Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech – Computer Systems and Networking (Part Time)
Curriculum and Syllabus
2013 Regulation

I SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MMA130017	Graph Theory for Networks	3	1	0	4
2	MCS13N001	Design and Implementation of TCP/IP Architecture	3	1	0	4
3	MCS13N002	Java Network Programming	3	0	0	3
4	MCS13NL01	Network programming Lab	0	0	3	1
		Total	**9**	**2**	**3**	**12**

II SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13N003	Advanced Data Structures and Network Algorithms	3	0	0	3
2	MCS13N004	Data Communication	3	0	0	3
3	MCS13N005	Advanced Database Management	3	0	0	3
4	MCS13NL02	Data Structure Lab	0	0	3	1
		Total	**9**	**0**	**3**	**10**

III SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MMA130020	Queuing Theory for Networks	3	1	0	4
2	MCS13N007	Network Management	3	0	0	3
3	MCS13NEXX	Elective I	3	0	0	3
4	MCS13NL03	Network Simulation Lab	0	0	3	1
		Total	**9**	**1**	**3**	**11**

IV SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13N008	Cryptography and Network Security	3	0	0	3
2	MCS13N006	Wireless Infrastructure Networks	3	0	0	3
3	MCS13NEXX	Elective II	3	0	0	3
4	MCS13CL03	Term Paper & Seminar	0	0	3	1
5	MCS13NL04	Network Security Lab	0	0	3	1
		Total	**9**	**0**	**6**	**11**

V SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13N009	Ad hoc and Wireless Sensor Network	3	1	0	4
2	MCS13NEXX	Elective III	3	0	0	3
3	MCS13NEXX	Elective IV	3	0	0	3
4	MCS13NL05	Project Work Phase-I	0	0	12	6
5						
		Total	**9**	**1**	**12**	**16**

VI SEMESTER						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13NL06	Project Work Phase-II	0	0	24	15
		Total	**0**	**0**	**24**	**15**

Summary of Credits:

1st Semester Credits	**12**
2nd Semester Credits	**10**
3rd Semester Credits	**11**
4th Semester Credits	**11**
5th Semester Credits	**16**
6th Semester Credits	**15**
Total	**75**

Elective I						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13NE01	Advanced Distributed Computing	3	0	0	3
2	MCS13NE02	Machine Learning Techniques for Networks	3	0	0	3
3	MCS13NE03	High Speed Networks	3	0	0	3
4	MCS13NE04	Satellite Communication Systems	3	0	0	3

Elective II						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13NE05	Design of Wired and Wireless Networks	3	0	0	3
2	MCS13NE06	Digital Forensics in Networking	3	0	0	3
3	MCS13NE07	Network Performance Evaluation	3	0	0	3
4	MCS13NE08	Network Routing Algorithm and Protocols	3	0	0	3

Elective III						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13NE09	Data Center Design and Cloud Computing	3	0	0	3
2	MCS13NE10	Ethical Hacking and Counter Measure	3	0	0	3
3	MCS13NE11	Communication Protocol Engineering	3	0	0	3
4	MCS13NE12	Convergent Network Architecture	3	0	0	3

Elective IV						
S.No	**Sub.Code**	**Title of Subject**	**L**	**T**	**P**	**C**
1	MCS13NE13	Advanced 3G Networks	3	0	0	3
2	MCS13NE14	Optical Communication Systems & Networking	3	0	0	3
3	MCS13NE15	Network Reliability & Fault Tolerance	3	0	0	3
4	MCS13NE16	Pervasive Computing	3	0	0	3

MMA130017 GRAPH THEORY FOR NETWORKS 3 1 0 4

OBJECTIVES:

- To practice creative problem solving and improve skills in Graph theory.
- Understand some applications of graph theory to practical problems and other branches of mathematics.
- Learn about how graph theory and combinatorics developed via a creative organic historical process.

UNIT I GRAPHS 12Hrs

Basic concepts of Graphs – Sub graphs – Paths and Circuits – Matrix representation of Graphs – Graph Isomorphism – Connected graphs and Components – Euler and Hamiltonian paths – Travelling salesman problem.

UNIT II TREES 12Hrs

Basic concepts of Trees– Properties – Pendant vertices – Rooted and Binary trees – Spanning trees – Fundamental circuits – Finding all spanning trees of a graph – Spanning trees in a weighted graph.

UNIT III CUT SETS AND ALGORITHMS 12Hrs

Basic concepts of Cut Sets – Properties – Fundamental circuits and cut sets – Connectivity and Separability – Basic concepts of Algorithms – Algorithms for: (i) Connectedness and Components (ii) A Spanning Tree.

UNIT IV DIRECTED GRAPHS I 12Hrs

Basic concepts of Directed graph (Digraph) – Types of Digraphs – Digraphs and Binary relations – Directed paths and Connectedness.

UNIT V DIRECTED GRAPHS II 12Hrs

Euler Digraphs – Trees with directed edges – Fundamental circuits in Digraphs – Adjacency matrix of a Digraph.

Total no. of hrs: 60

Reference Books:

1) Narsingh Deo, (2004),*Graph theory with applications to Engineering and Computer Science*, Prentice Hall of India

2) Robin J. Wilson, (2002) *Introduction to Graph theory (4th ed.)*, Pearson

3) Tremblay J.P., Manohar R., (2004) *Discrete Mathematical structures with applications to Computer science*, Tata McGraw Hill Publishing Co.,

4) Hamdy A. Taha, (2010) *Operations Research: An Introduction (9th ed.)*, Pearson

5) Hillier, Lieberman,(2005) *Introduction to Operations Research (8th ed.) (IAE)*, Tata McGraw Hill Publishing Co.

MCS13N001 DESIGN AND IMPLEMENTATION OF TCP/IP ARCHITECTURE 3 1 0 4

OBJECTIVES:

- To study the design and implementation of TCP/IP Architecture.
- To understand the importance of IP in TCP/IP architecture.
- To understand how the TCP handles congestion in Communication network traffic.
- To study about IP switching and Traffic Engineering.
- To understand the significance of IPV6.

UNIT I INTRODUCTION 12Hrs

OSI reference model, TCP/IP, comparison, architecture, Mapping between OSI and TCP/IP-Standards and underlying technologies-Internet addressing- ARP -RARP-BOOTP-DHCP, Interconnecting devices- Routers, bridges , Hub , Switches.

UNIT II INTERNET PROTOCOL 12Hrs

IP Datagram-IP Package-IP forwarding and routing algorithms-computing paths-RIPOSPF-ICMP-IGMP, Multiplexing in transport layer and physical layer.

UNIT III TCP and UDP 12Hrs

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, UDP-packet, data path, format, ports, applications

UNIT IV IP SWITCHING AND TRAFFIC ENGINEERING 12Hrs

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 12Hrs

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

Total no.of hrs: 60

REFERENCES:

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

MCS13N002 JAVA NETWORK PROGRAMMING 3 0 0 3

OBJECTIVES:

- To learn programming fundamentals and TCP/IP socket programming.
- Provide a suitable basis for later networking units that require Java-based skills.
- Understand fundamental program structures and Understand the concepts of system analysis.
- Explain fundamental object-oriented concepts.
- Write small programs in Java that use TCP/IP sockets.
- Design, write and debug small programs in Java with text input/output.
- Write small programs in Java that use simple GUI .

UNIT I BASIC NETWORK CONCEPTS 9Hrs

Layers of Network , IP, TCP, UDP, Internet, client server model, standards. Basic web concepts: URL, HTML,XML,HTTP,MIME types, server side programming.

UNIT II INPUT/OUTPUT METHOD 9Hrs

Streams-I/O, Input, Output, Read/Write Streams. Threads-Running threads, returning information from threads, synchronization, deadlock, thread scheduling and thread pools. Internet address,IPv4,IPv6,network interface class.URL class, encoder and decoder class.

UNIT III HTML AND INTERFACE TECHNIQUES 9Hrs

HTML in swing- HTML on components, J-editor pane, parsing HTML, sockets basics, Telnet, class, execeptions and address. Server sockets, useful servers, Secure sockets.

UNIT IV CLIENT SERVER MODEL 9Hrs

Non blocking I/O, example client-server, Buffers channels, UDP data gram and sockets, Multicast sockets.

UNIT V URL & RMI 9Hrs

URL connections, Protocol handler, Content handler, RMI, Java mail API.

Total no.of hrs: 45

REFERENCES:

1. Elliotte Rusty Harold,(2005)" *Java Network programming*" ,(3rd ed.)
2. Deitel & Deitel,(2009)"*Internet & World Wide Web How to Program*",(4th ed.), Pearson Education India
3. Deitel & Deitel,(2001)" *XML How to Program*", Pearson Education
4. Robert W.Sebesta ,(2009) " *Programming withWorld Wide Web* ",Pearson Education

MCS13NL01 NETWORK PROGRAMMING LAB 0 0 3 1

OBJECTIVE: To implement the following programs.

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.

MCS13N003 ADVANCED DATA STRUCTURES AND NETWORK ALGORITHMS 3 0 0 3

OBJECTIVES:

- To be familiar with basic techniques of algorithm analysis.
- To master in the implementation of linked data structures such as linked lists and binary trees.
- To be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
- To be familiar with several sub-quadratic sorting algorithms including quicksort, mergesort and heapsort.
- To be familiar with some graph algorithms such as shortest path and minimum spanning tree.
- To master the standard data structure library of a major programming language.
- To analyze problems and writing program solutions to problems using the above techniques.

UNIT-I DATA TYPES 9Hrs

Amortized Complexity Analysis. Advanced Structures for Dictionary ADT: Red-Black Trees, Splay Trees. Multidimensional Search Trees: k-d Trees, Point Quad trees.

UNIT-II QUEUES AND TREES 9Hrs

Advanced Structures for Priority Queues: Leftist Trees, Binomial Heaps, Symmetric Min-Max Heaps, Binary Search Tree, Multimedia Data Structure.

UNIT-III SEARCHING TECHNIQUES 9Hrs

Substitution Method, Recursion Tree, and Master Method. Divide and Conquer: Selection, Convex Hull, Maximum-sub array problem. Greedy Methods: Container Loading, Continuous Knapsack Problem. Dynamic Programming: 0/1 Knapsack, Flow Shop Scheduling.

UNIT-IV TRAVERSAL METHODS 9Hrs

Approximation Algorithms: Vertex-Cover Problem, Traveling-Salesman Problem, Set-Covering Problem, Subset-Sum Problem. Introduction to Probabilistic Analysis and Randomized Algorithms.

UNIT-V N-P PROBLEMS 9Hrs

String Matching: The naïve string matching algorithm, Rabin-Karp algorithm, Knuth-Morris-Pratt algorithm. NP-Completeness: Polynomial time, Verification, NP Completeness and reducibility, NP-Completeness proofs, NP-Complete problems

Total no.of hrs: 45

REFERENCES:

1. T.H.Cormen, C.E.Leiserson,R.L.Rivest, and C.Stein,(2011)" *Introduction to Algorithms*", ,PHI Pvt.Ltd. Pearson Education
2. E. Horowitz, S. Sahni, and D. Mehta, (2007)"*Fundamentals of Data Structures in C++*",(2nd ed.), University Press
3. E. Horowitz, S. Sahni, and S. Rajasekharan,(2007) "*Fundamentals of Computer Algorithms*",(2nd ed.), University Press
4. T. H. Cormen, C. E. Leiserson, R. Rivest, and C Stein,(2009)" *Introduction to Algorithms*", (3rd ed.), Prentice Hall of India

MCS13N004 **DATA COMMUNICATION** **3 0 0 3**

OBJECTIVES:

- To understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP.
- Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network.
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT-I BASICS **9Hrs**

Overview-data Communication model-Data Communication, Networks and Internet, TCP/IP Protocol Architecture –Internet based Application-Multimedia

UNIT-II TRANSMISSION METHODS **9Hrs**

Data Transmission - Analog & Digital transmission-Transmission Media-Signal Encoding Techniques-Digital Data communication Techniques-Data link Control protocols-Multiplexing-Spread Spectrum

UNIT-III WIDE AREA NETWORKS **9Hrs**

Circuit Switching& Packet Switching-Asynchronous Transfer Mode-Routing in Switched Data Networks-Congestion Control in Data Networks-Cellular Wireless networks.

UNIT-IV LOCAL AREA NETWORKS **9Hrs**

Overview –Ethernet-Wireless LANs-Internet Protocol-Internetwork Operation-Internetwork Quos.

UNIT-V TRANSPORT & APPLICATION LAYER **9Hrs**

Multiprotocol label Switching-Transport Protocols-Computer and Network Security Threats & Techniques. Electronic mail, DNS and HTTP, Internet Multimedia Support.

Total no.of hrs: 45

REFERENCES:

1. William Stalling,(2011) “Data & Computer Communications”, (9th ed.), Pearson Education
2. A. Behrouz Forouzan,(2007)” Data Communications & Networking”, (4th ed.),TMH
3. William Stalling, (2007)“Data & Computer Communications”, (8th ed.), Pearson Education

MCS13N005 ADVANCED DATABASE MANAGEMENT 3 0 0 3

OBJECTIVES:

- To understand the role of a Data Base Management System in an organization.
- To understand basic database concepts, including the structure and operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- To design and implement a small database project using Microsoft Access.
- To understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.
- To understand and explain Data Communications System and its components.

UNIT-I THE RELATIONAL MODEL & RDBMS IMPLEMENTATION TECHNIQUES 9Hrs
Theoretical concepts, Relational model conformity and Integrity, Advanced SQL programming, Query optimization, Concurrency control and Transaction management, Database performance tuning, Distributed relational systems and Data Replication, Security considerations

UNIT-II THE EXTENDED ENTITY RELATIONSHIP MODEL AND OBJECT MODEL 9Hrs
The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization, Relationship types of degree higher than two.

UNIT-III EMERGING DATABASE MANAGEMENT SYSTEM TECHNOLOGIES 9Hrs
Object Oriented database concepts; Object Relational database concepts; Active database concepts; Temporal database concepts; Spatial database concepts and architecture; Deductive databases and Query processing; Mobile Databases; Geographic Information Systems.

UNIT-IV MOBILE DATABASE SYSTEM 9Hrs
Data Processing and Mobility-Transaction Execution in MDS-Mobile Transaction Model-Execution Model-Consistency Model- Consistency Control-Transaction Commitment-Mobile database Recovery

UNIT-V DISTRIBUTED DATABASE 9Hrs
Design Issues, DBMS Architecture, Database Design, Integration, Data and Access control, Query processing, Localization, Optimization, Multi-database Query Processing.

Total no.of hrs: 45

REFERENCES:

1. Elmasri and Navathe, (2008)"*Fundamentals of Database Systems*",(5th ed.),Pearson Education.
2. Korth, Silberchatz, Sudarshan , (2010)"*Database System Concepts*", 6th ed.),McGraw-Hill
3. M. Tamer Özsu, Patrick Valduriez,(2011)"*Principles of Distributed Database Systems*",(3rd ed.),Springer
4. C. J. Date & Longman, (2006)"*Introduction to Database Systems*", (8th ed.),Pearson Education
5. Vijay Kumar,(2006)"*Mobile Database Systems*",Wiley-Interscience

MCS13NL02 DATA STRUCTURE LAB **0 0 3 1**

OBJECTIVE: To implement the following programs.

LIST OF EXPERIMENTS

1. Implementation of stack and queue operations using linked list and array.
2. Implementation of linked lists operations
3. Implementation of sorting techniques
    a. Quick sort b. Merge sort c. Bubble sort
    d. Selection sort e. Insertion sort f. Shell and heap sort
4. Implementation of Searching techniques
    a. Linear search b. Binary search
5. Maximum-sub array problem
6. Container Loading & Continuous Knapsack Problem.
7. Implementation of Flow Shop Scheduling
8. Traveling-Salesman Problem
9. Implementation of Rabin-Karp algorithm
10. Implementation of Subset-Sum Problem

MMA130020 QUEUING THEORY FOR NETWORKS 3 1 0 4

OBJECTIVES:

- To understand such queuing phenomenon in order to predict the performance, control, and sometimes optimize the system where the queuing occurs.
- Proper understanding and studying variety of queues.
- To model a single checkout counter or a single machine, to complex networks of queues, that can be used to model job shops or flexible flow shops in production environments.
- Intuitive understanding of queuing and on modeling and solution techniques that are useful in applications.

UNIT I RANDOM VARIABLES 12Hrs

Baye's Theorem – Random Variables – Distribution functions – Moments – Moment Generating functions – Chebychev's Inequality (statement only) – Function of Random Variables.

UNIT II STANDARD DISTRIBUTIONS 12Hrs

Marginal and Conditional Distributions – Binomial – Poisson – Geometric – Uniform – Exponential– Normal distributions – Central Limit theorem(applications only).

UNIT III RANDOM PROCESS 12Hrs

Classification of Random Process – Stationary Process – Ergodic Process – Poisson Process –Markov Process – Markov Chains.

UNIT IV QUEUING MODELS 12Hrs

Elementary concepts – Role of Exponential distribution – Pure Birth and Death process – Single server Markovian models with infinite and finite capacity – Multi server Markovian models with infinite and finite capacity.

UNIT V SIMULATION 12Hrs

Simulation: Introduction – Monte-Carlo Technique – Generation of Random numbers – Applications to Queuing models.

Total no. of hrs: 60

Reference Books:

1. Veerarajan T., (2008) *Probability, Statistics and, Random Processes*, Tata McGraw Hill Publishing Co.
2. Singaravelu,(2008) *Probability and Random Processes*, Meenakshi Agency
3. Kandasamy P., Thilagavathy K., Gunavathi K., (2010) *Probability and Queuing theory*, S.Chand & Co
4. Hamdy A. Taha, (2010) *Operations Research: An Introduction (9th ed.)*, Pearson
5. Hillier, Lieberman,(2005) *Introduction to Operations Research (8th ed.) (IAE)*, Tata McGraw Hill Publishing Co.
6. Hira D.S., Gupta P.K., (2007)*Operations Research*, S.Chand and Co.

MCS13N007 NETWORK MANAGEMENT 3 0 0 3

OBJECTIVES:

- To understand the need for interoperable network management.
- Understand general concepts and architecture behind standards based network management.
- Understand concepts and terminology associated with SNMP and TMN.
- Appreciate network management as a typical distributed application.
- Get a feeling of current trends in network management technologies.
- Understand Advanced Information Processing Techniques such as Distributed Object Technologies, Software Agents and Internet Technologies used for network management

UNIT-I DATA COMMUNICATION AND NETWORK MANAGEMENT 9Hrs

TCP/IP based Networks-Communication Protocol and Standard-Network System and Services-Goals, Organization & Functions-Network Architecture &Organization, ISDN, Frame Relay, Broadband

UNIT-II SNMP MANAGEMENT 9Hrs

SNMP v1 - organization and information models, Communication and Functional models-SNMPv2, SNMP v3.

UNIT-III MONITIORING METHODS 9Hrs

RMON1 and RMON 2, Network Management Tools, Systems and Engineering

UNIT-IV MANAGEMENT LAYER 9Hrs

Telecommunication Management Network-Network management Applications

UNIT-V BROADBAND & OPTICAL NETWORK 9Hrs

Broadband Network management, wired and Optical access Networks.

Total no.of hrs: 45

REFERENCES:

1. Mani Subramanian, (2010)"*Network Management Principles and Practice*", Pearson education
2. William Stallings,(2009)"SNMP, *SNMPV2, SNMPV3, RMON1&2*", (3rd ed.), Addison Wesley
3. Douglas E. Comer and David L. Stevens,(2006)"*Internetworking with TCP/IP*", Vol2. PHI
4. Peterson Davie (2000) *Computer Networks - A System Approach*, (2nd ed.),Morgan Kauffman - Harcourt Asia
5. Andrew S. Tananbaum, (2003)"Computer Networks ", (3rd ed.), PHI, 2003.

MCS13NL03 NETWORK SIMULATION LAB **0 0 3 1**

The following experiments shall be conducted using NS / OPNET or any other suitable simulator.

OBJECTIVE: To implement the following programs.

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network with the links connected as follows:

n0 – n2, n1 – n2 and n2 – n3.

a. Apply TCP agent between n0-n3 and UDP between n1-n3.

b. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

3. Simulate the different types of Internet traffic such as FTP and TELNET over a network and analyze the throughput.
4. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
5. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
6 Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and determine collision across different nodes.
7. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
8. Simulate simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets.

MCS13N008 CRYPTOGRAPHY AND NETWORK SECURITY 3 0 0 3

OBJECTIVES:

- To learn the fundamentals of cryptography and its application to network security.
- To understand the mathematics behind cryptography.
- To study about network security threats, securities services and counter measures.
- To learn about the principles and protocols that enables its application to wired and wireless networks.
- To develop an understanding of security policies such as authentication, integrity and confidentiality as well as protocols to implement such policies.
- To design cryptographic algorithms and carry out their implementation.
- To be able to do cryptanalysis on cipher.
- To be able to design and implement security protocols.

UNIT I CONVENTIONAL ENCRYPTION 9 Hrs

Introduction, Conventional encryption model, Stegnography, Data Encryption Standard, block cipher, Encryption algorithms, confidentiality, Key distribution

UNIT II PUBLIC KEY ENCRYPTION AND HASHING 9 Hrs

Principles of public key cryptosystems, RSA algorithm, Diffie- Hellman Key Exchange. Elliptic curve cryptology, message authentication and Hash functions, Hash and Mac algorithms, Digital signatures

UNIT III IP SECURITY 9Hrs

IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management

UNIT IV WEB SECURITY 9 Hrs

Web security requirement, secure sockets layer and transport layer security, secure electronic transaction, digital signature

UNIT V SYSTEM SECURITY 9 Hrs

Intruders, Viruses, Worms, firewall design, trusted systems, antivirus techniques, digital Immune systems

Total no.of hrs: 45

REFERENCE:

1. William Stallings(2011)"*Cryptography and Network security*", (5th ed.),Prentice Hall of India, New Delhi
2. Behrouz A. Forouzan,(2008)"*Cryptography and Network Security* ",TMH
3. Atul Kahate,(2008)" *Cryptography And Network Security*", TMH

MCS13N006 WIRELESS INFRASTRUCTURE NETWORKS 3 0 0 3

OBJECTIVES:

- To understand the fundamentals of wireless networks.
- To learn the concepts of optical networks.
- To give adequate exposure to the emerging technologies and their potential impact.
- To design the various access networks.
- To be able to design the 4G and LTE networks.
- To design broadband fiber optic networks.
- To design Hybrid wireless – optical networks.

UNIT I WIRELESS LOCAL AREA NETWORKS 9Hrs

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayerMAC Management Sublayer- Wireless ATM - HIPERLAN- HIPERLAN-2, WiMax

UNIT II 3G OVERVIEW & 2.5G EVOLUTION 9Hrs

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 MOBILE NETWORKS 9Hrs

Architecture of GSM, Multiplexing Techniques-TDMA, SDMA, FDMA, CDMA, DECT, TETRA, UMTS, IMT 2000.

UNIT IV INTERWORKING BETWEEN WLANS AND 3G WWANS 9Hrs

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 9Hrs

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

Total no.of hrs: 45

REFERENCES:

1. Clint Smith. P.E., and Daniel Collins,(2007)"*3G Wireless Networks*", (2nd ed.), Tata McGraw Hill
2. William Stallings,(2007) "*Wireless Communications and networks*",(2nd ed.), Pearson,Prentice Hall of India
3. Dharma Prakash Agrawal & Qing-An Zeng,(2007) "Introduction to Wireless and Mobile Systems", (2nd ed.).Thomson India Edition
4. Gary. S. Rogers & John Edwards, (2007)"*An Introduction to Wireless Technology*", Pearson Education
5. Sumit Kasera and Nishit Narang,(2007) "*3G Networks – Architecture, Protocols and Procedures*", Tata McGraw Hill
6. Jochen Schiller,(2008)"Mobile Communications", (2nd ed.),Pearson Education

MCS13CL03 **TERM PAPER AND SEMINAR** **0 0 3 1**

- The Students are expected to prepare paper on any current emerging technology in computer science.
- The Students are expected to deliver the seminars on the respective topics.
- The students will be evaluated based on the presentation and demonstration.
- Report and VIVA-VOCE

MCS13NL04 **NETWORK SECURITY LAB** **0 0 3 1**

OBJECTIVE: To implement the following programs.

1. Write a program that can encrypt and decrypt using the general Caesar cipher, also known as an additive cipher.
2. Write a program that can perform a letter frequency attack on an additive cipher without human intervention (substitution cipher).
3. Write a program that can encrypt and decrypt using Hill cipher.
4. Create software that can encrypt and decrypt using SDES.
   Test data: Use plaintext, cipher text, and key.
5. Write a program that can encrypt and decrypt using triple DES algorithm
6. Write a program to implement the Blowfish algorithm logic.
7. Implement Random Number Generation and MD5 algorithm.
8. Implement RSA, RC4Algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism
10. Calculate the message digest of a text using the SHA-1 algorithm
11. Write a program to perform a digital signature on a given text.
12. Implement ELGAMAL Algorithm

MCS13N009 AD HOC AND WIRELESS SENSOR NETWORKS 3 1 0 4

OBJECTIVES:

- To learn about Adhoc network characteristics applications.
- To understand about Broadcasting and Multicasting along with transport protocols of Ad hoc networks
- To develop an understanding of sensor network architectures from a design and performance perspective.
- To understand the layered approach in sensor networks starting from physical layer to application layer.
- To study the WSN protocols.

UNIT I AD HOC NETWORKS 12 Hrs

Introduction and Definitions, Ad hoc Network Applications, Design Challenges. Collision Avoidance Protocols.

UNIT II ROUTING TECHNIQUES 12 Hrs

Routing in Mobile Ad hoc Networks -Multicasting -Transport layer Protocols

UNIT III SECURITY ISSUES 12 Hrs

Energy Conservation-Use of Smart Antennas-QoS Issues-Security

UNIT IV WIRELESS SENSOR NETWORKS 12Hrs

Introduction-Applications- Medium Access Control Protocols

UNIT V NETWORK AND TRANSPORT LAYER PROTOCOL 12 Hrs

Routing Protocols - Transport Control Protocols- Network Management

Total no.of hrs: 60

REFERENCES

1. Prasant Mohapatra and Srihanamurthy,(2009)"*Ad Hoc Networks Technologies and Protocols*", Springer, Springer International Edition
2. Kazem Sohraby, Daniel Minoli, Taieb Znati, (2007)"*Wireless Sensor Networks*", A John Wiley & Sons, Inc., Publication
3. Carlos De Morais Cordeiro, Dharma Prakash Agrawal,(2011)"*Ad Hoc and Sensor Networks: Theory and Applications*", (2nd ed.),World Scientific
4. Houda Labiod,(2010)"*Wireless Ad Hoc and Sensor Networks*", John Wiley & Sons

MCS13NE01 ADVANCED DISTRIBUTED COMPUTING 3 0 0 3

OBJECTIVES:

- Understanding the major tools and techniques that allow programmers to effectively program the parts of the code that require substantial communication and synchronization for distributed systems.
- Studying the core ideas behind modern coordination paradigms and concurrent data structures.
- Realizing not only the basic principles but also the best practice engineering techniques of distributed computing.
- Identifying techniques to formally prove correctness of multiprocessor programs.
- Analyzing the performance of multiprocessor algorithms.

UNIT I INTRODUCTION 9 Hrs

Model of distributed computations, distributed program, Model of distributed executions, Models of communication networks, Cuts of a distributed computation-Logical Time: framework for a system of logical clocks, Scalar and Vector time, Implementations of vector clocks, Jard–Jourdan's adaptive technique, Matrix and Virtual time, NTP.

UNIT II GLOBAL STATE AND SNAPSHOT RECORDING ALGORITHMS 9 Hrs

System model, Snapshot algorithms for FIFO and non-FIFO channels, variations of the Chandy–Lamport algorithm, causal delivery system, monitoring global state, necessary and sufficient conditions for consistent global snapshots, terminology and basic algorithms

UNIT III MESSAGE ORDERING AND GROUP COMMUNICATION 9 Hrs

Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order, Total order, nomenclature for multicast Propagation trees for multicast, classification of application-level multicast algorithms, Termination detection

UNIT IV REASONING WITH KNOWLEDGE 9 Hrs

The muddy children puzzle Logic of knowledge in Synchronous systems, Knowledge in asynchronous systems, Knowledge Transfer Knowledge and clocks. Distributed mutual exclusion algorithms, Deadlock detection in distributed systems

UNIT V GLOBAL PREDICATE DETECTION 9 Hrs

Stable and unstable predicates, Modalities on Predicates, Centralized algorithm for relational predicates, Conjunctive predicates, Distributed algorithms for conjunctive predicates- Distributed shared memory, check pointing and rollback recovery.

Total no. of hrs: 45

REFERENCES:

1. Ajay D. Kshemkalyani, Mukesh Singhal,(2008),"Distributed Computing: Principles, Algorithms, and Systems" Cambridge University Press
2. Singhl & Shivaratri,(2001) "Advanced Concept in Operating System", ,McGraw Hill.
3. Coulouris, Dollimore, Kindberg,(2005) "Distributed System: Concepts and Design" ,Pearson Education Press.

MCS13NE02 MACHINE LEARNING TECHNIQUES FOR NETWORKS 3 0 0 3

OBJECTIVES:

- Be able to formulate machine learning problems corresponding to different applications.
- Understand a range of machine learning algorithms along with their strengths and weaknesses.
- Understand the basic theory underlying machine learning.
- Be able to apply machine learning algorithms to solve problems of moderate complexity.
- Be able to read current research papers and understand the issues raised by current research.

UNIT - I INTRODUCTION 9 Hrs

Introduction to Machine Learning – Applications – Learning Associations – Classification – Regression – Unsupervised Learning – Reinforcement Learning – Supervised Learning – Vapnik-Chervonenkis (VC) Dimension – Probably Approximately Correct (PAC) Learning – Noise – Learning multiple classes – Model selection and Generalization.

UNIT - II PERFORMANCE ISSUES 9 Hrs

Bayesian Decision Theory – Classification – Losses and Risks – Discriminant Functions – Utility theory – Value of Information – Bayesian Networks – Influence Diagrams – Association rules – Maximum Likelihood estimation – Bernoulli Density – Multinomial Density – Gaussian Density – Bias and Variance – Bayes' estimator – Tuning Model complexity – Model selection procedures.

UNIT - III DATA ANALYSIS 9 Hrs

Multivariate methods – Parameter estimation – Multivariate Normal Distribution – Tuning Complexity – Discrete Features – Multivariate regression – Subset selection – Principal component analysis – Factor analysis – Multidimensional scaling – Linear discriminate analysis.

UNIT – IV CLUSTERING METHODS 9 Hrs

Clustering – Mixture densities – k-Means clustering – Expectation-Maximization algorithm – Hierarchical clustering – Non-parametric methods – Histogram estimator – Kernel estimator – k-Nearest neighbor estimator – Decision trees – Univariate trees – Pruning – Rule extraction from trees – Learning rules from data – Multivariate trees.

UNIT – V EVALUATION TECHNIQUES 9 Hrs

Multilayer perceptions – Neural networks – perceptron – Training a perceptron – Back propagation algorithm – Local models – Competitive learning – Radial basis functions – Mixture of experts – Hidden Markov models – Discrete Markov processes – Evaluation problem – State sequence – Learning model parameters – Model selection in HMM.

Total no.of hrs: 45

REFERENCES:

1. Ethem Alpaydin, (2010) "*Introduction to Machine Learning*", MIT Press
2. Jaime Guillermo Carbonell and Tom Michael Mitchell,(1994) "*Machine Learning*", Morgan Kaufmann

MCS13NE03 HIGH SPEED NETWORKS 3 0 0 3

OBJECTIVES:

- Students will get an introduction about ATM and Frame relay.
- Students will be provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.
- Students will be provided with different levels of quality of service (QOS) to different applications.

UNIT I HIGH SPEED NETWORKS 9 Hrs

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 – 802.11.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9 Hrs

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 ATM CONGESTION CONTROL 9 Hrs

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 OPTICAL NETWORKS 9 Hrs

SONET/SDH-Optical wavelength routing networks-Optical Cross connects and Burst Switching-PONS- Intelligent optical networks-IP over WDM networks.

UNIT V END-TO –END SYSTEM 9 Hrs

End-to-End Protocol-Functions ,Mechanisms, semantics-State Management-Multiplexing-Error control-Flow control-security

Total no.of hrs: 45

REFERENCES:

1. William Stallings, (2002)"*High speed networks and internet*", (2nd ed.),Pearson Education
2. Warland, Pravin Varaiya, (2001),"*High performance communication networks*", (2nd ed.),Jean Harcourt Asia Pvt. Ltd.
3. James P.G Sterbenz and Joseph D.Touch (2001)"*High Speed Networking: A Systematic approach to high-bandwidth low latency communication*" Wiley
4. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, (2003)"*MPLS and VPN architecture*", Cisco Press, Volume 1 and 2
5. Abhijit S. Pandya, Ercan Sea, (2004)"*ATM Technology for Broad Band Telecommunication Networks*", CRC Press, New York.

MCS13NE04 SATELLITE COMMUNICATION SYSTEM 3 0 0 3

OBJECTIVES:

- To determine the azimuth and elevation angles and visibility of a geostationary satellite from an earth station.
- Create link budgets for an uplink and a downlink, and determine carrier to noise ratio (C/N) at an earth terminal receiver.
- Design a communications satellite system to meet specified objectives for signal to noise ratio (S/N) in an analog baseband or BER in a digital link using appropriate multiple access techniques.
- Determine the effect of rain attenuation in a satellite link and the availability of the link based on the geographic location of the earth terminals.
- Determine the type and dimensions of antennas for use on satellites and at earth stations.
- Design satellite communication systems using GEO or LEO satellites to carry voice, video, or data signals using analog or digital modulation.

UNIT I ELEMENTS OF SATELLITE COMMUNICATION 9 Hrs

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

UNIT II 9 Hrs

TRANSMISSION, MULTIPLEXING, MODULATION, MULTIPLE ACCESS AND CODING

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

UNIT III SATELLITE LINK DESIGN 9 Hrs

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 9 Hrs

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

UNIT V APPLICATIONS 9 Hrs

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

Total no.of hrs: 45

REFERENCES:

1. Louis J. Ippolito Jr ,(2008)"*Satellite Communications Systems Engineering*, ", John wiley & sons Ltd.
2. Dharma Raj Cheruku,(2009)"*Satellite Communication*",.I.K.International Publishing House Pvt Ltd.
3. Wilbur L. Pritchard, H.G. Suyderhoud ,Robert A.Nelson,(2006), *Satellite Communication Systems Engineering*, Prentice Hall, New Jersey
4. Timothy Pratt and Charles W.Bostain, (2003) *Satellite Communications*, John Wiley and Sons
5. D.Roddy, (2006) *Satellite Communication*, McGrawHill

MCS13NE05 DESIGN OF WIRED AND WIRELESS NETWORKS 3 0 0 3

OBJECTIVES:

- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To clarify wired and wireless network terminology.
- To provide an opportunity to do network programming using TCP/IP.
- To give the students experience working in programming teams.
- To provide a WLAN measurement experience.
- To expose students to emerging technologies and their potential impact.

UNIT I OVERVIEW OF NETWORKS 9 Hrs

Networks types, networking issues, networking topologies. Protocols architectures: The ISO/OSI reference model; TCP/IP and the OSI Mode. Communications networks transmission principles: Switching technologies; Error and flow control techniques and standards; Performance issues and analysis.

UNIT II ATM NETWORKS 9 Hrs

SDH standards; The STM frame structure; Multiplexing of containers. ATM CELL STRUCTURE: Virtual Paths and Channels; QoS Parameters; The ATM Adaptation Layer; Delay in ATM networks. Signaling in telecommunications networks; SS7; ISDN narrow broadband access, computer networks, comparison of different types.

UNIT III OSI & TCP 9 Hrs

Protocol stack, protocol concept, PDUs and their transformation in computer networks, multilayer protocol. OSI and TCP/IP models, Physical layer, Shannon's result, Manchester code, simplex, half-duplex and full-duplex media. Performance comparison. Common types of Ethernet cables.

UNIT IV MEDIUM ACCESS CONTROL 9 Hrs

Ethernet , Modeling the jam handshake in half-duplex Ethernet, physical constraints in Ethernets, CSMA/CD, back-off algorithm, unfairness, max frame rate, max throughput, max utilization conditions, link aggregation, Ethernet frame, fragmentation, Repeaters, hubs, bridges, switches.IP, format, ARP, fragmentation, routing algorithm, routing table, classes of networks, netmasks, LAN analysis, ICMP.

UNIT V APPLICATION LAYER 9 Hrs

TCP, the concept of reliable connection, functions, ports and sockets, format, 3-way handshake, ARQ in TCP, comparison to UDP, wireless protocols. HTTP, HTML, Privacy and Security in communications networks, issues, protocols, algorithms and techniques, public and private key cryptography, common attacks, "man in the middle" attack, countermeasures, voice over IP.

Total no.of hrs: 45

REFERENCES:

1. Stalling, William,(2011), *Data and Computer Communication*, (9th ed.), Pearson
2. Steven W.Richard, (1994)*TCP/IP Illustrated* Addition Wesley

MCS13NE06 DIGITAL FORENSICS IN NETWORKING 3 0 0 3

OBJECTIVES:

- To learn about Attribution Meta data and other logs that can be used to attribute actions to an individual.
- Alibis and statements Information provided by those involved can be cross checked with digital evidence.
- Evaluation of source File artifacts and meta-data can be used to identify the origin of a particular piece of data.
- Document authentication related to "Evaluation of source meta data associated with digital documents can be easily modified".
- Document authentication related to detecting and identifying falsification of such details.

UNIT – I BASICS 9 Hrs

Computer Forensics, Computer Forensics and Investigations, Data Acquisition, Working with windows and DOS Systems, Computer Forensics Tools, Forensics Analysis and Validation.

UNIT – II CLOUD AND TRAFFIC IN NETWORK 9 Hrs

Network Forensics-Introduction to Cloud Computing-Gathering Evidence-Capturing Network Traffic- Using Snort for Network-Based Forensics

UNIT – III HACKING 9 Hrs

Network Evidence -Deciphering a TCP Header -Incorporating Network Forensics into Incident Response Plans Investigation Method, Incident Response, DMCA Violations, Web Site Compromise: Search Engine Spam and Phishing.

UNIT – IV DATA ANALYSIS TECHNIQUES 9 Hrs

Commercial Net Flow Applications-Net Witness Investigator-Net Witness Investigator Architecture, Import/Live Capture Network Traffic, Collections, Parsers, Feeds, and Rules, Navigation Views, Data Analysis, Exporting Captured Data-Silent Runner by Access Data

UNIT – V LEGAL IMPLICATIONS 9 Hrs

Legal Implications and Considerations-Network Forensics Examiner Skills and Investigation Life Cycle-The Future of Cloud Computing-The Future of Network Forensics-Today's Challenges with Existing Devices for Network Forensics, Network Forensics Quadrants of Focus and Analysis Tools.

Total no.of hrs: 45

REFERENCES:

1. Clint Garrison,(2010)" *Digital Forensics for Network, Internet and Cloud Computing*", Syengress,
2. Bill Nelson, Amelia Phillips, Christopher Steuart,(2010)" *Guide To Computer Forensics and Investigations"*, (4th ed.)
3. John Sammons (2012)"*The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics*" Elsevier Inc,
4. Eoghan Casey, (2009)"*Handbook of Digital Forensics and Investigation*", Academic press

MCS13NE07 NETWORK PERFORMANCE EVALUATION 3 0 0 3

OBJECTIVES:

- To learn about Performance Evaluation in Computer Network Performance Metrics.
- Performance Evaluation Techniques includes the following methods Workload Characterization, Simulation Models, Analytic Models.
- Also to understand about Empirical Measurement Studies
- Study about the choice of measurement tools,
- Study about the Design of Measurement Experiments.

UNIT I INTRODUCTION 9 Hrs

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 PERFORMANCE ISSUES 9 Hrs

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

UNIT III QUEUEING METHODS 9 Hrs

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 SCHEDULING AND THROUGHPUT 9 Hrs

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

UNIT V OPTIMIZATION 9 Hrs

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 no.of hrs: 45

REFERENCES:

1. James D.McCabe, (2007)*Network analysis, Architecture and Design*, 3 rd Edition, Elsevier, 2007.
2. Bertsekas & Gallager, (2003)*Data Networks*, (2nd ed.), Pearson Education
3. Sheldon Ross ,(2003) Introduction to Probability Models , (8th ed.),Academic Press, New York
4. D. Bertsekas, A. Nedic and A. Ozdaglar,(2003) Convex Analysis and Optimization, Athena Scientific, Cambridge, Massachusetts
5. Nader f. Mir ,(2007)*Computer and Communication Networks*, Pearson Education

MCS13NE08 NETWORK ROUTING ALGORITHM AND PROTOCOLS 3 0 0 3

OBJECTIVES:

- To learn about the basic concepts of networking and IP addressing scheme and its principals.
- To understand about the routing algorithms based on distance vector and link state routing.
- To understand the characteristics of routers and its architectures.
- Lookup algorithms and IP packet filtering and protocols of networks.

UNIT I BASIC ALGORITHMS 9 Hrs

Network and Network routing-Routing Algorithm- Shortest Path Widest Path- Routing Protocol- Frame Work and Principles-Network Flow Modeling

UNIT II IP TRAFFIC 9 Hrs

IP Routing and Distance Vector Protocol Family, OSPF and Integrated IS-IS, IP Traffic Engineering

UNIT III INTERNET ROUTING 9 Hrs

BGP -Internet Routing Architectures- Router Architectures**:** Functions of a Router, Types of Routers, Elements of a Router, Packet Processing: Fast Path Vs Slow Path, Router Architectures.

UNIT IV FILTERING 9 Hrs

IP Address Lookup Algorithms-IP Packet Filtering and Classification

UNIT V VOIP 9 Hrs

Quality of Service Routing- MPLS and GMPLS- Routing and Traffic Engineering With MPLS- VOIP Routing: Interoperability through IP and PSTN:

Total no.of hrs: 45

REFERENCES:

1. Deepankar Medhi, Karthikeyan Ramasamy,(2007)" *Network Routing Algorithms, Protocols, and Architectures*" , Elsevier Inc.
2. Nader F.Mir(2010),"*Computer and Communication Networks*", PHI
3. Kurose & Ross, (2012)"*Computer Networks– A Top-down approach featuring the Internet"*, Pearson Education
4. Tanenbaum, (2003)"*Computer Networks*", (4th ed.),Pearson Education ,PHI.

MCS13NE09 DATA CENTRE DESIGN AND CLOUD COMPUTING 3 0 0 3

OBJECTIVES:

- To understand about the basic storage and networking concepts in SAN, Fabrics, Along with its addressing scheme and storage technique.
- To understand about Fiber channel products.
- Study about history of cloud computing, pros and cons of cloud computing, cloud storage, web based application and developing cloud services.

UNIT I INTRODUCTION 9 Hrs

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

UNIT II STORAGE TECHNIQUE 9 Hrs

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 FIBER CHALLEL & SCSI 9 Hrs

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

UNIT IV UNDERSTANDING CLOUD COMPUTING 9 Hrs

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

UNIT V DEVELOPING CLOUD SERVICES 9 Hrs

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

Total no.of hrs: 45

REFERENCES:

1. Tom Clark,(2003) "*Designing Storage Area Networks*",(2nd ed.), Addison-Wesley Professional
2. Alex Goldman, (2002)"*Storage Area Networks Fundamentals*", Cisco Press
3. Michael Miller, (2008)*Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing*
4. Haley Beard, (2008)*Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*, Emereo Pty Limited

MCS13NE10 ETHICAL HACKING AND COUNTER MEASURE 3 0 0 3

OBJECTIVES:

- To know about an interactive environment where the students will be shown how to scan, test, hack and secure their own systems.
- Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks, no real network is harmed.
- Students then learn how intruders escalate privileges and what steps can be taken to secure a system.
- Students will also learn about Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.

UNIT I BASIC HACKING 9 Hrs

Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks , PHP Injections – Buffer overflow attacks - Privacy attacks.

UNIT II TYPES OF ATTACKS 9 Hrs

TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls.

UNIT III ATTACKS AND COUNTER MEASURES 9 Hrs

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process.- Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks. Phishing.

UNIT IV FRAUD INDICATOR 9 Hrs

Key Fraud Indicator selection process customized taxonomies – Key fraud signature selection process – Accounting Forensics – Computer Forensics – Journaling and it requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection

UNIT V FORGERY ANALYSIS 9 Hrs

Footprinting, Scanning, Enumeration, Email Analysis and Spam Mails, Proxy Servers, Spoofing, Banner Grabbing, Social Engineering, Sniffers, Session Hijacking, Defending Virus, Defending Trojans, Backdoor ,Rootkits and Worms, Keyloggers, , Cross Site Scripting.(XSS) ,Cross Site Request Forgery (CSRF) Countermeasures, Expert Levels Hands on OWASP, IP Tracing Hunting Hackers.

Total Hours: 45

REFERENCES

1. Kenneth C.Brancik (2008)"*Insider Computer Fraud*" Auerbach Publications Taylor & Francis Group
2. Ankit Fadia(2006) " *Ethical Hacking*",(2nd ed.),Macmillan India Ltd,
3. EC- Council(2009) *Ethical Hacking and Countermeasures: Threats and Defense Mechanisms Ec-Council Press Series:Certified Ethical Hacker*
4. Ali Jahangiri (2009) *Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers and IT Security Experts...*
5. *Ethical hacking counter measure - An Ultimate Guide For Ethical Hackers.*

MCS13NE11 COMMUNICATION PROTOCOL ENGINEERING 3 0 0 3

OBJECTIVES:

- To introduce the concepts and techniques associated with Wireless Cellular Communication systems.
- To familiarize with state of art standards used in wireless cellular systems.
- Explain the Classification of mobile communication system.
- Analyze the radio channel characteristics and the cellular principle.
- Analyze the measures to increase the capacity in GSM systems- sectorization and Spatial Filtering for Interference Reduction.
- Ability to analyze improved data services in cellular communication

UNIT-I INTRODUCTION: 9 Hrs

Communication model, Software and Subsystems, Communication Protocol Definition/Representation, Formal and Informal Protocol Development Methods, Protocol Engineering Process

UNIT-II NETWORK REFERENCE MODEL: 9 Hrs

Layered Architecture, Network Services and Interfaces, Protocol Functions- OSI Model - TCP/IP Protocol Suite, Application Protocols.

Protocol Specification: Components of specification, Service specification, Communication Service Specification, Protocol entity specification, Interface specifications, Interactions, Multimedia specifications.

UNIT-III PROTOCOL SPECIFICATIONS 9 Hrs

Protocol Specification Language (SDL), SDL based Protocol Specifications, Protocol Verification / Validation: Protocol Verification using FSM, ABP Verification, Protocol Design Errors, Protocol Validation Approaches, SDL Based Protocol Verification, SDL Based Protocol Validation.

UNIT-IV TESTING 9 Hrs

Protocol Conformance Testing- Methodology and Framework, Conformance Test Architectures, Test Sequence Generation Methods, Distributed Architecture by Local Methods, Conformance testing with TTCN and RIP, Testing Multimedia Systems, quality of service test architecture(QOS), Performance Test methods, SDL Based Performance Testing of TCP, OSPF, Interoperability testing, Scalability testing

UNIT-V PROTOCOL SYNTHESIS AND IMPLEMENTATION 9 Hrs

Synthesis methods, Interactive Synthesis Algorithm, Automatic Synthesis Algorithm, Automatic Synthesis of SDL from MSC, Protocol Re-synthesis, Requirements of Protocol Implementation, Objects Based Approach to Protocol Implementation, Protocol Compilers.

Total no.of hrs: 45

REFERENCES:

1. Pallapa Venkataram and Sunilkumar S. Manvi,(2004) *Communication Protocol Engineering*, PHI
2. Mohammed G. Gouda(2004) *Elements of Protocol Design*, Wiley Student Edition
3. Richard Lai and Jirachiefpattana,(1998)"*Communication Protocol Specification and Verification*", Kluwer publishers, Boston,
4. Tarnay, K., (1991)"*Protocol Specification and Testing*", Plenum, New york

MCS13NE12 CONVERGENT NETWORK ARCHITECTURE 3 0 0 3

OBJECTIVES:

- To study about small- and medium-sized businesses are embracing the idea of running voice and video services on their data networks.
- Study about how voice over IP (VoIP) and video over IP affect a hierarchical network.
- To study about how the network costs were associated with convergence because more expensive switch hardware was required to support the additional bandwidth requirements.
- Management of converged network in relation to quality of service (QoS),
- Classification of voice and video data traffic according to the prioritization on the network.

UNIT I BACKBONE NETWORK 9 Hrs

Overview of Converged Networking, Benefits for Converged Networking, Converged Network Technologies, Voice Communication Network Concepts: Voice Transmission Schemes, PSTN, ISDN, Advanced Intelligent Networks, SONET Systems, Transporting voice by IP.

UNIT II ENCRYPTION METHODS 9 Hrs

Speech coding techniques-Voice quality, sampling, types of coder,G.711,Selecting and cascaded Codec,H.323 Architecture RAS Signalling, Call Signalling,Call Scenarios,H.245 Control Signalling, Conference calls,Deconposed gateway.

UNIT III SESSION MANAGEMENT 9 Hrs

Session Initiation Protocol-Architecture, overview, Message sequence, redirect and proxy server, structure of SDP, Use of SDP in SIP, Enhancements. Media Gateway control and soft switch Architecture.

UNIT IV SS7 & ISUP ARCHITECTURE 9 Hrs

MTP, SS7 Protocol Suite and network architecture, ISUP, Sigtran Architecture, M3UA Operation, QoS-Need and Overview, RSVP, Diffserv, MPLS.

UNIT V VOIP 9 Hrs

Designing Voice over IP Network, Design Criteria, Product and Vendor selection, Traffic forecast, Node locations and bandwidth requirements, Physical Connectivity

Total no.of hrs: 45

REFERENCES:

1. Daniel Collins, (2005)"*Carrier Grade Voice over IP*",(2nd ed.)
2. Oliver C. Ibe,(2002) "*Converged Network Architectures, Delivering Voice and Data over IP, ATM, and Frame Relay*", John Wiley & Sons
3. Hu Hanrahan,(2007)"*Network Convergence: Services, Applications, Transport, and Operations Support*" John Wiley & Sons
4. Jeffrey Bannister, Paul Mather, Sebastian Coope,(2004)" *Convergence Technologies for 3G Networks: IP, UMTS, EGPRS and ATM",* John Wiley & Sons

MCS13NE13 ADVANCED 3G NETWORKS 3 0 0 3

OBJECTIVES:

- To understand about the existing mobile networks and the necessity to new architecture and its interfaces.
- To learn about the interfaces in different techniques.
- To understand how packet core network is evolved and its security and mobility concepts.
- To understand different functions and procedures of 3GPP system and its protocols.

UNIT - I MOBILE NETWORK 9 Hrs

Introduction, Motivation, Scope, Nomenclature, GSM, GPRS and UMTS, Need of new architecture, Radio interfaces, Requirements for new architecture, Evolution of mobile network standardization

UNIT - II 3GPP ARCHITECTURE 9 Hrs

Overall Architecture, Radio Access Network, EPC, Internetworking with EPC, 3GPP CS System, CDMA 2000, I-WLAN Architecture, Network Discovery and Selection, Home Cell Deployment,

UNIT - III MAIN CONCEPTS 9 Hrs

E-UTRA- Physical, Radio Link Layer, RAN, MME Load Balancing, Tracking Concepts, IP packet Bearers, AAA, Security, EPS Mobility,QoS,Non-3GPP Access

UNIT - IV FUNCTIONS AND PROCEDURES OF 3GPP SYSTEM 9 Hrs

Access control, Node selection, IP Address allocation, Initial attachment, Connectivity and Detachment, S1 connection management, Intra, Inter -System Mobility, session Handling Procedure.

UNIT - V PROTOCOLS 9 Hrs

GPT, PMIPv6, EAP, MOBIKE, SCTP, S1, X2, NAS protocols.

Total no.of hrs: 45

REFERENCES:

1. Gottfried Punz,(2010*)" Evolution of 3G Networks: The Concept, Architecture and Realization of Mobile Networks beyond UMTS*" ,Springer link
2. Clint Smith.P.E,Daniel Collins,(2007)" *3G Wireless Networks*" ,(2nd ed.),TMH
3. Mooi Choo Chuah, Qinqing Zhang,(2008)"*Design and Performance of 3G Wireless Networks and Wireless LANs*",Springer
4. Vijay .k. Garg,(2002)"*Wireless Network Evolution: 2G To 3G*",Pearson Education

MCS13NE14 OPTICAL COMMUNICATION SYSTEMS AND NETWORKING 3 0 0 3

OBJECTIVES:

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

UNIT I INTRODUCTION 9 Hrs

Tele communication network architecture, services, circuit switching and packet switching, optical networks, optical layer, optical packet switching, transmission basics, optical amplifier, propogation of signals in optical fiber

UNIT II TRANSMISSION SYSTEM 9 Hrs

Modulation, Demodulation, Transmission system engineering-model, Transmitter, Receiver, Amplifier, Crosstalk, Dispersion, Design consideration.

UNIT III NETWORKS 9 Hrs

SONET / SDH - Optical Transport network-Ethernet, IP, Multiprotocol label switching, Resilient Packet ring, Storage area network, WDM Network Elements.

UNIT IV CONTROL AND MANAGEMENT 9 Hrs

Network Management functions - service interface- performance management - fault management – optical layer overhead- configuration Management - optical safety, Network Survivability

UNIT V ACCESS NETWORKS & SWITCHING 9 Hrs

WDM Network Design, Access network, Photonic packet switching-optical TDM, synchronization, header processing, Buffering, Burst switching, testbeds-Deployment consideration.

Total no.of hrs: 45

REFERENCES:

1. Rajiv Ramaswamy and Kumar N.Sivarajan,(2010) "*Optical Networks – A Practical Persepctive*", (3rd ed.), Morgan Kauffman

2. D.W.Smith,(1995) *Optical Network Technology*, Chapman and Hall, London

MCS13NE15 NETWORK RELIABILITY AND FAULT TOLERANCE 3 0 0 3

OBJECTIVES:

- To learn about the basics of network reliability in spanning trees and Kruskal algorithm.
- Analyze the model of reliability.
- To understand about the fault tolerance concepts and its evaluation technique.

UNIT I INTRODUCTION 9 Hrs

Network Reliability-Introduction, Spanning trees and Kruskal algorithm, Network reliability, exponentially distributed lifetime, static and dynamic reliability, Reliability Gradient

UNIT II RELIABILITY MODELS 9 Hrs

Reliability and availability, Coding techniques, Software reliability and recovery Techniques-Lifecycle Theory ,Software Error Models, Reliability Models, Software Redundancy

UNIT-III FAULT TOLERANCE TECHNIQUES 9 Hrs

Hardware Fault tolerance-Failure rate, Reliability, MTTF, Canonical and resilient structures, Evaluation technique, Processor level techniques, Byzantine Failures. Information Redundancy-RAID-Data Replication

UNIT IV RECOVERY APPROACH 9 Hrs

Fault tolerant networks, Measure of Resilience, common network technology, fault tolerant grouping, software fault tolerance-Single-Version Fault tolerance, Recovery Block Approach, Pre-condition and post condition, Exceptional handling, software reliability model,

UNIT V CHECK POINTS 9 Hrs

Check pointing-Levels-cache-aided rollback error recovery, checkpoint in distributed system, shared memory system, real time system.

Total no.of hrs: 45

REFERENCES:

1. Israel Koren, C. Mani Krishna,(2010)"*Fault-Tolerant Systems*", Morgan Kaufmann
2. Ilya B. Gertsbakh, Yoseph Shpungin,(2010)"*Models of Network Reliability: Analysis, Combinatorics, and Monte Carlo*", CRC Press
3. Martin L. Shooman,(2003)"*Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design"*, John Wiley & Sons,
4. Ilya Gertsbakh,(2011) "*Network Reliability and Resilience*"Springer

MCS13NE16 PERVASIVE COMPUTING 3 0 0 3

OBJECTIVES:

- To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing.
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area.
- To give practical experience in the area through the design and execution of a model.
- To design successful mobile and pervasive computing applications and services.
- To evaluate critical design tradeoffs associated with different mobile technologies, architectures, interfaces and business models and how they impact the usability, security, privacy and commercial viability of mobile and pervasive computing services and applications**.**

UNIT I PERVASIVE ARCHITECTURE 9 Hrs

Local Area Networks – Wireless LANs – Relationship of Wireless, Internet and Ubiquitous Computing –Pervasive Computing and Ubiquitous Computing – Ambient Computing – Pervasive Web application Architecture – Requirements of computational infrastructure – failure management – security –performance –dependability.

UNIT II MOBILE DEVICE TECHNOLOGIES 9 Hrs

Mobile Computing devices characteristics – Adaptation – Data dissemination and Management –Heterogeneity – Interoperability – Context awareness – Language localization issues – User Interface design issues – Difference between UI design for mobile devices and conventional systems –Mobile Agents – Mobile Device technology overview – Windows CE – Symbian – J2ME – Pocket PC– BREW.

UNIT III SENSOR NETWORKS AND RFID'S 9 Hrs

Introduction to Sensor networks – Sensor Node Architecture – Sensor Network Architecture – Types of sensor networks – Platforms for Wireless sensor networks – Applications of Wireless Sensor networks – Introduction to RFID – transponder and reader architecture – Types of tags and readers – Frequencies of operation–Application of RFID Technologies.

UNIT IV LOCAL AREA AND WIDE AREA WIRELESS TECHNOLOGIES 9 Hrs

IEEE 802.11 technologies – Infrared technologies – Bluetooth networks (OBEX Protocol) – Personal Area Networks – Mobility Management – Mobile IP – Establishing Wide area wireless networks – Concept and structure of cell" – Call establishment and maintenance – Channel management – Frequency Assignment techniques.

UNIT V PROTOCOLS AND APPLICATIONS 9 Hrs

Networking protocols – Packet switched protocols – Routing Protocols for Sensor Networks – Data Centric Protocols – Hierarchical Protocols – Location – based protocols – Multimedia Messaging Service (MMS) Protocols – Wireless Application Protocol (WAP) – Applications of Pervasive Computing – Retail – Healthcare – Sales force automation-Tracking-applications.

Total no.of hrs: 45

REFERENCES:

1. Burkhardt, Henn, Hepper, Rintdorff, Schaeck,(2002) "*Pervasive Computing*", Addison Wesley.
2. F.Adelstein, S.K.S. Gupta, (2005)"*Fundamentals of Mobile and Pervasive Computing*" Tata McGraw-Hill,
3. Ashoke Talukdar and Roopa Yavagal, (2005)"*Mobile Computing*", Tata McGraw Hill.