COMPUTER NETWORKS

Course Code	**23CS3502**	**Year**	III	**Semester**	I
Course Category	**Professional Core**	**Branch**	**CSE**	**Course Type**	Theory
Credits	3	**L – T – P**	3-0-0	**Prerequisites**	Computer Organisation and Architecture and Data Structures
Continuous Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the foundational concepts of computer networks, including network types, topologies, models, and transmission media, to establish a basis for analyzing and designing network architectures.	L2
CO2	**Apply** data link layer and media access control (MAC) sublayer mechanisms, including their protocols, to **determine** suitable techniques for efficient and reliable data transmission.	L3
CO3	**Apply** network layer concepts, including routing algorithms, IP addressing schemes, congestion control techniques, and protocol mechanisms, to **develop** efficient network communication strategies.	L3
CO4	**Analyze** the functionalities of transport and application layer protocols, including TCP, UDP, DNS, HTTP, and email systems, to **assess** their role in achieving secure, reliable, and efficient end-to-end communication.	L4

Syllabus		
Unit No.	**CONTENTS**	**Mapped CO**
I	**Introduction:** Network Types-LAN, MAN, WAN; Network Topologies; Reference models- the OSI Reference Model, the TCP/IP Reference Model, A Comparison of the OSI and TCP/IP Reference Models. **Physical Layer –**Introduction to Guided Media-Twisted-pair cable, Coaxial cable and Fiber optic cable; Introduction about unguided media.	**CO1**
II	**Data link layer:** Data link layer design issues-Services provided to Network Layer, **Framing**: fixed size framing, variable size framing, error control, flow control; Error detection codes-CRC; **Elementary Data Link Layer protocols**: Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. **Sliding window protocol:** One bit, Go back N, and Selective repeat	**CO1, CO2**

III	**Media Access Control: Random Access**: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA)	**CO1,CO2**
IV	**The Network Layer:** The network layer design issues-Store and Forward Packet Switching, Services Provided to the Transport layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram Networks; Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical; Congestion Control algorithms-General principles of congestion control, Congestion prevention polices; Fragmentation, Network layer in the internet – IP protocols, IP Version 4 protocol- IPV4 Header Format, IP addresses, Class full Addressing, CIDR, Subnets, IP Version 6-the main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6.	**CO1, CO3**
V	**The Transport Layer:** Transport layer protocols: Introduction-services- port number; User data gram protocol-User datagram, UDP services, UDP applications; Transmission control protocol: TCP services- TCP features- Segment- A TCP connection- windows in TCP-flow control-Error control, Congestion control in TCP. **Application Layer:** World Wide Web, HTTP, Electronic mail-Architecture, web based mail, email security, TELENET-local versus remote Logging; Domain Name System.	**CO1, CO4**

Learning Resources

Text Books

1. A. S. Tanenbaum, D. J. Wetherall, and N. Feamster, *Computer Networks*, 6th ed. Pearson Education, 2021.
2. B. A. Forouzan, *Data Communications and Networking*, 6th ed. New Delhi, India: McGraw-Hill Education, 2022.

Reference Books

1. A. S. Godbole and A. Kahate, *Data Communications and Networks*, 2nd ed. New Delhi, India: McGraw-Hill Education (TMH), 2011.
2. M. Dave, *Computer Networks*, 1st ed. New Delhi, India: Cengage Learning India Pvt Ltd, 2012.

E-Resources & other digital material

- Raman, B. *Computer Networks* – ***NPTEL Online Course.*** Indian Institute of Technology Bombay. Retrieved from https://nptel.ac.in/courses/106101092
- University of Colorado. *Computer Communications* – ***Coursera***. Retrieved from https://www.coursera.org/learn/computer-communications
- Western Governors University. *Computer Networking Essentials* – ***edX Course***. Retrieved from https://www.edx.org/course/computer-networking-essentials
- Bonaventure, O. *Computer Networking: Principles, Protocols and Practice* **(Open textbook).** Retrieved from https://inl.info.ucl.ac.be/CNP3
- **Cisco Networking Academy.** *Packet Tracer Simulation Tool & Courses*. Cisco Systems. Retrieved from https://www.netacad.com/courses/packet-tracer
- Gate Smashers. *Computer Networks – Full Course Playlist [**YouTube**]*. Retrieved from

https://www.youtube.com/playlist?list=PLmXKhU9FNesQGzPjAEr3p5PzzuIYQ_Tcq

- **GeeksforGeeks.** *Computer Network Tutorials*. Retrieved from https://www.geeksforgeeks.org/computer-network-tutorials/
- **TutorialsPoint.** *Data Communication & Computer Network*. Retrieved from https://www.tutorialspoint.com/data_communication_computer_network/index.htm
- **InterviewBit.** *Computer Networking Interview Preparation*. Retrieved from https://www.interviewbit.com/computer-networking/overview/