

AFFILIATED INSTITUTION
ANNA UNIVERSITY, CHENNAI
REGULATIONS - 2009
M.E NETWORKING AND INTERNET ENGINEERING
CURRICULUM AND SYLLABUS – I SEMESTER
CURRICULUM
SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9331	Mathematics for network engineering	3	0	0	3
2	CP9212	High performance computer networks	3	0	0	3
3	NI9311	Trusted internet	3	0	0	3
4	NI9312	Internet and java programming	3	0	0	3
5	CR9002	Adhoc networks	3	0	0	3
6	CP9222	Wireless networks	3	0	0	3
PRACTICAL						
7	NI9313	Internet programming lab	0	0	3	2
8	NI9314	Wireless and ad hoc network lab	0	0	3	2
TOTAL			18	0	6	22

MA9331	MATHEMATICS FOR NETWORK ENGINEERING	L T P C 3 0 0 3
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UNIT I

Graph Theory Introduction: 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. **9**

UNIT II

Matching Connectivity and Flow: Matching and Covers Algorithms and Applications. Matching in General Graphs. -Connectivity and Paths: Cuts and Connectivity, k-connected graphs – Network Flow Problems. **9**

UNIT III

Planar Graphs, Edges and Cycles: 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, Applications in Networks. **9**

UNIT IV

Introduction to Probability Theory: Probability concepts, Random variables, moments, Moment Generating function, Binomial, Poisson, Geometric, Negative binominal, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality, Application in Networks. **9**

UNIT V

Queueing Theory: Markovian queueing models, Little's formula, Multi-server queues, M/G/1 Queues, Pollaczek-Khintchine formula, Applications in Networks. **9**

TOTAL: 45 PERIODS

REFERENCE BOOKS:

1. R J Wilson Introduction to Graph Theory , 4th Edition, Pearson Education 2003.
2. Reinhard Diestel Graph Theory ,, 2nd Edition, Springer- Verlag 2000.
3. Jay Yellen, Jonathan L.Gross Graph Theory and Its Applications ,CRC Press LLC 1998.
4. Trivedi K.S., " Probability and Statistics with reliability, Queuing and Computer Science Applications ", Prentice-Hall of India, New Delhi, 1984.
5. Allen, A.O., Probability Statistics and Queueing Theory ", Academic Press, 1981
6. Gross D, and Harris C.M, Fundamentals of Queueing Theory ", John Wiley & Sons, 1985.

CP9212	HIGH PERFORMANCE COMPUTER NETWORKS	L T P C 3 0 0 3
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UNIT I

INTRODUCTION

Review of OSI, TCP/IP; Multiplexing, Modes of Communication, Switching, Routing. SONET – DWDM – DSL – ISDN – BISDN,ATM. **9**

UNIT II

MULTIMEDIA NETWORKING APPLICATIONS

Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Beyond best effort – scheduling and policing mechanism – integrated services – RSVP- differentiated services. **9**

UNIT III ADVANCED NETWORKS CONCEPTS: **10**
VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in
VPN.MPLSoperation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based
VPN,overlay networks-P2P connections.

UNIT IV TRAFFIC MODELLING: **7**
Little's theorem, Need for modeling , Poisson modeling and its failure, Non- poisson models,
Network performance evaluation.

UNIT V NETWORK SECURITY AND MANAGEMENT: **10**
Principles of cryptography – Authentication – integrity – key distribution and certification –
Access control and: fire walls – attacks and counter measures – security in many layers.
Infrastructure for network management – The internet standard management framework – SMI,
MIB, SNMP, Security and administration – ASN.1

TOTAL:45 PERIODS

REFERENCES:

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

NI9311	TRUSTED INTERNET	L T P C
		3 0 0 3

UNIT I **9**
Introduction: Understanding the Internet's underlying architecture, connecting to the internet,
Internet Service Providers (ISP), TCP/IP Suite and Internet Stack Protocols, Web Client Server
Architecture, Internet Security Evolution.

UNIT II **9**
Internet Security: Security Issues, Real Threats that Impact Security, Securing the Web Client -
Protecting Web Browser, Enhancing Web server security - Controlling Access, Extended Web
Site Security Functionality, Securing Web Communications with SSL, VPNS.

UNIT III **9**
Trusted Systems and Security Policies: Trusted System Design, Trusted OS, Secure System
Models, Security in Networks: Network Security Controls, IDS, Firewalls, Secure E-Mail. Internet
Security Policies: Web Server and Web Browser policies.

UNIT IV **9**
E-Commerce Security: SET for E- Commerce Transactions, Business requirements for SET, SET System Participants, Dual Signature and Signature, Authentication and Message Integrity, Payment Processing.

UNIT V **9**
Secure Internet Programming, Security development life cycle, Internet Security Standards and Internet Security Products, Trusted Internet Security services.

TOTAL: 45 PERIODS

REFERENCES

1. Charles P.Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", Pearson Education Pvt Ltd, 4th Edition, 2006.
2. Man Young Rhee, "Internet Security Cryptographic Principles, Algorithms and Protocols", John Wiley & Sons Ltd, 2003.
3. John R. Vacca, "Practical Internet Security", Springer, 2007.
4. Preston Gralla, Michael Troller, "How the Internet Works", Que Publishers, 8th Edition.

NI9312 **INTERNET AND JAVA PROGRAMMING** **L T P C**
3 0 0 3
UNIT I **INTRODUCTION** **9**

Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C) - History of the Internet History of the World Wide Web - History of SGML –XML Introduction to HyperText Markup Language - Editing HTML - Common Elements – Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists – HTML Tables-Basic HTML Forms

UNIT II **DYNAMIC HTML** **9**
Dynamic HTML Object Model and Collections, Event Model, Filters and Transitions, Data Binding with Tabular Data Control, Dynamic HTML-Structured Graphics ActiveX Controls, Dynamic HTML-Path, Sequencer and Sprite ActiveX Controls JavaScript, Introduction to Scripting, Control Statements, Functions, Arrays, Objects..

UNIT III **XML** **9**
Creating Markup with XML -Parsers and Well-formed XML Documents -Parsing an XML Document with msxml - Document Type Definition (DTD) - Document Type Declaration - Element Type Declarations - Attribute Declarations - Document Object Model – DOM Implementations - – DOM Components - path - XSL: Extensible Stylesheet Language Transformations (XSLT)

UNIT IV **THE APPLLET CLASS** **9**
HTML – Programming– applet initialization and terminatipon – Applet skeleton – Simple Applet Display method – Passing parameters to applet .Events – Classes – Handling AWT Controls – Sources of events –Event Listener interfaces–Handling the events .AWT Classes –Windows fundamentals – Creating frame Window– Handing events in frame window - Working with graphics – Working with Color – Working with font –Layout Managers – MenuBars and menus – Dialog Boxes.

UNIT V NETWORKING BASIS 9

Java and Net – InetAddress –TCP/IP Client socket – URL Connection –TCP/IP Server socket – Datagrams. Servlets : Life cycle of servlet – jsdk – A simple servlet – Servlet API – javax.servlet Package

Reading servlet parameters – Reading initialisation parameters– javax.servlet.http Package – Handling HTTP Request and response –Using Cookies.

TOTAL: 45 PERIODS

REFERENCES:

1. Deitel & Deitel Internet & World Wide Web How to Program, Pearson Education India -Third Edition -2004
2. Patric Naughton , Herbert Schildt, *The Complete Reference “Java 2 “*,Third edition Tata Mc Graw Hills ,1999.
3. Robert W.Sebesta , “ Programming with World Wide Web”,Pearson Education ,2009
4. Negrino and Smith Javascript for the World Wide Web, 5th Edition, Peachpit Press 2003.
5. Benoit Marchal, XML by Example, 2nd Edition, Que/Sams 2002.
6. Coyle, F.P., “XML Web Services and the Data Revolution”, Pearson Education, 2002

CR9002

AD-HOC NETWORKS

**LT PC
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, TCP-BuS, Ad Hoc TCP, and Split TCP.

UNIT III WSN –MAC 9

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

UNIT IV WSN ROUTING, LOCALIZATION & QOS 9

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

UNIT V MESH NETWORKS 9

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

TOTAL: 45 PERIODS

REFERENCES:

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

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

UNIT V 4G & BEYOND 9

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

TOTAL: 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.

NI9313

INTERNET PROGRAMMING LAB

L T P C
0 0 3 2

LIST OF EXPERIMENTS

1. Creating a web page with cascading style sheets and Embedded style sheets.
2. Create a web page with the following.
3. Order form using HTML form elements
4. Validate the details in client side by using java script
5. Create a simple web page for college information system
6. Create a web page for to implement of searching technique.
7. Design a HTML Editor using java applet.
8. Design a web page for library Management using java applet and JDBC.
9. Write a Java RMI program to copy a text file from server to client.
10. Design a web page to conduct On-line Quiz using java server pages.
11. Write a servlet program to do the following.
 - a. Set the URL of another server.
 - b. Display the header details during request of a page.
 - c. Display response header as well as contents during response from the server.
12. Design a web page to demonstrate session tracking Management using Java servlet.

TOTAL: 45 PERIODS

NI9314

WIRELESS AND AD HOC NETWORK LAB

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Lab Exercise

1. Performance analysis of Unicast routing protocol for ad hoc network.
 - i) Table-driven protocols (e.g., link state or DSDV)
 - ii) On demand protocols with caching (e.g., DSR, AODV, TORA)
 - iii) Hybrid protocols (e.g., ZRP, contact-based architectures)
 - iv) Hierarchical protocols (e.g., cluster based and landmark-based)
 - v) Geographic routing (e.g., greedy routing, GPSR)
2. Performance analysis of Multicast routing for ad hoc network.
 - i) Using tree-based or mesh-based approaches (ODMRP, CAMP, FGMP)
 - ii) Extensions of unicast ad hoc routing (MAODV, MCEDAR)

3. Performance analysis of broadcast routing
 - i) Using naïve flooding, heuristics (e.g., probabilistic, counter based),
 - ii) Minimum dominating sets (e.g., MPR multi-point relays, CEDAR)
4. Resource discovery and rendezvous routing using contact-assisted protocols (e.g., MARQ, CARD, PARSE), and distributed consistent hashing (e.g., Rendezvous regions, GHT)
5. Comparison between various Wireless MAC protocols (CSMA/CA (802.11), MACA, MACAW, PAMAS, SMAC)
6. Analysis of using TCP over various queuing disciplines (FIFO, RED, and WFQ).
7. Measurement of physical and MAC layer characteristics of wireless Links: using signal strength, data rate, retransmission and delay measurements. Program for bit stuffing and CRC computation
8. Comparison of various mobility models using GloMoSim/NS2 (Random way point, group mobility, highway model, Manhattan model, hybrid models)
(Spatial correlation, temporal correlation, relative speed, link durations)
9. Measurement of network parameters for WLAN (SNR, overall throughput and Delay)
10. Short range Bluetooth communications (formation of Piconet and scatternet) (Topology maintenance and Multihop transmissions, Mobility issues) (File transfer rate)
11. Web-based applications in Wireless Environment (Write a program to download a web page)
12. Delay & Jitter measurement for Multimedia Communication.
13. Analysis of various protocols using protocol analyzer.

TOTAL: 45 PERIODS