I Year M.Tech. CNIS I - Semester

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CS629 ADVANCED COMPUTER NETWORKS

Objectives of the Course :

- *The objective of this course is to build a solid foundation in computer networks concepts and design*
- *To understand computer network architectures, protocols, and interfaces.*
- *The OSI reference model and the Internet architecture network applications.*
- *The course will expose students to the concepts of traditional as well as modern day computer networks - wireless and mobile, multimedia-based.*
- *Students completing this course will understand the key concepts and practices employed in modern computer networking*

UNIT - I
Review
Computer Networks and the Internet: History of Computer Networking and the Internet, Networking Devices, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones.
Networking Models: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM.

UNIT - II
Network Routing
Routing and its concepts: Structure of a Router, Building a Routing Table, Static Routing, Dynamic Routing – Distance Vector Routing Protocol (RIPv1, RIPv2, EIGRP), Link State Routing Protocols (OSPF).

UNIT - III
LAN Switching
Switching and its concepts: Structure of a Switch, Virtual LANs (VLANs), VLAN Trunking Protocol (VTP), Spanning Tree Protocol (STP), Inter-VLAN Routing.

UNIT - IV
Wide Area Networks (WANs)
Introduction to WANs, Point-to-Point Protocol (PPP) concepts, Frame Relay concepts, Dynamic Host Configuration Protocol (DHCP), Network Address Translation (NAT), IPv6.

UNIT - V
Network Programming using Java
TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI) - Basic RMI Process, Implementation details - Client-Server Application.

TEXT BOOKS :

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W.Ross*, Fifth Edition, Pearson Education, 2012.
2. Network Fundamentals, *Mark Dye*, Pearson Education.
3. Routing Protocols & Concepts, *Rick Graziani*, Pearson Education.
4. LAN Switching & Wireless, Wayne Lewis, Pearson Education.
5. Accessing the WAN, *Bob Vachon*, Pearson Education.
6. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.

REFERENCE BOOKS:

1. Computer Networks: A Systems approach, *Larry L. Peterson & Bruce S. Davie,* Fifth edition, Elsevier, rp2012.
2. Computer Networks: A Top-Down Approach, *Behrouz A. Forouzan, Firoz Mosharaf*, Tata McGraw Hill, 2012.
3. Java Network Programming,3rd edition, *E.R. Harold*, SPD, O'Reilly.(Unit V)
4. An Engineering Approach to Computer Networking*, S.Keshav,* Pearson Education, 1997.
5. Computer Networks: Principles, Technologies And Protocols For Network Design, *Natalia Olifer, Victor Olifer*, Wiley India, 2006.
6. Computer Networks, *Andrew S. Tanenbaum*, Fifth Edition, Prentice Hall.
7. Computer and Communication Networks, *Nader F. Mir,* Pearson Education, 2007
8. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007.
9. Computer Networks, *Bhushan Trivedi,* Oxford University Press, 2011.
10. Fundamentals of Business Data Communications, *Jerry FitzGerald and Alan Dennis*, Tenth Edition, Wiley, 2009.
11. Internetworking with TCP/IP: Principles, Protocols and Architecture, Volume 1, *Douglas E.Comer,* 4th edition, PHI, 2005.
12. Next-Generation Internet: Architectures and Protocols, *Byrav Ramamurthy* et al, Cambridge, 2011.