COURSE CONTENT

COMPUTER NETWORKS								
V Semester: CSE / CSD / CSM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
2450513	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**0**	**4**	**40**	**60**	**100**
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		
Prerequisites: **Data Structures**								

Course Overview:

A computer networks course provides a comprehensive overview of how digital devices communicate, covering network architecture, protocols, and technologies. Students learn the fundamentals of the TCP/IP and OSI models, covering layers from physical transmission to application-level services

Course Objectives:

1. To introduce the basic concepts of data communications, transmission media, switching techniques, and network reference models (OSI & TCP/IP).
2. To develop an understanding of data link layer functions such as framing, error detection and correction, flow/error control, and medium access protocols used in wired and wireless networks.
3. To explain the principles of network layer operations, including logical addressing, routing algorithms, address mapping, and congestion control mechanisms.
4. To impart knowledge of transport layer services and protocols with emphasis on reliable communication, TCP/UDP mechanisms, congestion handling, and quality of service (QoS).
5. To familiarize students with application layer protocols and enabling effective communication over the Internet.

Course Outcomes: After Completion of the Course, Students should be able to

1. Explain the fundamentals of data communication, network structures, transmission media, switching techniques, and reference models (OSI & TCP/IP).
2. Apply error detection/correction techniques and medium access control protocols for ensuring reliable and efficient data link layer communication.
3. Analyze logical addressing, routing algorithms, and congestion control techniques for effective network layer operations.
4. Evaluate transport layer protocols (TCP/UDP) and mechanisms for process-to-process delivery, congestion control, and Quality of Service (QoS).
5. Demonstrate the use of application layer protocols such as DNS,SMTP, FTP, HTTP, and SNMP in real-world networking scenarios.

UNIT – I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless Transmission.

Data link layer: Design issues, framing, Error detection and correction.

UNIT – II

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols. Multiplexing and Demultiplexing.

UNIT - V

Application Layer: Principles of Network Applications, Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS, Peer-to-Peer Applications, Socket Programming: Creating Network Applications.

TEXT BOOKS:

1. Computer Networks -- Andrew S Tanenbaum, David. J. Wetherall, 5th Edition. Pearson Education/PHI
2. Computer Networking: A Top-Down Approach – James F.Kurose, Keith W. Ross, Pearson

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

ELECTRONIC RESOURCES:

1. https://www.geeksforgeeks.org/computer-networks/computer-network-tutorials/
2. https://onlinecourses.nptel.ac.in/noc26_cs35/preview
3. https://www.netacad.com/courses/networking-basics

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos