AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS - 2009

CURRICULUM AND SYLLABUS FOR I TO VI SEMESTERS (PART TIME)

M.E. NETWORK ENGINEERING

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	**MA9219**	**Operations Research**	3	1	0	4
2	NE9212	Internet and Java Programming	3	0	0	3
3	NE9213	Network Management	3	0	0	3
PRACTICAL						
4	NE9217	Network Programming Lab	0	0	4	2
		TOTAL	**9**	**1**	**4**	**12**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	NE9221	Network Security	3	0	0	3
2	CP9222	Wireless Networks	3	0	0	3
3	E1	Elective I	3	0	0	3
PRACTICAL						
4	NE9227	Wireless Networks Laboratory	0	0	4	2
		TOTAL	**9**	**0**	**4**	**11**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	NE9211	TCP/IP	3	0	0	3
2	NE9214	Information Theory and Coding	3	0	0	3
3	E2	Elective II	3	0	0	3
		TOTAL	**9**	**0**	**0**	**9**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	NE9223	Graph Theory	3	0	0	3
2	NE9222	High Speed Networks	3	0	0	3
3	E3	Elective III	3	0	0	3
		TOTAL	**9**	**0**	**0**	**9**

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E4	Elective IV	3	0	0	3
2	E5	Elective V	3	0	0	3
3	E6	Elective VI	3	0	0	3
PRACTICAL						
4	NE9236	Project Work (phase I)	0	0	12	6
		TOTAL	**9**	**0**	**12**	**15**

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	NE9241	Project Work (Phase II)	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL CREDIT 12+11+9+9+15+12 = 68

LIST OF ELECTIVES
M.E. NETWORK ENGINEERING

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS9251	Mobile Computing	3	0	0	3
2	NE9251	Reliability Engineering	3	0	0	3
3	AP9252	Neural Networks and Its Applications	3	0	0	3
4	NE9253	Real-Time Embedded Systems	3	0	0	3
5	NE9254	Software Engineering Methodologies	3	0	0	3
6	CS9225	Web Technology	3	0	0	3
7	CP9253	High Speed Switching Architecture	3	0	0	3
8	NE9256	Genetic Algorithms and Applications	3	0	0	3
9	CU9224	Satellite Communication	3	0	0	3
10	NE9257	Multimedia Compression Technologies	3	0	0	3
11	NE9258	Advanced Algorithms	3	0	0	3
12	NE9259	Telecommunication and Switching Techniques	3	0	0	3
13	NE9260	Storage Area Networks	3	0	0	3
14	NE9261	Enterprise Networks	3	0	0	3
15	NE9262	Optical Communication Systems and Networking	3	0	0	3
16	NE9263	Distributed Computing	3	0	0	3
17	CS9256	Multimedia Systems	3	0	0	3
18	CS9266	Agent Based Intelligent Systems	3	0	0	3
19	NE9266	Simulation of Communication Systems and Networks	3	0	0	3
20	NE9255	Microwaves And Radar	3	0	0	3
21	NE9264	Detection And Estimation Theory	3	0	0	3
22		Special Elective	3	0	0	3

MA9219 **OPERATIONS RESEARCH** **L T P C**
3 1 0 4

UNIT I QUEUEING MODELS **12**

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

UNIT II ADVANCED QUEUEING MODELS **12**

Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing Networks –Closed Queueing networks.

UNIT III SIMULATION **12**

Discrete Even Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queueing systems.

UNIT IV LINEAR PROGRAMMING **12**

Formulation – Graphical solution – Simplex method – Two phase method - Transportation and Assignment Problems.

UNIT V NON-LINEAR PROGRAMMING **12**

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn - Tucker conditions – Quadratic Programming.

L + T: 45+15 = 60 PERIODS

REFERENCES

1. Winston.W.L. "Operations Research", Fourth Edition, Thomson – Brooks/Cole, 2003.
2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.
3. Robertazzi. T.G. "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.
4. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

NE9212 **INTERNET AND JAVA PROGRAMMING** **L T P C**
3 0 0 3

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: 45 PERIODS

REFERNCES

1. Deitel & Deitel Internet & World Wide Web How to Program, Pearson Education 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.

NE9213 NETWORK MANAGEMENT L T P C
3 0 0 3

UNIT I FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY 9

Network Topology, LAN, Network node components- Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology, Communications protocols and standards

UNIT II OSI NETWORK MANAGEMENT 9

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

UNIT III INTERNET MANAGEMENT(SNMP) 9

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

UNIT IV BROADBAND NETWORK MANAGEMENT 9

Broadband network s and services, ATM Technology-VP,VC,ATM Packet, Integrated service, ATMLAN emulation, Virtual Lan. ATM Network Management-ATM Network reference model, integrated local management Interface. ATM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management

UNIT V NETWORK MANAGEMENT APPLICATIONS 9

Configuration management, Fault management, performance management, Event Correlation Techniques security Management, Accounting management, Report Management, Policy Based Management Service Level Management

TOTAL: 45 PERIODS

REFERENCES

1. Mani Subramanian, “Network Management Principles and practice ", Addison Wesly New York, 2000.
2. Salah Aiidarous, Thomas Plevayk, “Telecommunications Network Management Technologies and Implementations ", eastern Economy Edition IEEE press, New Delhi, 1998.
3. Lakshmi G. Raman, “Fundamentals of Telecommunication Network Management ", Eastern Economy Edition IEEE Press, New Delhi, 1999.

NE9217	NETWORK PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS

1. Write a program to transfer a File using TCP.
2. Write a program to transfer Files using UDP.
3. Write a program to capture packets through the network interface
4. Simulate the functions of Data Link layer
5. Simulate Selective repeat algorithm
6. Implementation of Go-Back-N protocol
7. Implementation of IP fragmentation and Reassembly
8. Demonstrate SSL client/Server architecture
9. Demonstrate a simple multicast client/server
10. Test the Transaction TCP in client/server architecture

TOTAL: 60 PERIODS

NE9221 **NETWORK SECURITY** **L T P C**
3 0 0 3

UNIT I CONVENTIONAL ENCRYPTION 9
Introduction, Conventional encryption model, Stegnography ,Data Encryption Standard, block cipher, Encryption algorithms, confidentiality, Key distribution

UNIT II PUBLIC KEY ENCRYPTION AND HASHING 9
Principles of public key cryptosystems, RSA algorithm, Diffie- Hellman Key Exchange. Elliptic curve cryptology, message authentification and Hash functions, Hash and Mac algorithms, Digital signatures

UNIT III IP SECURITY 9
IP Security Overview, IP security Architecture, authentification Header, Security payload, security associations, Key Management

UNIT IV WEB SECURITY 9
Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature

UNIT V SYSTEM SECURITY 9
Intruders, Viruses, Worms, firewall design, Trusted systems, antivirus techniques, digital Immune systems

TOTAL: 45 PERIODS

REFERENCES

1. William Stallings,"Cryptography and Network security",2nd Edition,Prentice Hall of India,New Delhi,1999
2. Baldwin R and Rivest.R."TheRC5,RC5-CBC,TC5-CBC-PAD and RC5-CT5 Algorithms,RFC2040",October 1996.

CP9222 **WIRELESS NETWORKS** **L T P C**
3 0 0 3

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 Descripltion, Local Multipoint Distribution Service, Multichannel Multipoint Distribution system.

UNIT V 4G & BEYOND 9

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

TOTAL: 45 PERIODS

REFERENCES

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.

NE9227	WIRELESS NETWORKS LAB	L T P C 0 0 4 2

I. Using CDMA Spread Spectrum Trainer

(1) Embedded wireless solutions using CDMA network

(2) GPS integrated GSM modules using SMS for in tracking & remote monitoring applications

II. Using GPS Trainer

(3) Embedded GPS modules interfaced with other embedded modules for location based applications

(4) GPS integrated GSM modules using SMS for in tracking & remote monitoring applications

III. Using GSM Trainer

(5) Developing GSM board+ SIM card based applications emulating mobile phones (Eg. Mobile ATM Vans)

(6) SMS based remote monitoring/control applications using existing GSM network

IV. Using Bluetooth Trainer

(7) Bluetooth based wireless personal area networking (WPAN) – printers, mouse, keypads, and mobiles

(8) Combining RFID and Bluetooth

V. Mobile Communication Trainer MT2000

(9) Can be used as stand alone or full product development kit in 49 MHz ISM band

VI. RFID Development Kit

(10) Tag all assets inside Embedded Wireless Lab with RFID

(11) Use of passive and active tags for Library Management system

VII. Smart Wireless Applications & Wireless Sensor Networks

(12) Remote door locks and gate openers

TOTAL: 60 PERIODS

NE9211	**TCP/IP**	**L T P C**
		3 0 0 3

UNIT I INTRODUCTION **9**

Network architecture-Standards and underlying technologies-Internet addressing- ARP - RARP-BOOTP-DHCP.

UNIT II INTERNET PROTOCOL **9**

IP Datagram-IP Package-IP forwarding and routing algorithms-computing paths-RIP-OSPF-ICMP-IGMP.

UNIT III TCP **9**

TCP header- services-Connection establishment and termination - Interactive data flow - Bulk data flow – Flow control and Retransmission - TCP timers - Urgent Data processing – Congestion control – Extension headers.

UNIT IV IP SWITCHING AND TRAFFIC ENGINEERING **9**

Switching technology- MPLS fundamentals – signaling protocols – LDP – IP traffic engineering – ECMP – SBR – Routing extensions for traffic engineering – Traffic engineering limitations and future developments.

UNIT V IPv6 **9**

IP security protocol-IPv6 addresses –Packet format-Multicast-Anycast-ICMPv6-Interoperation between IPv4 and IPv6-QoS –Auto configuration.

TOTAL: 45 PERIODS

REFERENCES
1. Douglas E. Comer," Internetworking with TCP/IP Principles, Protocols, and Architecture"- 5th edition Volume-1, Prentice Hall-2006.
2. Adrian Farrel," The Internet and its Protocols- A Comparative approach" Morgan Kaufmann, 2004.
3. W.Richard Stevens "TCP/IP Illustrated,The Protocols". Volume I, Pearson Education India 2003.
4. Behrouz A.Forouzan,"TCP/IP Protocol Suite"-3rd edition-Tata McGraw Hill-2006.
5. Pete Loshin"IPv6 Theory, Protocol and Practice, 2nd edition", Morgon Kaufmann-December-2003.
6. Comer D.E & Stevens D.L "Internetworking TCP/IP- Volume III",Prentice Hall of India –1997.

NE9214 INFORMATION THEORY AND CODING L T P C
3 0 0 3

UNIT I INFORMATION THEORY 9

Information entropy and Mutual Information, Markov Sources, Capacity of the Discrete Noiseless Channel, – source encoding, Shannon's first fundamental theorem, source with finite memory, discrete channel with discrete noise,

UNIT II LOSSLESS COMPRESSION 9

Compression principles-source encoders and destination encoders-entropy encoding – source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding –Lempel ziv-welsh Compression.

UNIT III AUDIO, IMAGE AND VIDEO COMPRESSION 9

Audio compression–DPCM-Adaptive PCM –adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding -JPEG ,JBIG,Video compression –principles-H.261-H.263-MPEG 1, 2, 4.

UNIT IV BLOCK AND CYCLIC CODES 9

Structure of Linear block codes, Matrix description of linear block codes, hamming code, polynomial description of cyclic codes, matrix description, cyclic codes for correcting double error, first error correction.

UNIT V CONVOLUTIONAL CODES 9

Trees, and Trellis diagram, polynomial and matrix description of convolution codes, error correction, and some simple convolution codes, syndrome decoding, viterbi algorithm..

TOTAL: 45 PERIODS

REFERENCES
1. Fred Halsall, "Multimedia Communications, Applications Networks Protocols & Standards", Pearson education, Asia 2002;
2. Simon Haykin, Digital Communication,John Wiley ,2007
3. Proakis, J.G. "Digital Communication", McGraw-Hill, New York 1989.
4. Benede Ho. S, Biglieri E, Principles of Digital Transmission with wireless applications, Planum series in Telecommunications, 1999.
5. Viterbi, A J and Omura J K, Principles of Digital Communication and Coding, McGraw Hill 1979.
6. Blahut R.E, Theory and practice of error control codes, Addition Wesley publication company, London1984.

NE9223 **GRAPH THEORY** **L T P C**
3 0 0 3

UNIT I INTRODUCTION 9

Introduction Of Graphs, Paths, Cycles, And Trails, Vertex Degrees And Counting - Directed Graphs - Trees and Distance: Basic Properties. Spanning Trees and Enumeration, Optimization and Trees.

UNIT II MATCHING CONNECTIVITY AND FLOW 9

Matching and Covers Algorithms and Applications. Matching in General Graphs. - Connectivity and Paths: Cuts and Connectivity, k-connected graphs - Network Flow Problems.

UNIT III COLOURING 9

Vertex Colourings and Upper Bounds - Structure of k-chromatic Graphs, Enumerative Aspects.

UNIT IV PLANAR GRAPHS, EDGES AND CYCLES 9

Planar Graphs - Embeddings and Euler's Formula - Characterization of Planar graphs - Parameters of Planarity, Line Graphs and Edge-Colouring, Hamiltonian Cycles, Planarity, Colouring and Cycles.

UNIT V RAMSEY THEORY AND RANDOM GRAPHS 9

Ramsey Theory for Graphs: Ramsey's Theorems - Ramsey numbers -Induced Ramsey theorems - Ramsey Properties and Connectivity. Random Graphs: The notion of a random graph - The Probabilistic method - Properties of almost all graphs - Threshold functions and second moments

TOTAL: 45 PERIODS

REFERNCES

1. R J Wilson "Introduction to Graph Theory" , 4th Edition, Pearson Education 2003.
2. Reinhard Diestel "Graph Theory" ,, 2nd Edition, Springer- Verlog 2000,
3. Jay Yellen, Jonathan L.Gross "Graph Theory and Its Applications ",CRC Press LLC 1998.
4. Bela Bollobas "Modern Graph Theory", Springer Verlag, July 1998.
5. Wilson "Introduction to Graph Theory", 2nd edition, Pearson Education India

NE9222 **HIGH SPEED NETWORKS** **L T P C**
3 0 0 3

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 9

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QOS SUPPORT 9

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP **–** Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL: 45 PERIODS

REFERENCES

1. William Stallings, "High Speed Networks and Internet", Second Edition, Pearson Education, 2002.
2. Warland, Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
3. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN Architecture", Cisco Press, Volume 1 and 2, 2003.

CS9251 MOBILE COMPUTING L T P C
3 0 0 3

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.

TOTAL: 45 PERIODS

REFERENCES

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

NE9251 RELIABILITY ENGINEERING L T P C
3 0 0 3

UNIT I PROBABILITY PLOTTING AND LOAD-STRENGTH INTERFERENCE 9

Statistical distribution , statistical confidence and hypothesis testing ,probability plotting techniques – Weibull, extreme value ,hazard, binomial data; Analysis of load – strength interference , Safety margin and loading roughness on reliability.

UNIT II RELIABILITY PREDICTION, MODELLING AND DESIGN 9

Statistical design of experiments and analysis of variance Taguchi method, Reliability prediction, Reliability modeling, Block diagram and Fault tree Analysis ,petric Nets, State space Analysis, Monte carlo simulation, Design analysis methods – quality function deployment, load strength analysis, failure modes, effects and criticality analysis.

UNIT III ELECTRONICS AND SOFTWARE SYSTEMS RELIABILITY 9

Reliability of electronic components, component types and failure mechanisms, Electronic system reliability prediction, Reliability in electronic system design; software errors, software structure and modularity, fault tolerance, software reliability, prediction and measurement, hardware/software interfaces.

UNIT IV RELIABILITY TESTING AND ANALYSIS 9

Test environments, testing for reliability and durability, failure reporting, Pareto analysis, Accelerated test data analysis, CUSUM charts, Exploratory data analysis and proportional hazards modeling, reliability demonstration, reliability growth monitoring.

UNIT V MANUFACTURE AND RELIABILITY MAQNAGEMENT 9

Control of production variability, Acceptance sampling, Quality control and stress screening, Production failure reporting; preventive maintenance strategy, Maintenance schedules, Design for maintainability, Integrated reliability programmes , reliability and costs, standard for reliability, quality and safety, specifying reliability, organization for reliability.

TOTAL: 45 PERIODS

REFERENCES

1. Patrick D.T. O'Connor, David Newton and Richard Bromley, Practical Reliability Engineering, Fourth edition, John Wiley & Sons, 2002
2. David J. Klinger, Yoshinao Nakada and Maria A. Menendez, Von Nostrand Reinhold, New York, "AT & T Reliability Manual", 5th Edition, 1998.
3. Gregg K. Hobbs, "Accelerated Reliability Engineering - HALT and HASS", John Wiley & Sons, New York, 2000.
4. Lewis, "Introduction to Reliability Engineering", 2nd Edition, Wiley International, 1996.

AP9252 NEURAL NETWORKS AND ITS APPLICATIONS L T P C
3 0 0 3

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 Machines:

Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem - $\in$-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 SYSTEMS

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

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: 45 PERIODS

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.

NE9253 REAL- TIME EMBEDDED SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION 10

Real Time System – Embedded Systems – Architecture of Embedded System - Simple Programming for Embedded System – Process of Embedded System Development - Pervasive Computing – Information Access Devices – Smart Cards – PIC Microcontroller – ARM Processor.

UNIT II EMBEDDED/REAL TIME OPERATING SYSTEM 9

Operating System Concepts: Processes, Threads, Interrupts, Events - Real Time Scheduling Algorithms - Memory Management – Overview of Operating Systems for Embedded, Real Time, Handheld Devices – Target Image Creation – Programming in Linux, RTLinux, VxWorks, uC/Os-overview.

UNIT III CONNECTIVITY 9

Wireless Connectivity - Bluetooth – Other short Range Protocols – Wireless Application Environment – Service Discovery – Middleware.

UNIT IV REAL TIME UML 8

Requirements Analysis – Object Identification Strategies – Object Behavior – Real Time Design Patterns.

UNIT V SOFTWARE DEVELOPMENT AND CASE STUDY 9

Concurrency – Exceptions – Tools – Debugging Techniques – Optimization – Case Studies -Interfacing Digital Camera with USB port and Data Compressor.

TOTAL: 45 PERIODS

REFERENCES

1. R.J.A.Buhr, D.L.Bailey, “An Introduction to Real-Time Systems”, Prentice-Hall International, 1999.
2. David E-Simon, “An Embedded Software Primer”, Pearson Education, 2007. (UNIT – II)
3. C.M.Krishna, Kang G.Shin, “Real Time Systems”, Mc-Graw Hill, 1997. (UNIT- II)
4. B.P.Douglass, “Real Time UML 2nd Edition”, Addison-Wesley 2000. ((UNIT – IV)
5. J.Schiller, “Mobile Communication”, Addison-Wesley, 1999. (UNIT – III)
6. Dr.K.V.K.K.Prasad, “Embedded/Real Time Systems: Concepts, Design and Programming”, DreamTech press, Black Book, 2005. (UNIT – I)
7. R.Barnett, L.O.Cull, S.Cox, “Embedded C Programming and the Microchip PIC”, Thomason Learning 2004. (UNIT – I)
8. Wayne Wolf, “Computers as Components - Principles of Embedded Computer System Design”, Mergen Kaufman Publisher, 2006.
9. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-Graw Hill, 2004.

NE9254 SOFTWARE ENGINEERING METHODOLOGIES L T P C
3 0 0 3

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: 45 PERIODS

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

CS9225 **WEB TECHNOLOGY** **L T P C**
3 0 0 3

UNIT I **9**
Web essentials – clients – servers - communication – markup languages – XHTML – simple XHTML pages style sheets – CSS

UNIT II **9**
Client side programming – Java script language – java script objects – host objects : Browsers and the DOM

UNIT III **9**
Server side programming – java servlets – basics – simple program – separating programming and presentation – ASP/JSP - JSP basics ASP/JSP objects – simple ASP/JSP pages.

UNIT IV **9**
Representing Web data – data base connectivity – JDBC – Dynamic Web pages – XML – DTD – XML schema – DOM – SAX – Xquery.

UNIT V **9**
Building Web applications - cookies – sessions – open source environment – PHP – MYSQL – case studies.

TOTAL: 45 PERIODS

REFERENCES

1. Jeffrey C Jackson, " Web Technology – A computer Science perspective", Persoson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

CP9253 **HIGH SPEED SWITCHING ARCHITECTURE** **L T P C**
3 0 0 3

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 ",John Wiley & Sons Ltd, New York. 1998
2. Elhanany M. Hamdi, “High Performance Packet Switching architectures”, Springer Publications, 2007.
3. Christopher Y Metz, “Switching protocols & Architectures”, McGraw - Hill Professional Publishing, NewYork.1998.
4. Rainer Handel, Manfred N Huber, Stefan Schroder, “ATM Networks - Concepts Protocols, Applications”, 3rd Edition, Addison Wesley, New York. 1999.

NE9256 GENETIC ALGORITHMS AND APPLICATIONS L T P C
3 0 0 3

UNIT I 9

Fundamentals of genetic algorithm: A brief history of evolutionary computation-biological terminology-search space -encoding, reproduction-elements of genetic algorithm-genetic modeling-comparison of GA and traditional search methods.

UNIT II 9

Genetic technology: steady state algorithm - fitness scaling - inversion. Genetic programming - Genetic Algorithm in problem solving

UNIT III 9

Genetic Algorithm in engineering and optimization-natural evolution –simulated annealing and Tabu search .Genetic Algorithm in scientific models and theoretical foundations.

UNIT IV 9

Implementing a Genetic Algorithm – computer implementation - low level operator and knowledge based techniques in Genetic Algorithm.

UNIT V 9

Applications of Genetic based machine learning-Genetic Algorithm and parallel processors, composite laminates, constraint optimization, multilevel optimization, real life problem.

TOTAL: 45 PERIODS

REFERENCES

1. Melanie Mitchell, 'An introduction to Genetic Algorithm', Prentice-Hall of India, New Delhi, Edition: 2004
2. David.E.Golberg, 'Genetic algorithms in search, optimization and machine learning', Addition-Wesley-1999
3. S.Rajasekaran and G.A Vijayalakshmi Pai,'Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and Applications', Prentice Hall of India, New Delhi-2003.
4. Nils.J.Nilsson,'Artificial Intelligence- A new synthesis', Original edition-1999.

CU9224 SATELLITE COMMUNICATION L T P C
3 0 0 3

UNIT I ELEMENTS OF SATELLITE COMMUNICATION 8

Satellite Systems, Orbital description and Orbital mechanics of LEO, MEO and GSO, Placement of a Satellite in a GSO, Satellite – description of different Communication subsystems, Bandwidth allocation.

UNIT II TRANSMISSION, MULTIPLEXING, MODULATION, MULTIPLE ACCESS AND CODING 12

Different modulation and Multiplexing Schemes, Multiple Access Techniques – FDMA, TDMA, CDMA, and DAMA, Coding Schemes.

UNIT III SATELLITE LINK DESIGN 9

Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse.

UNIT IV SATELLITE NAVIGATION AND GLOBAL POSITIONING SYSTEM 8

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Receiver Operation and Differential GPS

UNIT V APPLICATIONS 8

Satellite Packet Communications , Intelsat series – INSAT series –VSAT, mobile satellite services, IMMERSAT, Satellite and Cable Television, DBS (DTH), VSAT, Satellite Phones.

TOTAL: 45 PERIODS

REFERENCES

1. Wilbur L. Pritchard, H.G. Suyderhoud ,Robert A.Nelson, Satellite Communication Systems Engineering, Prentice Hall, New Jersey, 2006.
2. Timothy Pratt and Charles W.Bostain, Satellite Communications, John Wiley and Sons, 2003.
3. D.Roddy, Satellite Communication, McGrawHill, 2006.
4. Tri T Ha, Digital Satellite Communication, McGrawHill,1990.
5. B.N.Agarwal, Design of Geosynchronous Spacecraft, Prentice Hall, 1993

NE9257 MULTIMEDIA COMPRESSION TECHNOLOGIES L T P C
3 0 0 3

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 – Arithmatic 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, 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, 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, NewYork, 1995

NE9258	ADVANCED ALGORITHMS	L	T	P	C
		3	0	0	3

UNIT I INTRODUCTION 9

Mathematical Background - Design and Analysis of algorithms – Time and Space Complexity - Basic concepts

UNIT II SORTING AND ORDER STATISTICS 9

Internal sort algorithms - Analysis - Worst-case - Average case - Sorting in Linear Time - Medians and order statistics - Augmenting Data Structures - Red Black Trees - Dynamic - Order Statistics - FFT - Algorithm - Implementation.

UNIT III DESIGN TECHNIQUES 9

Divide and Conquer - Dynamic Programming - Greedy method - Backtracking -- Branch & Bound – Classical examples - Analysis.

UNIT IV GRAPH AND PARALLEL ALGORITHMS 9

Graphs - Representation - Traversals - Topological sort - Minimum spanning tree - Shortest paths – Bi connected and strongly connected components - Parallel algorithms - Sorting - Matrix multiplication - Numerical - Graph.

UNIT V SELECTED TOPICS 9

NP Completeness - Approximation algorithms - Matrices - Transitive closure - Warshall's - Kronrod's algorithm - Computational Geometry

TOTAL: 45 PERIODS

TEXT BOOKS

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest, Introduction to Algorithms, McGraw Hill Book Company, 2002

REFERENCES

1. M.J. Quinn, Designing Efficient Algorithms for Parallel Computers, McGraw Hill Book Company, 1998
2. Sara Baase, "Computer Algorithms : Introduction to Design and Analysis, Addison Wesley Publishing Company, 1998
3. Donald.E.Knuth, Art of Computer Programming – Vol (1, 2, 3), Addison Wesley Professional,1997,1998

NE9259 TELECOMMUNICATION AND SWITCHING TECHNIQUES L T P C
3 0 0 3

UNIT I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUIT 9

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange, Stored programme exchange Digital exchange – Basic Tele communication equipments – Telephone handset, Hybrid circuit, Echo suppressors and cancellers, PCM coders, Modems and Relays.

UNIT II ELECTRONIC SWITCHING 9

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Spare switching, Combination switching – Digital switching system hardware configuration, Switching system software, Organization, Switching system call processing software, Hardware software integration.

UNIT III TELECOMMUNICATION SIGNALLING AND TRAFFIC 9

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching systems, Blocking models and Delay systems.

UNIT IV INTEGRATED DIGITAL NETWORKS 9

Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, Plesiocronous multiplexing techniques, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) – Cellular Mobile Communication Principles.

UNIT V DATA NET WORKS 9

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks – Multiple access techniques – LAN, WAN – standards – TCP / IP – Internet – Principle of ATM networks.

TOTAL: 45 PERIODS

TEXT BOOK

1. Viswanathan. T, “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994.
2. Behrouz Forouzan, “Introduction to Data Communication and Networking”, McGraw-Hill, 1998.

REFERENCES

1. L.S.Lawton, “Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi, 1996.
2. Syed R. Ali, “Digital Switching Systems”, McGraw-Hill Inc., New York, 1998.

NE9260 **STORAGE AREA NETWORKS** **L T P C**
3 0 0 3

UNIT I **9**

Introduction – Storage and networking concepts – SCSI bus architecture – Networking in front of he server – Networking behind the server – Network -attached Storage – Fibre channel internals – Layers – Data encoding – Framing protocol – class of service – flow control – Name and addressing conventions.

UNIT II **9**

SAN topologies – Point-to Point – Arbitrated Loop – Loop Addressing-Loop Initialization-Port Login-Loop port state machine – Design considerations for Arbitrated Loop – Fabrics – Fabric login – Simple Name Server – State Change Notification – Private Loop Support – Fabric Zoning – Building Extended SANs.

UNIT III **9**

Fibre Channel Products – Gigabit Interface Converters (GBICs) – host Bus Adapters – Fibre channel RAID – Fibre channel JBODs – Arbitrated Loop Hubs – hub Architecture – Unmanaged Hubs – Managed Hubs – Switching Hubs – Fabric Switches – Fibre Channel-to-SCSI Bridges – SAN software Products – Problem isolation in SANs – Isolation Techniques – Fibre channel Analyzers.

UNIT IV **9**

Management Studies – Storage Network Management – In-Band management – Out-of-Band Management-SNMP-HTTP-TELNET – Storage Network Management Issues – Storage Resource Management – Storage Management – Storage, Systems, and Enterprise Management Integration.

UNIT V **9**

Application Studies – Full-motion video – LAN free and Server free Tape Backup – server clustering – Internet Service Providers – Campus storage networks – Disaster recovery. Fiber Channel futures – Bandwidth – Fiber channel over Wide Area Networking – Coexistence within Enterprise Networks – Total SAN solutions.

TOTAL: 45 PERIODS

TEXT BOOK

1. Tom Clark, “Designing Storage Area Networks”, Addison-Wesley Professional, 1st edition, 1999
2. Alex Goldman, “Storage Area Networks Fundamentals”, Cisco Press 2002

NE9261 ENTERPRISE NETWORKS L T P C
3 0 0 3

UNIT I INTRODUCTION TO NETWORK CONCEPTS, STANDARDS AND PROTOCOLS 9

Introduction to Computer Networks - Networking Standards and Reference Models - Computer Network Protocols – Data Communication Fundamentals - Transmission Basics and Networking Media

UNIT II LOCAL AND WIDE AREA NETWORK TOPOLOGIES AND HARDWARE 9

Physical and Logical Topologies - Network Switching - Ethernet Local Area Networks - Networking Hardware - Wide Area Networking Technologies -WAN Topologies - WANs and WAN Transmission Methods - WAN Implementation and Remote Connectivity

UNIT III ENTERPRISE NETWORKING WITH WINDOWS 2000 AND NETWARE 9

Network Operating Systems - Networking with Windows 2000 – Enterprise Networking with NetWare - NetWare Based Networking

UNIT IV ENTERPRISE NETWORKING WITH UNIX 9

Networking with UNIX – Internetworking with TCP/IP for Enterprise Applications - Networking with TCP/IP: Internet, Intranet and Extranet - Internet Applications for Enterprise

UNIT V ENTERPRISE NETWORK MANAGEMENT 9

Troubleshooting Network Problems - Maintaining and Upgrading Computer Networks - Managing Network Design and Implementation - Enterprise Network Security: Issues, Concepts, and Techniques - Introduction to Network Security - Ensuring Network Integrity and Availability

TOTAL: 45 PERIODS

TEXTBOOK

1. Tamara's Network+ - Guide Networks, Second edition, published by Thomson Learning, 2002.

NE9262 OPTICAL COMMUNICATION SYSTEMS AND NETWORKING L T P C
3 0 0 3

UNIT I INTRODUCTION AND TECHNOLOGY 9

Telecommunication networks - First _second generation of optical Networks - multiplexing techniques - Network evolution - Light propagation in optical fiber - bandwidth - chromatic dispersion -Nonlinear effects - couplers -isolators and circulators - multiplexers and filters -optical amplifiers - Transmitters - detectors - switches - wavelength converters.

UNIT II MODULATION, DEMODULATION AND TRANSMISSION OF OPTICAL SIGNAL 9

Modulation - Demodulation - transmission system engineering -Optical amplifiers - crosstalk - dispersion - fiber non linearities - wavelength stabilization - overall design considerations.

UNIT III NETWORKS 9

SONET / SDH - Computer Interconnects - Metropolitan Area Networks - Layered architecture - Broadcast networks : -Topologies for broadcast networks -Media - access control protocols - Test beds - optical layer - Node designs - network design and operation - routing and wavelength assignment.

UNIT IV CONTROL AND MANAGEMENT 9

Network Management functions - configuration Management - performance management - fault management - optical safety - service interface.

UNIT V ACCESS NETWORKS & SWITCHING 9

Network architecture overview - today's access networks - future Access networks - optical access network architecture - application area - OTDM - mux and demuxing - synchronization - broadcast OTDM networks - switch bared networks - OTDM Test beds

TOTAL: 45 PERIODS

TEXT BOOK

1. Rajiv Ramaswamy and Kumar N.Sivarajan, “Optical Networks – A Practical Persepctive”, Morgan Kauffman, 2004

REFERENCES

1. D.W.Smith, Optical Network Technology, Chapman and Hall, London, 1995

NE9263 DISTRIBUTED COMPUTING L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols - Case Studies.

UNIT II PROCESSES AND DISTRIBUTED OBJECTS 9

Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study.

UNIT III OPERATING SYSTEM ISSUES – I 9

The OS Layer - Protection - Processes and Threads - Communication and Invocation – OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System

UNIT IV OPERATING SYSTEM ISSUES – II 9

Name Services -Domain Name System - Directory and Discovery Services - Global Name Service - X.500 Directory Service - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

UNIT V DISTRIBUTED TRANSACTION PROCESSING 9

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems

TOTAL: 45 PERIODS

TEXT BOOK

1. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Pearson Education, 3rd Edition, 2002.

REFERENCES

1. Sape Mullender, Distributed Systems, Addison Wesley, 2nd Edition, 1993.
2. Albert Fleishman, Distributes Systems- Software Design and Implementation, Springer-Verlag, 1994
3. M.L.Liu, Distributed Computing Principles and Applications, Pearson Education, 2004.
4. Andrew S Tanenbaum , Maartenvan Steen,Distibuted Systems –Principles and Pardigms,Pearson Education, 2002
5. Mugesh Singhal,Niranjan G Shivaratri,Advanced Concepts in Operating Systems,Tata McGraw Hill Edition, 2001

CS9256 MULTIMEDIA SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION AND QOS 9

Introduction-QOS Requirements and Constraints-Concepts-Resources- Establishment Phase-Run-Time Phase-Management Architectures.

UNIT II OPERATING SYSTEMS 9

Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management-Server Architecture-Disk Management.

UNIT III FILE SYSTEMS AND NETWORKS 9

Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Ethernet-Gigabit Ethernet-Token Ring-100VG AnyLAN-Fiber Distributed Data Interface (FDDI)- ATM Networks-MAN-WAN.

UNIT IV COMMUNICATION 9

Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Computer Supported Cooperative Work-Architecture-Session Management-MBone Applications.

UNIT V SYNCHRONIZATION 9

Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", Springer, I Edition 2004.

REFERENCES

1. Ralf Steinmetz and Klara Nahrstedt , Media Coding and Content Processing, Prentice hall, 2002.
2. Vaughan T, Multimedia, Tata McGraw Hill, 1999.
3. Mark J.B., Sandra K.M., Multimedia Applications Development using DVI technology, McGraw Hill, 1992.
4. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovacovic, D. A. Milovacovic , Multimedia Communication Systems: Techniques, Standards, and Networks, Prentice Hall, 1st Edition, 2002
5. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson, 2004.

CS9266 AGENT BASED INTELLIGENT SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics -Constraint Satisfaction Problems - Game playing

UNIT II KNOWLEDGE REPRESENTATION AND REASONING 9

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS 9

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-Multi-agent Planning

UNIT IV AGENTS AND UNCERTAINITY 9

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions

UNIT V HIGHER LEVEL AGENTS 9

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars-Future of AI

TOTAL: 45 PERIODS

TEXT BOOK:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002

REFERENCES:
1. Michael Wooldridge, “An Introduction to Multi Agent System”, John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

NE9266	SIMULATION OF COMMUNICATION SYSTEMS AND NETWORKS	L T P C 3 0 0 3

UNIT I MODELLING OF COMMUNICATION SYSTEM 9

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

UNIT II SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS 9

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

UNIT III ESTIMATION OF PERFORMANCE MEASURES 9

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

UNIT IV COMMUNICATION NETWORKS 9

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

UNIT V NETWORK OF QUEUES 9

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

TOTAL: 45 PERIODS

TEXT BOOK:

1. M.C.Jeruchim,Philip Balaban and K.Sam Shanmugam, "Simulation of communications systems",PlenumPress,New York,1992

REFERENCES:

1. A.M.Law and W.David Kelton, "Simulation Modelling and analysis", Mc Graw Hill Inc.,New York ,1991
2. J.F.Hayes, "Modelling and Analysis of Computer Communication networks, Plenum Press, New York,1984
3. Jerry Banks and John S.Carson, Discrete-event system Simulation, Prentice Hall,Inc.,New Jersey,1984

NE9255 MICROWAVES AND RADAR LT P C
3 0 0 3

UNIT I MICROWAVE SOURCES 10

Passive waveguide components, Microstrip line structure and components, Simple theory and operating characteristics of Reflex klystrons, Two cavity Klystrons, Magnetrons, and TWTS - solid state source - TEDS, IMPATTS, TRAPATT, GaAs FETs and Tunnel diode.

UNIT II RADAR PRINCIPLES 8

Introduction to Radar – Radar range equation – Receiver noise and signal to noise ratio- Radar cross section (RCS) – Radar system – Radar Antennas

UNIT III TYPES OF RADARS 10

CW and FMCW radars-Tracking radars-MTI radar -Principles of coherent MTI radars - Digital MTI, Synthetic Aperture radar, Principles of Pulsed Doppler Radar, Low-, High-, and medium-PRF Mode.

UNIT IV RADAR SIGNAL PROCESSING 9

Radar requirements –Matched filters- Radar ambiguity function – Optimum waveforms for detection in clutter – Classes of waveforms – Digital representation of signals -Pulse compression

UNIT V TRACKING RADAR 8

Tracking with radar – Monopulse Tracking – conical scan and sequential lobing – limitations to tracking Accuracy- Kalman Tracker -Fundamentals of Airborne radar

TOTAL : 45 PERIODS

REFERENCES:

1. Fred E.Nathanson " Radar design Principles " Signal processing and the environment, Prentice Hall, 2004
2. Y. Liao, Microwave Devices and Circuits, Prentice Hall, 1980.
3. M.I. Skolnik, Introduction to Radar System (Second Edition) McGraw Hill, 1980.
4. M.I. Skolnik, Radar Handbook (Second Edition) McGraw Hill, 1990.
5. Guy V. Morris, Linda L. Harkness, Airborne Pulsed Doppler radar, Second Edition, Artech House Publishers, 1996.
6. Blackman S.S., "Multiple target tracking with radar applications" Artech House 1986.

NE9264 DETECTION AND ESTIMATION THEORY LT P C
3 0 0 3

UNIT I REVIEW OF PROBABILITY AND STOCHASTIC PROCESS 9

Conditional Probability, Bayes' Theorem , Random Variables, Conditional Distributions and Densities, moments and distribution of random variables., Stationary Processes Cyclostationary Processes Averages and Ergodicity Autocorrelation Function Power Spectral Density Discrete-Time Stochastic Processes patial Stochastic Processes Random Signals, Relationship of Power Spectral Density and Autocorrelation Function.

UNIT II SINGLE AND MULTIPLE SAMPLE DETECTION 9

Hypothesis Testing and the MAP Criterion, Bayes Criterion , Minimax Criterion, Neyman-Pearson Criterion, Sequential Detection, The Optimum Digital Detector in Additive Gaussian Noise , Performance of Binary Receivers in AWGN

UNIT III FUNDAMENTALS OF ESTIMATION THEORY 9

Formulation of the General Parameter Estimation Problem, Relationship between Detection and Estimation Theory, Types of Estimation Problems, Properties of Estimators, Bayes Estimation, Minimax Estimation, Maximum-Likelihood Estimation, Comparison of Estimators of Parameters

UNIT IV WIENER AND KALMAN FILTERS 9

Orthogonality Principle, Autoregressive Techniques, Discrete Wiener Filter, Continuous Wiener Filter, Generalization of Discrete and Continuous Filter Representations , Linear Least-Squares Methods, Minimum-Variance Weighted Least-Squares Methods, Minimum-Variance Least-Squares or Kalman Algorithm, Kalman Algorithm Computational Considerations, Kalman Algorithm for Signal Estimation, Continuous Kalman Filter, Extended Kalman Filter

UNIT V APPLICATIONS 9

Detector Structures in Non-Gaussian Noise , Examples of Noise Models, Receiver Structures, and Error-Rate Performance, Estimation of Non-Gaussian Noise Parameters Fading Multipath Channel Models, Receiver Structures with Known Channel Parameters, Receiver Structures without Knowledge of Phase, Receiver Structures without Knowledge of Amplitude or Phase, Receiver Structures and Performance with No Channel Knowledge.

TOTAL : 45 PERIODS

REFERENCES:

1. Thomas Schonhoff," Detection and Estimation Theory", Prentice Hall, NewJersy, 2007
2. Steven M. Kay," Fundamentals of Statistical Processing, Volume I: Estimation Theory", Prentice Hall Signal Processing Series, Prentice Hall, PTR,New Jersy,1993.
3. Harry L. Van Trees, Detection, Estimation, and Modulation Theory, Part I John Wiley and Sons, New York, 2001.