENCES

1. Seila Andrew.F, "Simulation Modeling", Cengage Learning, 2009.
2. Narshing Deo, "System Simulation with Digital Computer", PHI Learning Pvt. Ltd, 2004.
3. H.James Harrington, "Simulation Modeling Methods", McGrawHill, 2009.
4. Gorden.G., "System Simulation", Prentice Hall, 2006.

CCE2F	SOFT COMPUTING	L T P C
	(Common to CSE, CS and CC)	3 0 0 3

OBJECTIVES

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

UNIT I SOFTCOMPUTING AND CONVENTIONAL AI 9

Evolution of Computing – Soft Computing Constituents – From Conventional AI to Computational Intelligence – Derivative based optimization: Descent Methods, Newton's method – Step size determination – Derivative free optimization.

UNIT II FUZZY SYSTEMS 9

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

UNIT III ARTIFICIAL NEURAL NETWORKS 9

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks.

UNIT IV NEURO - FUZZY MODELING 9

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

UNIT V GENETIC ALGORITHMS 9

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

TOTAL: 45 PERIODS

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", 1st Edition, Prentice Hall of India, 2003.
2. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", 1st Edition, Springer, 2007.
3. S.N.Sivanandam, S.N.Deepa, "Principles of Soft Computing", Wiley & Sons, 2nd Edition, 2007.
4. Agoston E.Eiben, J.E.Smith, "Introduction to Evolutionary Computing", 1st Edition, Springer, 2008.
5. S.N.Sivanandam, S.Sumathi and S.N.Deepa, "Introduction to Fuzzy Logic using MATLAB", 1st Edition, Springer, 2007.
6. James A.Freeman and David M.Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", 1st Edition, Pearson Education, 2003.

CCE2G	DISTRIBUTED COMPUTING (Common to CSE and CC)	L T P C 3 0 0 3

OBJECTIVES

- To learn the various paradigms in distributed environment.
- To know about distributed operating systems.
- To study the concept of distributed resource management.
- To understand the concept 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: Logical Clock – Vector Clock – 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 7

Introduction to Fault Tolerance – Process Resilience – Reliable Client Server Communication – Reliable Group Communication – Distributed Commit Protocols – Failure – Recovery.

UNIT V DISTRIBUTED OBJECT BASED SYSTEM 8

Distributed Object Based System: Architecture – Communication – Naming – CORBA – Distributed Coordination Based System – Coordination model – Architecture – Content based routing – Synchronization.

TOTAL: 45 PERIODS

REFERENCES

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education Asia, 2002.
2. Andrew S. Tanenbaum, M. Van Steen, "Distributed Systems", 2nd Edition, Prentice Hall, 2006.
3. Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", 2nd Edition, Wiley publishers, 2004.
4. Mukesh Singhal, "Advanced Concepts In Operating Systems", 3rd Edition, McGraw Hill, 2004.
5. M. L. Liu, "Distributed Computing Principles and Applications", Fourth Impression, Pearson Education, 2009.

CCE2H	PERVASIVE COMPUTING	L T P C
	(Common to CSE and CC)	3 0 0 3

OBJECTIVES

- To understand the pervasive computing concepts.
- To know the voice standards and speech applications.
- To know the issues in pervasive computing.

UNIT I INTRODUCTION 9

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

UNIT II WEB APPLICATIONS 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 SPEECH APPLICATIONS 9

Voice Enabling Pervasive Computing – Voice Standards – Speech Applications in Pervasive Computing and security.

UNIT IV PDA AND PERVASIVE COMPUTING 9

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

UNIT V ADVANCED CONCEPTS 9

User Interface Issues in Pervasive Computing – Architecture – Smart Card based Authentication Mechanisms – Wearable computing Architecture.

TOTAL: 45 PERIODS

REFERENCES

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec and Klaus Rindtorff, "Pervasive Computing Technology and Architecture of Mobile Internet Applications", 1st Edition, Addision Wesley professional, 2002.
2. Uwe Hansman, Lothat Merk, Martin S Nicklous and Thomas Stober, "Principles of Mobile Computing", 2nd Edition, Springer - Verlag, New Delhi, 2003.
3. Rahul Banerjee, "Internetworking Technologies: An Engineering Perspective", 2nd Edition, Prentice Hall of India, 2004.
4. Rahul Banerjee, "Lecture Notes in Pervasive Computing", Outline Notes, BITS-Pilani, 2003.
5. Jochen Burkhardt, Dr. Horst Henn, Stefan Hepper and Klaus Rintdorff, Thomas Schaeck, "Pervasive Computing", 2nd Edition, Addison Wesley, 2009.
6. F.Adelstein, S.K.S. Gupta, "Fundamentals of Mobile and Pervasive Computing", 1st Edition, Tata McGraw Hill, 2005.

CCE2J	DIGITAL IMAGING	L T P C
	(Common to CSE and CC)	3 0 0 3

OBJECTIVES

- To understand the fundamentals of image processing.
- To learn the various image enhancement and segmentation techniques.
- To know the various image compression standards.
- To know the applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Elements of digital image processing systems, Elements of visual perception, brightness, contrast, hue, saturation – Color fundamentals and models – Image file formats – Image Acquisition – Sampling and Quantization – Pixel Relationships – Image operations – Morphological Image Processing – Matlab: Basics - Implementation of Image operations.

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 – Matlab functions of Transformations.

UNIT III IMAGE SEGMENTATION AND ANALYSIS 9

Color Image Processing – Image Segmentation – Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction – Implementation of Image Segmentation techniques using Matlab.

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 Matlab Implementation of Wavelets and Compression – Matlab: Wavelets Basics – Types – Compression Techniques.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9

Image Representation – Boundary Descriptors – Regional Descriptors – Relational Descriptors – Object Recognition – Applications of Image Processing – Matlab Implementation of Object Recognition.

TOTAL: 45 PERIODS

REFERENCES

1. Rafael C.Gonzalez, Richard E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2009.
2. S.Jayaraman, S.Esakkirajan and T.Veerakumar, "Digital Image Processing", 1st Edition, Tata Mc Graw Hill, 2009.
3. Rafael C.Gonzalez, Richard E.Woods and Steven L.Addins, "Digital Image Processing Using MATLAB", 2nd Edition, Pearson Education, 2009.
4. Wilhelm Burger, Mark Burge, "Principles of Digital Image Processing: Fundamental Techniques", 1st Edition, Springer, 2009.
5. Castleman, "Digital Image Processing", 1st Edition Pearson Education, 2007.
6. Anil K.Jain, "Fundamentals of Digital Image Processing", 2nd Edition, Pearson Education, 2003.

CCE2K SPEECH SIGNAL PROCESSING L T P C
(Common to M.E CS and M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I MECHANICS OF SPEECH 8

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

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 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.

TOTAL: 45 PERIODS

REFERENCES:

1. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", 2nd Edition, John Wiley and Sons Inc., Singapore, 2004.
2. Quatieri, "Discrete-time Speech Signal Processing", Pearson Education, 2008.
3. Lawrence Rabiner and Ronald Schafer, "Theory and Applications of Digital Speech Processing", Pearson Education, 2010.
4. Nejat Ince, "Digital Speech Processing-Speech Coding, Synthesis and Recognition", The Springer International Series in Engineering and Computer Science, 2010.

CCE3A **EMBEDDED SYSTEMS** **L T P C**
(Common to M.E CS, M.E CSE and M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I EMBEDDED SYSTEM BASICS 9

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

UNIT II ARM ARCHITECTURE 9

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

UNIT III EMBEDDED PROGRAMMING AND COMPUTING PLATFORM 9

Embedded software development based on ARM including: ARM basic instruction set, Thumb instruction set- assembly programming- ARM processor mode switching-embedded C programming-C and assembly language mix programming.

UNIT IV ARM BASIC PERIPHERAL INTERFACING 9

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

UNIT V ARM COMMUNICATION INTERFACING AND DEVELOPMENT TOOLS 9

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

TOTAL: 45 PERIODS

REFERENCES:

1. "ARM Architecture Reference Manual", ARM Ltd, 2011.
2. "The ARM-Thumb Procedure Call Standard", ARM Ltd, 2011.
3. Steve Furber, "ARM System-on-Chip Architecture", 2nd Edition, Addison-Wesley, 2000.
4. Todd D. Morton, "Embedded Microcontrollers", Prentice Hall, 2001.
5. "Embest ARM Teaching System User Manual", Embest Info & Tech, Ltd, Version2.01.
6. Embedded System Development and Labs for ARM, (Edited, revised and updated by Radu Muresan).

CCE3B DATA MINING ALGORITHMS L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics and various techniques of data mining.
- To classify and cluster the data
- To know about mining of various types of data.
- To gain knowledge about mining of various multidimensional data

UNIT I MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS 9

Introduction to data mining algorithms, Basic Concepts and a Road Map, Efficient and Scalable Frequent Item set 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 Back propagation, 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 Sub graphs, Mining Variant and Constrained Substructure Patterns, Applications.

UNIT V MINING OBJECT, SPATIAL, MULTIMEDIA, TEXT AND WEB DATA 9

Multidimensional analysis and descriptive mining of complex data objects – Spatial data mining – Multimedia Data mining – Text mining – Mining the World Wide Web- Applications of data mining

TOTAL: 45 PERIODS

TEXT BOOK:

1. Han J and Kamber M, "Data Mining : Concepts and Techniques" (Morgan Kaufmann Publishers, 2nd Edition, 2006.

REFERENCES:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, Pearson Education 2004.
2. Davis E.Goldberg, "Genetic Algorithms: The Design of Innovation" Springer, 2012.
3. Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Prentice Hall, 1994.

CCE3C	EVOLUTIONARY COMPUTING	L	T	P	C
	(Common to HVE, CSE, CS and CC)	3	0	0	3

UNIT I INTRODUCTION TO EVOLUTIONARY COMPUTATION 9

Introduction – Possible applications of evolutionary computations – History of evolutionary computation – Genetic algorithms – Evolution strategic – Evolutionary programming – Derivative methods – Stochastic processes – Modes of stochastic convergence – Schema processing – Transform methods – Fitness landscape – Probably Approximately Correct(PAC) learning analysis – Limitation of evolutionary computation methods – Local performance measures.

UNIT II REPRESENTATION, SELECTION AND SEARCH OPERATORS 9

Representation – Binary strings – Real-valued vectors – Permutations – finite-state representation – Parse trees – Guidelines for a suitable encoding – Other representations Selection – Proportional selection and sampling algorithms – Tournament selection – Rank based selection – Boltz Mann selection – Other selection methods – Hybrids Generation gap methods –A comparison of selection mechanisms – Interactive evolution – Search Operators – Mutation – recombination – Other operators.

UNIT III FITNESS EVALUATION AND CONSTRAINT HANDLING 9

Fitness Evaluation – Encoding and decoding functions – Competitive fitness evaluation – Complexity based fitness evaluation – Multi objective optimization – Constraint handling techniques – Penalty functions – Decoders – Repair algorithms – Constraint preserving operators – Other constraint handling methods – Constraint satisfaction problems – Population structures – Niching Methods – Specification methods – Island(migration)models.

UNIT IV HYBRID SYSTEM 9

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

UNIT V PARAMETER SETTING AND APPLICATIONS 9

Heuristics for Parameter setting Issues – Population size – Mutation parameters – Recombination parameters – Implementation of Evolutionary Algorithms – Efficient implementation of algorithms – Computation time of evolutionary operators – Applications – Classical optimization problems – Control Identification – Scheduling – Pattern recognition – Simulation models

Total 45 Periods

REFERENCES:

1. Thomas Backetal., "Handbook on evolutionary computation", Institute of Physics, Publishing, 2000.
2. Xin Yao, "Evolutionary Computations: Theory and Applications", World Scientific 39 Publishing, 1999.
3. Goldberg, "Genetic algorithm in search, optimization and machine learning", Addison Wesley, 1998.
4. Davis, "Hand book on Genetic Algorithms", NewYork, 1991.
5. Kenneth A. De Jong, "Evolutionary Computation: A Unified Approach", MIT Press, 2006.

CCE3D CLOUD COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- 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 PERIODS

TEXT BOOK:

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Pearson Education, 2009.

REFERENCE BOOK:

1. 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, 2nd Edition, 2009.

CCE3E SECURITY IN WIRELESS SENSOR NETWORKS L T P C
(Common to CSE, CS and CC) **3 0 0 3**

OBJECTIVES

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

UNIT I INTRODUCTION 9

Communication architecture of WSN – Constraints – security requirements – Threats – evaluation – attacks; Vulnerabilities of physical layer – jamming, tampering; Vulnerabilities of data link layer – collisions, exhaustion, unfairness; Vulnerabilities of network layer - Spoofed, Altered, or Replayed Routing Information, Selective Forwarding, Sinkhole, Sybil, Wormholes, Hello Flood Attacks, Acknowledgment Spoofing; Vulnerabilities of transport layer – Flooding, Desynchronization.

UNIT II KEY MANAGEMENT PROTOCOLS AND BROADCAST AUTHENTICATION 9

Key distribution – classifications: deterministic and probabilistic; protocols: LEAP, BROSK, IOS/DMBS, PIKE, SKEW; Broadcast authentication: μTesla, Certificate-Based Authentication Scheme, Basic Merkle Hash Tree Based Authentication Scheme, Enhanced Merkle Hash Tree Based Authentication Scheme, ID-Based Authentication Scheme.

UNIT III SECURE ROUTING PROTOCOLS 9

EAR, PRSA, R-LEACH, S-SPIN, Secure-SPIN, Segment transmission secure routing protocol, SONS, SS-LEACH, INSENS

UNIT IV DATA AGGREGATION, INTRUSION DETECTION AND AUTOCONFIGURATION 9

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

UNIT V TRUST MANAGEMENT 9

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

TOTAL: 45 PERIODS

REFERENCES

1. Yang Xiao, "Security in distributed, grid, mobile and pervasive computing", Auerbach publications, 3rd Edition, 2006.
2. Yong Wang, Garhan Attebury and Byrav Ramamurthy, "A Survey of security issues in wireless sensor networks" IEEE Communication Surveys & Tutorials, 2nd Quarter 2006.
3. Mohsen Sharifi, Saeid Peurroostaei Ardakani, Saeed Sedighian Kashi, "SKEW: An Efficient Self Key Establishment Protocol for Wireless Sensor Networks", IEEE 2009.
4. Kui Ren, Kai Zeng, Wenjing Lou and Patrick J.Moran, "On Broadcast Authentication in Wireless Sensor Networks", Proc. First International Conference on Wireless Algorithms, Systems, and Applications, WASA 2006, Springer Publication.
5. Hani Alzaid, Ernest Foo and Juan Genzalez Nieto, "Secure Data Aggregation in Wireless Sensor Network: a survey", Australasian Information Security Conference (ACSC2008), Wollongong, Australia, January 2008. Australian Computer Society Inc.

CCE3F HIGH SPEED SWITCHING ARCHITECTURES L T P C
(Common to M.E CS and M.E CC) **3 0 0 3**

OBJECTIVES:

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

UNIT I LAN SWITCHING TECHNOLOGY 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 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.

TOTAL: 45 PERIODS

REFERENCES:

1. Achille Pattavina, "Switching Theory: Architectures and performance in Broadband ATM networks", 1st Edition, John Wiley & Sons Ltd, New York. 1998.
2. Itamar Elhanany and Mounir Hamdi, "High-performance Packet Switching Architectures", Springer Publications, 2011.
3. Rich Seifert and James Edwards, "The All-New Switch Book: The Complete Guide to LAN Switching Technology", 2nd Edition (Reprint), John Wiley & Sons, 2008.
4. Christopher Y.Metz , "IP Switching: Protocols and architectures", McGraw Hill, 1999.

CCE3G NEURAL NETWORKS AND ITS APPLICATIONS L T P C
(Common to CC & CS) 3 0 0 3

OBJECTIVES:

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

UNIT I BASIC LEARNING ALGORITHMS 9

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 9

Radial Basis Function Networks: 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

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

UNIT IV ATTRACTOR NEURAL NETWORKS 10

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 8

Self-organizing Map – Maximal Eigenvector Filtering – Sanger's Rule – Generalized Learning Law – Competitive Learning – Vector Quantization – Mexican Hat Networks - Self-organizing Feature Maps – Applications

PULSED NEURON MODELS

Spiking Neuron Model – Integrate-and-Fire Neurons – Conductance Based Models – Computing with Spiking Neurons.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Satish Kumar, "Neural Networks: A Classroom Approach", Tata McGraw-Hill Publishing Company Limited, New Delhi, Reprint 2007.
2. Simon Haykin, "Neural Networks: A Comprehensive Foundation", 2nd Edition, Addison Wesley Longman (Singapore) Private Limited, Delhi, 2001.

REFERENCES:

1. Martin T.Hagan, Howard B. Demuth, and Mark Beale, "Neural Network Design", Thomson Learning, New Delhi, 2003.
2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications and Programming Techniques", Pearson Education (Singapore) Private Limited, Delhi, 2003.
3. Simon Haykin, "Neural Networks and Learning Machines", 3rd Edition, Prentice Hall, 2009.

CCE3H MODELING AND SIMULATION OF WIRELESS SYSTEMS L T P C
(Common to CSE and CC) **3 0 0 3**

OBJECTIVES

- To study about the simulation and verification techniques for generation of random numbers and random variables.
- To understand about the simulation and modeling of communication channels and models.
- To estimate different parameters which are considered for simulation and analyses the performance measures from simulation with some test cases.

UNIT I SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS 9

Univariate and multi-variate models, Transformation of random variables, Bounds and approximation, Random process models – Markov and ARMA sequences, Sampling rate for simulation, Computer generation and testing of random numbers.

UNIT II MODELING OF COMMUNICATION SYSTEMS 9

Information Sources, Formatting/Source Coding, Digital Waveforms, Line Coding, Channel Coding, Radio frequency and Optical Modulation, Demodulation and Detection, Filtering, Multiplexing/Multiple Access, Synchronization, Calibration of Simulations.

UNIT III COMMUNICATION CHANNELS AND MODELS 9

Fading and Multipath Channels, Almost Free-Space Channels, Finite State Channel Models, Methodology for Simulating Communication Systems Operating over Fading Channels, Reference Models for Mobile Channels: GSM, UMTS-IMT-2000.

UNIT IV ESTIMATION OF PARAMETERS IN SIMULATION 9

Quality of an estimator, estimating the Average Level of a Waveform, Estimating the Average power of a waveform, Estimating the Power Spectral Density of a process, Estimating the Delay and Phase.

UNIT V ESTIMATION OF PERFORMANCE MEASURES FROM SIMULATION 9

Estimation of SNR, Performance Measures for Digital Systems, Importance sampling method, Efficient Simulation using Importance Sampling, Quasianalytical Estimation. Case Studies: 16-QAM Equalized Line of Sight Digital Radio Link, CDMA Cellular Radio System.

TOTAL: 45 PERIODS

REFERENCES

1. M.C. Jeruchim, Philip Balaban and K.Sam Shanmugam, "Simulation of Communication Systems Modeling, Methodology and Techniques", 3rd Edition, Kluwer Academic/Plenum Publishers, New York, 2000.
2. C. Britton Rorabaugh, "Simulating Wireless Communication Systems: Practical Models In C++", 2nd Edition, Prentice Hall, 2004.
3. William H. Tranter, K. Sam Shanmugan, Theodore S. Rappaport, Kurt L. Kosbar, "Principles of Communication Systems Simulation with Wireless Applications", 3rd Edition, Prentice Hall PTR, 2002.
4. John G. Proakis, Masoud Salehi, Gerhard Bauch, Bill Stenquist, Tom Ziolkowski, "Contemporary Communication Systems Using MATLAB" Thomson-Engineering, 2nd Edition, 2002.

CCE3J XML AND WEB SERVICES L T P C
(Common to CSE and CC) **3 0 0 3**

OBJECTIVES

- To understand the need of XML in web based systems.
- To learn the architecture of web services.
- To gain knowledge in protocols used in web services.

UNIT I INTRODUCTION 9

Role of XML – XML and the Web – XML Language Basics – Comparison with HTML – XML Documents – Well-Formed XML Document – XML Elements – Types of Elements – Attributes – Elements Vs Attributes – C DATA Sections.

UNIT II XML TECHNOLOGY 9

XML – XML Schemas – Validating XML documents using XML Schema – Namespaces – Structuring with Schemas – Presentation Techniques – Transformation Techniques.

UNIT III WEB SERVICES 9

Overview – Architecture – Key Technologies – UDDI Data Structure – Business Entity – Business Service – WSDL – Types, Messages, Ports, Bindings, Services.

UNIT IV SOAP 9

Overview of SOAP – HTTP – XML – RPC – Message Structure – Intermediaries – Actors – Design Patterns and Faults – SOAP with Attachments – SOAP and Web Services in E- Commerce.

UNIT V XML SECURITY 9

Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines for Signing XML Documents – XML in Practice

TOTAL: 45 PERIODS

REFERENCES

1. Michael Papazoglou, "Web Services: Principles and Technology", 1st Edition, Prentice Hall of India, 2008.
2. Frank. P. Coyle, "XML, Web Services and the Data Revolution", 1st Edition, Pearson Education, 2002.
3. Ron Schmalzer, Travis Vandersypen, Jason Bloomberg, "XML and Web Services Unleashed", 2nd Edition, Pearson Education, 2008.
4. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, "Developing Java Web Services", 2nd Edition, Wiley Technology Publishing, 2004.
5. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", 1st Edition, Prentice Hall Professional, 2004
6. James McGovern, Sameer Tyagi, Michael Stevens and Sunil Mathew, "Java Web Services Architecture", 2nd Edition, Morgan Kaufmann Publishers, 2005.

CCE3K OPHTHALMOLOGY-RETINA AND VITREOUS L T P C
3 0 0 3

OBJECTIVES

- To learn about the computational and mathematical methods in medical image processing.
- To enrich the knowledge about Anatomy of Retina, Diagnostic Approaches of Retinal diseases.
- To acquire the knowledge about Retinal Macular Disorders and Retinal Vascular Disorders.
- To study various methods used to enhance and extract useful information from Retinal images.

UNIT I MEDICAL IMAGE PROCESSING FUNDAMENTALS 9

Introduction-Medical image Formation-Basic Physics, Imaging Modalities-Image Enhancement-Image data visualization-Visual Feature Extraction-Segmentation-Classification-Statistic Classifier, Syntactic Classifiers, Computational intelligence-based Classifier-Quantitative Measurements and Interpretation.

UNIT II DIAGNOSTICS APPROACHES 9

Basic Anatomy-The vitreous, Neurosensory Retina, Retinal Pigment Epithelium, Diagnostic Approach to Retinal Disease, Techniques of Examination, Retinal Angiography Techniques, Fluorescein Angiography, Optical Coherence Tomography, Scanning Laser ophthalmoscopy, Retinal thickness analyzer, Fundus Autofluorescence,

UNIT III RETINAL DISEASES & MACULAR DISORDERS 9

Applied Anatomy, Vascular disorders, Retinal artery occlusions, Retinal vein Occlusions, Diabetic Retinopathy, Hypertensive retinopathy, Sickle cell retinopathy, Retinopathy of prematurity, Macular disorders, Glaucoma, Age-Related Macular degeneration, Genetics and AMD, Nonneovascular Abnormalities in AMD, Neovascular AMD,

UNIT IV RETINAL VASCULAR DISEASES 9

Diabetic Retinopathy-Terminology, Epidemiology, Pathogenesis, Conditions Associated With Potential Vision Loss from Diabetic Retinopathy, Classification of Diabetic Retinopathy and Disease Progression, Diabetic Macular Edema, Diabetic Macular Ischemia, Photocoagulation for Diabetic Retinopathy, Cataract Surgery in patients With Diabetes, Sickle Cell Retinopathy, Retinopathy of Prematurity, Venous Occlusive Disease, Artery Occlusive Disease.

UNIT V RETINAL IMAGE PROCESSING 9

Retinal imaging & image Analysis, Algorithms for digital image processing in Diabetic Retinopathy, Super pixel Classification for Glaucoma Screening, Evolutionary algorithm for Diabetic Retinopathy Screening, Rotational asymmetry metric for Diabetic Macula edema Detection, Inverse Surface Adaptive thresholding and Wavelet for Lesion Detection

TOTAL: 45 PERIODS

REFERENCES

1. Atam P.Dhawan , "Medical Image Analysis" Wiley Interscience Publication, NJ, US 2003
2. Thomas Martin Deserno "Biomedical Image Processing" Springer Publication,NY,2011
3. Hermann D. Schubert, M.D. "Retina and Vitreous" American Academy of Ophthalmology, 2012
4. A. K. Khurana "Comprehensive Ophthalmology" ANSHAN PUB, 2008
5. Eric Krestel, "Image System for Medical diagnosis" Siemens Aktiengesell Schaft, Germany, 1990