



COURSE CONTENT

COMPUTER NETWORKS								
Semester: CSD/CSE/CSM								
Course Code	Category	Hours/ Week			Credits	Maximum Marks		
2540512	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			TotalClasses:45			
Prerequisites: There are no prerequisites to take this course.								

Course Objectives

1. Equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.
3. Elucidate the students about working and implementation of protocols at various layers in protocols stack.

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

1. Explain fundamental concepts of computer networks including Internet structure, protocol models, packet switching, performance metrics, network attacks, and historical evolution.
2. Analyze application-layer principles, architectures, and protocols such as HTTP, FTP, SMTP, DNS, peer-to-peer systems, and socket-based network applications.
3. Describe transport-layer mechanisms including UDP, TCP, reliable data transfer protocols, flow control, congestion control, and fairness concepts.
4. Interpret network-layer functions such as IP addressing, routing algorithms, intra-AS and inter-AS routing protocols, multicast and broadcast routing, and security mechanisms.
5. Evaluate link-layer technologies including error detection and correction, multiple access protocols, Ethernet, VLANs, MPLS, wireless LANs, and end-to-end data communication processes.

UNIT-I

Introduction: The Internet, Protocol, Network Edge, Access Networks, Network Core, Packet Switching, Circuit Switching, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol reference models: ISO-OSI, TCP/IP, Types of Network attacks, History of Computer Networking and the Internet.

UNIT-II

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.

UNIT-III

Transport Layer: Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control, TCP Congestion Control, Fairness.

UNIT-IV

Network Layer: Data and Control plane, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Router working, The Internet Protocol(IP):Forwarding and Addressing in the Internet, Datagram Format, IPv4 Addressing, Internet Control Message Protocol (ICMP), IPv6, IP Security, Routing Algorithms- The Link-State (LS) Routing Algorithm, The Distance- Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet-Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing, Broadcast Routing Algorithms, Multicasting.

UNIT-V

The Link Layer: The Services Provided by the Link Layer, Error-Detection and-Correction Techniques- Parity Checks, Checksum Methods, Cyclic Redundancy Check(CRC), Hamming code, Multiple Access Links and Protocols, Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols, DOCSIS: The Link-Layer Protocol for Cable Internet Access, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks(VLANs), Link Virtualization-Multiprotocol Label Switching (MPLS), Data Center Networking, A Day in the Life of a Web Page Request. Wireless network characteristics, Wireless LAN.

TEXTBOOKS:

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

REFERENCEBOOK:

1. Data Communications and Networking— Behrouz A. Forouzan. Third Edition TMH.

ELECTRONIC RESOURCES:

1. <https://nptel.ac.in/courses/106105183>
2. <http://www.digimat.in/nptel/courses/video/106105081/L25.html>
3. <https://nptel.ac.in/courses/106106243>
4. <https://technet.microsoft.com/en-us/network/default.aspx>

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(ELRV)