

# Computer Networks (404209)

## Teaching Scheme:

Lectures: 4 Hrs/ Week

## Examination Scheme:

In Semester Assessment:

Phase I : 30

End Semester Examination:

Phase II: 70

## Course Objectives:

- Build an understanding of the fundamental concepts of computer networking
- Preparing the student for entry Advanced courses in computer networking.
- Acquire the required skill to design simple computer networks.

## Course Outcomes:

**At the end of the course a student will be able to:**

- Design, implement, and analyze simple computer networks.
- Identify, formulate, and solve network engineering problems.
- Use techniques, skills, and modern networking tools necessary for engineering practice.
- Have a basic knowledge of the use of cryptography and network security

## Unit I : Introduction to Computer Networks

7L

Definition & Uses of computer Network, Network Hardware-LAN, WAN, MAN & Internet, Network Software-design Issues for layers, Service primitives and relationship of services to Protocols, Reference models-OSI & TCP/IP, network architectures introduction, Addressing types-Physical, Logical & port address, Protocols and Standards.

## Unit II : Physical Layer

8L

Physical layer-Data rate limits, Transmission media-guided and Unguided, Switching systems-Circuit switching, Datagram Switching & Virtual circuit switching, Example of networks-X.25, Frame Relay & ATM, Structure of circuit and packet switch networks, cable modem and DSL technologies, Communication satellites (LEO/MEO/GEO), Introduction to physical layer in 802.11 LAN & 802.15 WPAN.

## Unit III : Data link layer

8L

Data link layer: Framing, Flow & Error control Protocols, noiseless channels, Noisy channels, HDLC, PPP, Multiple access techniques-random access, controlled access & Channelization, Ethernet types-bridged, Switched, Full duplex, Fast & gigabit Ethernet. Introduction to Data link layer in 802.11 LAN, Connecting devices like passive hubs, repeaters, Active hubs, Bridges, Two-layer Switches, Routers, three layer switches, Gateway etc., Backbone networks, Virtual LANs.

#### **Unit IV : Network Layer and Transport Layer**

8L

Network Layer: IPv4 address, IPv6 address, Address mapping-ARP, RARP & DHCP, IPv4 datagram detail format, IPv6 datagram detail format, ICMP, IGMP, Network layer issues like Delivery, forwarding, intradomain and Interdomain routing, Routing algorithms like Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Path vector routing etc., Simple Router architecture. Transport layer-Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.

#### **Unit V : Application Layer**

8L

Application layer protocols and applications like Ping, FTP, telnet, http (www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, NFS, RPC, X-server, E-mail, Introduction to streaming Audio/Video,P2P file sharing, Introduction to socket & Socket Interface, Introduction to HTML programming.

#### **Unit VI : Basics of Network Security and Network administration**

8L

Network security: Introduction to Cryptography, Secret key algorithm, public key algorithm, Hash Functions, Basics of Security Requirements/Services/Dimensions, Basics of Security attacks, Basics of Security mechanisms / solutions. Network Administration: UTP Cabling for PC to PC communication, Network tester, network monitoring, Protocol Analyzer, Network Simulation, internet access through Dialup/DSL/Leased Line/Mobile handset.

#### **Text Books**

1. Behrouz A. Forouzan, Data Communications and Networking, 4th Edition, TATA McGraw Hill
2. Andrew Tenenbaum, Computer Networks, 4th Edition, Pearson Education.

#### **Reference Books**

1. William Stallings, Computer Networks and Cryptography, 3rd edition, Pearson Education
2. Behrouz A. Forouzan, TCP/IP protocol Suit, 3rd edition, TATA McGraw Hill
3. Stevens, TCP/IP illustrated Volume - I & II, Pearson education.
4. Feibel Werner, Encyclopaedia of networking, Pearson education.
5. Frank J. Derfler, Practical Networking, 2nd edition, QUE international Publishing.
6. Atul Kahate, Cryptography and Network Security, 2nd edition, TATA McGraw Hill
7. Kenneth Mansfield, Computer Networking from LANs to WANs: Hardware, Software & Security, CENGAGE learning.
8. Nurul Sarkar, Computer Networking & Hardware concepts, Information Science Publisher, USA.
9. Kurose & Ross, Computer Networking: A top Down Approach featuring the Internet. 3rd edition, Pearson Education