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

SEMESTER II

SI.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	NE9221	Network Security	3	0	0	3
2	NE9222	High Speed Networks	3	0	0	3
3	NE9223	Graph Theory	3	0	0	3
4	CP9222	Wireless Networks	3	0	0	3
5	E2	Elective II	3	0	0	3
6	E3	Elective III	3	0	0	3
PRACTICAL						
7	NE9227	Wireless Network Lab	0	0	4	2
		TOTAL CREDITS	18	0	4	20

SEMESTER III

SI.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	CR9331	Project Work (Phase I)	0	0	12	6
		TOTAL CREDITS	9	0	12	15

SEMESTER IV

SI.NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	CR9341	Project Work (Phase II)	0	0	24	12
		TOTAL CREDITS	0	0	24	12

Total no. of credits to earned for the award of Degree 21+20+15+12 = 68

LIST OF ELECTIVES
M.E. COMPUTER NETWORKS

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS9251	Mobile Computing	3	0	0	3
2	CR9001	Internet routing design	3	0	0	3
3	AP9252	Neural Networks and Its Applications	3	0	0	3
4	CS9263	Adhoc Networks	3	0	0	3
5	CR9003	Software Quality assurance	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	CS9265	Performance Evaluation of Computer Systems and Networks	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	CR9005	Infrastructure Management	3	0	0	3

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.
3. William Stallings, "Network Security Essentials", Third Edition, Pearson Education India, 2008.
4. Moti Yung, Jonatham Katz, "Digital Signatures", Springer, 2007.

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 LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

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", Pearson Education, Second Edition, 2002.
2. Warland & Pravin Varaiya, "High Performance Communication Networks", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
4. Marc Boissean, Midrel Demanage, Jean-Marie Muurier, "High Speed Networks", Wiley, 1994.
5. Michael Welz "Network Congestion Control Managing internet traffic", John Wiley and Sons, 2005.

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
6. Narsingh Deo, "Graph Theory: with Application to Engineering & Computer Science", PHI, 2003

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 NETWORK 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

Requirement for a batch of 25 students
1. CDMA Trainer   2 Nos
2. GPS Trainer   2 Nos
3. GSM Trainer   2 Nos
4. Bluetooth Trainer   2 Nos.
5. RFID Trainer   2 Nos
6. MT2000   2 Nos
7. Ptolemy (free software) 2 Nos

TOTAL : 60 PERIODS

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.

CR9001   **INTERNET ROUTING DESIGN**   **L T P C**
                                                                                       3 0 0 3

UNIT I   NETWORKING AND NETWORK ROUTING: AN INTRODUCTION   9
Addressing and Internet Service: An Overview, Network Routing, IP Addressing, Service Architecture, Protocol Stack Architecture, Router Architecture, Network Topology, Architecture, Network Management Architecture, Public Switched Telephone Network

UNIT II   ROUTING ALGORITHMS: 9
Shortest Path and Widest Path**:** Bellman–Ford Algorithm and the Distance Vector Approach, Dijkstra's Algorithm, Widest Path Algorithm, Dijkstra-Based Approach, Bellman–Ford-Based Approach, *k*-Shortest Paths Algorithm. OSPF and Integrated IS-IS **:** OSPF: Protocol Features, OSPF Packet Format, Integrated IS-IS, Key Features, comparison BGP **:** Features ,Operations, Configuration Initialization, phases, Message Format. IP Routing and Distance Vector Protocol Family **:**RIPv1 and RIPv2

UNIT III   ROUTING PROTOCOLS: FRAMEWORK AND PRINCIPLES   9
Routing Protocol, Routing Algorithm, and Routing Table, Routing Information Representation and Protocol Messages, Distance Vector Routing Protocol, Link State Routing Protocol, Path Vector Routing, Protocol, Link Cost.

UNIT IV   INTERNET ROUTING AND ROUTER ARCHITECTURES   9
Architectural View of the Internet, Allocation of IP Prefixes and AS Number, Policy- Based Routing, Point of Presence, Traffic Engineering Implications, Internet Routing Instability.
Router Architectures**:** Functions, Types, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures

UNIT V   ANALYSIS OF NETWORK ALGORITHMS   9
Network Bottleneck, Network Algorithmics, Strawman solutions, Thinking Algorithmically, Refining the Algorithm, Cleaning up, Characteristics of Network
Algorithms.
IP Address Lookup Algorithms : Impact, Address Aggregation, Longest Prefix Matching, Naïve Algorithms, Binary , Multibit and Compressing Multibit Tries, Search by Length Algorithms, Search by Value Approaches, Hardware Algorithms, Comparing Different Approaches
IP Packet Filtering and Classification : Classification, Classification Algorithms, Naïve Solutions, Two-Dimensional Solutions, Approaches for *d* Dimensions,

TOTAL : 45 PERIODS
REFERENCES:
1. 1.Network Routing: Algorithms, Protocols, and Architectures Deepankar Medhi and Karthikeyan Ramasamy (Morgan Kaufmann Series in Networking)
2. Network Algorithmics: An Interdisciplinary Approach to Designing Fast Networked Devices George Varghese (Morgan Kaufmann Series in Networking)
3. TCP/IP Protocol Suite, (B.A. Forouzum) Tata McGraw Hill Edition, Third Edition
4. TCP/IP Volume 1,2,3 (N. Richard Steveus Addison Wesley)
5. Computer Networks (A.S. Taueubaum) Pearson Edition, 4th Edition

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 – MemoryBased 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 - ▢-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 ttractors 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: 45PERIODS

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.
5. B. Yegnanarayana, "Artificial Neural Networks" Prentice Hall of India, 1999
6. C.M. Bishop, Pattern Recognition & Machine Learning, Springer 2006.

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

UNIT I   AD-HOC MAC   **9**
Introduction-Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power Control MAC Protocol.

UNIT II   AD-HOC NETWORK ROUTING & TCP   **9**
Issues – classifications of routing protocols-Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc- Feedback based, TCP with explicit link, TCO-Bus, Ad Hoc TCP, and Split TCP.

UNIT III   WSN – MAC   **9**
Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – Self – organizing, Hybrid TDMA/FDMA and CSMA based MAC

UNIT IV   WSN ROUTING, LOCALIZATION & QOS   **9**
Issues in WSN routing – OLSR, AODV, Localization – Indoor and Sensor network Localization. QoS in WSN.

UNIT V   MESH NETWORKS   **9**
Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness- Heterogeneous Mesh Networks – Vehicular Mesh Networks.

REFERENCES:

1. C. Siva Ram Murthy and B. Smanoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2003.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan kaufman Publishers, 2004.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reiily Publishers, 2007.
5. Charles E.Perkins, "Ad Hoc networking", Addison Wesley 2000.

CR9003   **SOFTWARE QUALITY ASSURANCE**   **L T P C**
                                                                    3 0 0 3

UNIT I   **9**
Introduction to software quality – challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews.

UNIT II   **9**
Basics of software testing – test generation from requirements – finite state models – combinatorial designs – test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

UNIT III   **9**
Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing – internationalization testing – ad – hoc testing – website testing – usability testing – accessibility testing. Test plan – management – execution and reporting – software test automation – automated testing tools.

UNIT IV   **9**
Hierarchical models of software quality – software quality metrics – function points – Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certification – configuration management – documentation control

UNIT V   **9**
Project progress control – costs – quality management standards – project process standards – management and its role in SQA –SQA unit

                                                           TOTAL :45 PERIODS

REFERENCES:
1. Daniel Galin, Software quality assurance – from theory to implementation Pearson education, 2009.
2. Aditya Mathur, Foundations of Software testing, Pearson Education, 2008.
3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices, Pearson education, 2006.
4. Ron Patton, software testing, second edition, Pearson education, 2007.

5. Alan C Gillies, " Software Quality Theory and Management", CengageLearning, Second edition, 2003.
6. Stephen Kan, "Metrics & Models in Software Quality Engineering (2nd Edition), Addison Wesley, 2002
7. Schulmeyer, G. Gordon and Momanus, James, (Eds), Handbook of software Quality Assurance, 3rd Ed. Prentice Hall, 1999.

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 – separatingprogramming 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.

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.
3. Deitel & Deitel, Goldberg, "Internet and World Wide Web – How to program", Pearson Education Asia, 2001
4. Eric Ladd, Jim O' Donnel, 'using HTML 4 XML and JAVA", Prentice Hall of India QUE, 1999.
5. Aferganatel, "Web programming Desktop Management PHI, 2004.
6. Rajkamal, "Web Technology", Tata McGraw – Hill, 2001

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
5. Thiggrajan Viswanathan, "Tele Communication Switching system and Networks", Prentice Hall of India, Pvt. Ltd., New Delhi, 1995

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.
5. Goldberg and Dovid E. "Genetic Algorithm is search optimization and Machine Learning", Pearson Education, New Delhi 2006.
6. Kalyamoy Dob, "Multi objective optimization using Evolutionary algorithms", John Wiley & Sons, First Edition, USA, 2003.

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
6. M.Richaria: Satellite Communication systems Design Principles Macmillan Press Ltd., Second Edition 2003.

CS9265   PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND   L T P C
**   NETWORKS   3 0 0 3**
UNIT I   9
Performance Characteristics – Requirement Analysis: Concepts – User, Device, Network Requirements – Process – Developing RMA, Delay, Capacity Requirements – Flow analysis – Identifying and Developing Flows Models – Flow Prioritization – Specification.

UNIT II   9
Random variables – Stochastic process – Link Delay components – Queuing Models – Little's Theorem – Birth & Death Process – Queuing Disciplines.

UNIT III   9
Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov – Non – Markovian and self – similar models – Network of Queues – Burke's Theorem – Jackson's Theorem.

UNIT IV   9
Multi- User Uplinks/Downlinks – Capacity Regions – Opportunistic Scheduling for Stability and Max Throughput – Multi-hop routing – Mobile Networks – Throughput Optimality and Backpressure

UNIT V   9
Performance of Optimal Lyapunov Networking – Energy Optimality – energy – Delay Tradeoffs – Virtual Cost Queues – Average Power Constraints – Flow Control with Infinite Demand – Auxiliary Variables – flow Control with Finite Demand – General Utility Optimization.

TOTAL : 45 PERIODS

TEXT BOOKS
1. James D.McCabe, Network analysis, Architecture and Design, 2nd Edition, Elsevier, 2003.
2. Bertsekas & Gallager, Data Networks, second edition, Pearson Education, 2003.
3. Introduction to Probability Models by Sheldon Ross (8th edition) Academic Press, New York, 2003.

REFERENCES
1. D. Bertsekas, A. Nedic and A. Ozdaglar, Convex Analysis and Optimization, Athena Scientific, Cambridge, Massachusetts, 2003.
2. Nader f. Mir Computer and Communication Networks, Pearson Education, 2007.
3. Paul J.Fortier, Howard E.Michel, Computer Systems Performance Evaluation and Prediction, Elsevier, 2003.
4. Thomas G. Robertazzi, "Computer Networks and Systems Queuing Theory and Performance Evaluation" 3rd Edition Springer, 2000.

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

16

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
4. C.H. Papadimitrion, Computational Complexity, Addison-Wesley, 1994.
5. D.S.Hochbaum, Ed., Approximation Algorithms for Np-Complete problems, PWS, 1997

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 BOOKS:
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	LT 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 BOOKS:
1. Tom Clark, "Designing Storage Area Networks", Addison-Wesley Professional, 1st edition, 1999
2. Alex Goldman, "Storage Area Networks Fundamentals", Cisco Press 2002

REFERENCES:
1. Storage Networks Explained – Uif Troppens, Raiver Erkens and Wolfgang Muller, John Wiley & Sons, 2003.
2. Storage Networks: The Complete Reference – Robert Sparding, Tata Mcgraw Hills, 2003.
3. Storage Area Network Essentials: a Complete Guide to understanding and implementing SANs- Richard Barker and Paul Massiglia, John Wiley India – 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.

REFERENCES
1. Pradeep Ray, "Cooperative Management of Enterprise Networks", Springer 2000.
2. David M. Peterson, "Enterprise Network Management a guide to IBM's Net views, McGraw Hill, 1994.

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

REFERENCE:
1. D.W.Smith, Optical Network Technology, Chapman and Hall, London, 1995
2. J Gower, "Optical Communication Systems" Prentice Hall of India, 2001.
3. Franz & Jain, "Optical Communication, systems and Components, Narosa Publications, New Delhi, 2000

NE9263   **DISTRIBUTED COMPUTING**   **LT 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 BOOK:
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,

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 :45PERIODS

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

CR9005 INFRASTRUCTURE MANAGEMENT L T P C
3 0 0 3

UNIT I INFRASTRUCTURE MANAGEMENT OVERVIEW

Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, Value of Systems management for business

UNIT II PREPARING FOR INFRASTRUCTURE MANAGEMENT

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL)

UNIT III SERVICE DELIVERY PROCESSES

Service-level management, financial management and costing, IT services continuity management, Capacity management, Availability management

UNIT IV SERVICE SUPPORT PROCESSES

Configuration Management, Service desk, Incident management, Problem management, Change management, Release management

UNIT V STORAGE AND SECURITY MANAGEMENT

Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical space management, Database Application protection, Bare machine recovery, Data retention

TOTAL : 45 PERIODS

REFERENCES:

1. Foundations of IT Service Management: based on ITIL, by Jan Van Bon, Van Haren Publishing, 2nd edition 2005
2. Floyd Piedad, Michael Hawkins, "High Availability: Design, Techniques, and Processes", Prentice Hall, 2000.
3. Harris Kern, Stuart Galup, Guy Nemiro, "IT Organization: Building a Worldclass Infrastructure", Prentice Hall, 2000.
4. Rich Schiesser, "IT Systems Management: Designing, Implementing, and Managing World-Class Infrastructures", Prentice Hall PTR; 2001