

COMPUTER NETWORKS

Course Code	23CS3502/ 23IT3502/ 23AM3502/ 23DS3502	Year	III	Semester	I
Course Category	Professional Core	Branch	CSE/IT/AIML/DS	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 policies; 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

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| <ol style="list-style-type: none"> 1. A. S. Tanenbaum, D. J. Wetherall, and N. Feamster, <i>Computer Networks</i>, 6th ed. Pearson Education, 2021. 2. B. A. Forouzan, <i>Data Communications and Networking</i>, 6th ed. New Delhi, India: McGraw-Hill Education, 2022. |
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Reference Books

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| <ol style="list-style-type: none"> 1. A. S. Godbole and A. Kahate, <i>Data Communications and Networks</i>, 2nd ed. New Delhi, India: McGraw-Hill Education (TMH), 2011. 2. M. Dave, <i>Computer Networks</i>, 1st ed. New Delhi, India: Cengage Learning India Pvt Ltd, 2012. |
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E-Resources & other digital material

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| <ul style="list-style-type: none"> • Raman, B. <i>Computer Networks – NPTEL Online Course</i>. Indian Institute of Technology Bombay. Retrieved from https://nptel.ac.in/courses/106101092 • University of Colorado. <i>Computer Communications – Coursera</i>. Retrieved from https://www.coursera.org/learn/computer-communications • Western Governors University. <i>Computer Networking Essentials – edX Course</i>. Retrieved from https://www.edx.org/course/computer-networking-essentials • Bonaventure, O. <i>Computer Networking: Principles, Protocols and Practice (Open textbook)</i>. Retrieved from https://inl.info.ucl.ac.be/CNP3 • Cisco Networking Academy. <i>Packet Tracer Simulation Tool & Courses</i>. Cisco Systems. Retrieved from https://www.netacad.com/courses/packet-tracer • Gate Smashers. <i>Computer Networks – Full Course Playlist [YouTube]</i>. Retrieved from https://www.youtube.com/playlist?list=PLmXKhU9FNesQGzPjAEr3p5PzzuIYQ_Tcq • GeeksforGeeks. <i>Computer Network Tutorials</i>. Retrieved from https://www.geeksforgeeks.org/computer-network-tutorials/ • TutorialsPoint. <i>Data Communication & Computer Network</i>. Retrieved from https://www.tutorialspoint.com/data_communication_computer_network/index.htm • InterviewBit. <i>Computer Networking Interview Preparation</i>. Retrieved from https://www.interviewbit.com/computer-networking/overview/ |
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