MCPC1002 COMPUTER NETWORKS (3-0-0)

Objective :

1. Introduce students to the architecture, standards, and protocols of computer networks.

2. Provide an understanding of the functionalities of various network layers, including physical, data link, network, transport, and application layers.

3. Discuss the principles of routing, addressing, and internetworking in modern network environments.

4. Familiarize students with network applications, standard protocols, and techniques for ensuring quality of service and congestion control.

Module-I

Overview of the Internet: introduction to data communication, network application, Network hardware, Protocol, Layering Scenario, reference models: The OSI Model, TCP/IP model, Internet history, standards and administration; Comparison of the OSI and TCP/IP reference model. Physical Layer: data and signals: analog and digital, periodic analog signals, digital signals, transmission impairments, data rate limit, Guided transmission media, unguided transmission media, Wireless transmission, mobile telephone system.

Module–II

Data Link Layer: Design issues, error detection and correction design issues, elementary data link protocols, CRC codes, sliding window protocols, HDLC, the data link layer in the internet. Elementary Data Link Layer Protocols, sliding window protocols, noisy and noiseless channels.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

Module–III

Connecting devices: learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways, definition of multiplexing and types.

Network Layer: Network Layer Design issues, store and forward packet switching, connectionless and connection oriented networks-routing algorithms-optimality principle, circuit and packet switching, definition of flooding and multicast.

Module– IV

Routing protocols: Shortest Path, Routing uni-cast Distance Vector Routing, RIP, link state protocols, path vector routing. Internetworking: logical addressing, internet protocols, IP address, CIDR, IPv4 addressing, IPv6 Protocol addressing, addresses mapping, ICMP, IGMP,ARP,RARP, DHCP.

Module-V

Transport Protocols: process to process delivery, UDP, TCP, TCP Sliding Window, TCP Congestion Control, congestion control and quality of service.

Application Layer-World Wide Web, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

Course Outcome :

Upon successful completion of this course, students will be able to:

1. Explain the architecture and functioning of different network layers and their associated protocols.
2. Compare the OSI and TCP/IP reference models and understand their application in real-world networks.
3. Implement and troubleshoot data link layer protocols and error detection/correction methods.
4. Design and manage network systems using appropriate hardware and software tools, including IP addressing and routing protocols.
5. Utilize and manage network applications and protocols such as HTTP, FTP, email, TELNET, and DNS effectively.

Text Books :

1. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
2. "Data Communications and Networking" by Behrouz A. Forouzan.

References :

1. Computer networks by Tanenbaum, A.S., Pearson Education India.
2. Computer Networks by Bhushan Trivedi, Oxford University Press