

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-502	Computer Networks	PCC	4	3	1	0	50	100	150

**Course Outcomes:**

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

CO1	Explain the fundamental concepts and layered architecture of computer networks.
CO2	Describe the challenges and protocols in data transmission at the physical layer.
CO3	Analyze design issues, error control, and protocols at the data link layer.
CO4	Apply routing algorithms and congestion control mechanisms at the network layer.
CO5	Evaluate the functions of higher layers and common network applications.

**Detailed Syllabus****Section A**

**Unit 1:** Introduction to Computer Networks: Data Communication - Communication system, synchronous and asynchronous systems, serial and parallel systems, dataflow - simplex, half-duplex, full-duplex, Uses of computer networks, categories of computer networks, protocol and standards, Reference Models: OSI and TCP/IP reference models, their comparison and critique, Network Topologies, Internetworking devices. **(12 Hrs.)**

**Unit 2:** Physical Layer: Data Transmission-Digital to Digital Conversion-Line Coding Scheme, Transmission Media, RS-232 Interface, Switching mechanisms and Comparison –circuit, packet, message, Modem, and its types. **(08 Hrs.)**

**Unit 3:** Data Link Layer: Design Issues: Framing, Error Control, Flow Control, Error Detection and Correction, Flow Control: Elements of data link protocol, Sliding Window Protocol, Data Link Protocols - HDLC, Channel Allocation Problems, Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, IEEE Standards. **(08 Hrs.)**

**Section B**

**Unit 4:** Network Layer : Design Issues, Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Congestion Control Algorithms: Approaches to Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit and Datagram Subnets, Load Shedding, Jitter Control, Traffic shaping algorithm - leaky bucket algorithm, token bucket algorithm, QOS, IP Addresses, Internet Control Protocols, OSPF, BGP, Mobile IP. **(10 Hrs.)**

**Unit 5:** Transport, Session, Presentation and Application Layer: Transport Services: Transport Service Primitives, Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Reliable end-to-end transmission protocols; UDP header; Details of TCP header and operation including options headers and congestion control, Application Layer Design Issues: Application Layer Paradigms, Client-Server Model, Domain Name System (DNS), Electronic Mail: Architecture, Introduction to WWW, Firewalls. **(10 Hrs.)**

**Text Books**

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Computer Networks: A System Approach	Andrew S. Tanenbaum, David J. Wetherall	Pearson Education	6 <sup>th</sup> (2021)
2	Computer Networking: A Top-Down Approach	James Kurose, Keith Ross	Pearson Education	8 <sup>th</sup> (2020)