

25MCST302	COMPUTER NETWORKS	Category	L	T	P	R	Credit	Year of Introduction
		VAC	4	0	0	0	4	2025

Preamble: This course introduces the basic concepts of computer networks and the principles that enable communication between interconnected devices. It covers network types, transmission media, networking devices, and layered architectures used in data communication systems. The course explains how data is transmitted and routed in wired and wireless environments, along with key protocols supporting common Internet services.

Prerequisite: Nil

Course Outcomes: After the completion of the course, the student will be able to:

CO	Course Outcomes	Knowledge Level
CO1	Explain the fundamental concepts of computer networks.	K2 Understand
CO2	Describe Data Link Layer mechanisms and related communication technologies.	K2 Understand
CO3	Apply appropriate routing algorithms, congestion control techniques, and Quality of Service requirements in network design.	K3 Apply
CO4	Explain the functions and protocols of transport and application layers in inter-networking.	K2 Understand

Mapping of course outcomes with program outcomes and program specific outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	–	–	–	–	–	–	1	2	1
CO2	3	2	–	–	–	–	–	–	–	–	1	2	1
CO3	3	2	-	–	–	–	–	–	–	–	1	2	1
CO4	2	1	-	–	–	–	–	–	–	–	1	2	1
Avg	2.75	1.75	-	–	–	–	–	-	–	-	1	2	1

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*				*	
CO2	*	*	*	*				*	
CO3	*	*	*	*				*	
CO4	*	*	*	*				*	

Wks Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
*	*	*	*				*	

Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	40	60	2.5 hrs

Continuous Internal Evaluation Pattern:

Attendance	: 5 marks
Continuous Assessment Test	: 20 marks
Continuous Assessment Assignment	: 15 marks

SYLLABUS

Module 1 (14 hrs)

Introduction to Computer Networks - Need & Applications ,Types of Networks - LAN, MAN, WAN, PAN, Basic Network Topologies - Star, Bus, Ring, Mesh , OSI & TCP/IP Models - Functional overview, Data Transmission Basics - Signals, Bandwidth, Noise ,Transmission Media - Twisted Pair, Coaxial, Fiber, Wi-Fi, Radio, Microwave, Switching -Circuit & Packet Switching.

Module 2 (14 hrs)

Data Link Layer - Purpose and Basic Services, Error Detection Basics - Parity & CRC, Flow Control, MAC Concepts - Collision, CSMA/CD, CSMA/CA, Ethernet - Basic idea of LAN communication, Wi-Fi (IEEE 802.11) - Architecture & basic operation, Introduction to Bluetooth and RFID.

Module 3 (14 hrs)

Routing fundamentals- static vs dynamic routing-Routing Algorithms and Protocols- Distance Vector Algorithm, Link State Algorithm, Basics of RIP, OSPF and BGP- Congestion Control Techniques- Causes of congestion, Open-loop and Closed-loop control, Leaky Bucket and Token Bucket algorithms- Quality of Service (QoS) - QoS parameters-bandwidth, delay, jitter, packet loss,-Traffic shaping and scheduling.

Module 4 (14 hrs)

Transport Layer - Need, Functions, Protocols -Transmission Control Protocol(TCP) ,User Datagram Protocol (UDP), Application Layer –Functions - Hypertext Transfer Protocol(HTTP), File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), Domain Name System (DNS).

Text Books:

- 1.Tanenbaum, A. S., Feamster, N., & Wetherall, D. J. (2021). *Computer Networks (6th ed.)*. Pearson.
- 2.Forouzan, B. A. (2021). *Data Communications and Networking with TCP/IP Protocol Suite (6th ed.)*. McGraw-Hill Education.
- 3.Comer, D. E. (2014). *Computer Networks and Internets (6th ed.)*. Pearson Education.

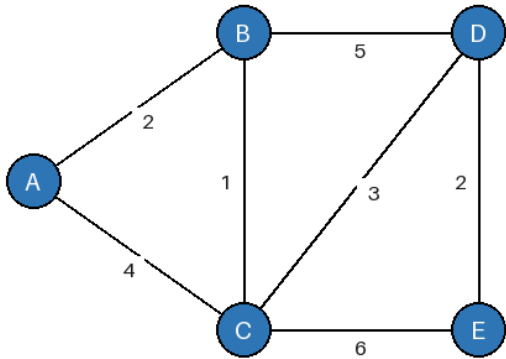
Reference Books:

- 1.Kurose, J. F., & Ross, K. W. (2025). *Computer Networking: A Top-Down Approach (9th ed.)*. Pearson.
2. Stallings, W. (2022). *Data and Computer Communications (10th ed.)*. Pearson.
- 3.Tanenbaum, A. S., & Wetherall, D. J. (2021). *Computer Networks (6th ed.)*. Pearson.

END SEMESTER EXAMINATION – MODEL QUESTION PAPER

Course Code	25MCST302
Course Name	COMPUTER NETWORKS
Max. Marks: 60	Duration: 2.5 Hours

Part A <i>(Answer all questions. Each question carries 3 marks)</i>				
Qn No.	Question	Marks	CO	B L
1	Explain the need and types of computer networks with examples.	3	1	L2
2	Distinguish between circuit switching and packet switching.	3	1	L2
3	Differentiate between CSMA/CD and CSMA/CA with respect to their working principles and applications.	3	2	L2
4	Illustrate the need for flow control in data communication with a suitable example.	3	2	L2
5	A token bucket has a capacity of 8 tokens and generates 2 tokens per second. If 5 packets arrive simultaneously when the bucket contains 6 tokens, determine how many packets can be transmitted immediately.	3	3	L3
6	A voice application requires a maximum delay of 150 ms. If the measured end-to-end delay is 180 ms, determine whether the QoS requirement is satisfied. Justify your answer.	3	3	L3

7	Explain the role of the Domain Name System (DNS) in Internet communication.	3	4	L2
8	Explain the need for the Transport Layer in computer networks.	3	4	L2
Part B (Answer any one full question from each Module. Each carry 9 marks)				
Module I				
Qn No.	Question	Marks	CO	B L
9	Describe the various network topologies with necessary diagrams.	9	1	L2
OR				
10	Explain the functional overview of the OSI reference model. Compare it with the TCP/IP model.	9	1	L2
Module II				
Qn No.	Question	Marks	CO	B L
11	Describe the working principles of Parity Check and Cyclic Redundancy Check (CRC) as error detection techniques. Compare their effectiveness in detecting errors.	9	2	L2
OR				
12	Describe the architecture of IEEE 802.11 (Wi-Fi) and explain the basic operation of a wireless LAN.	9	2	L2
Module III				
Qn No.	Question	Marks	CO	B L
13	Apply the link state routing algorithm to determine the shortest path from source node A to all other nodes in the given network shown below. Also, Explain the working principle of the algorithm. 	9	3	L3
OR				

14.a	Three routers X, Y, Z are connected: X–Y cost 1, Y–Z cost 2, X–Z cost 7. Initially each router only knows its directly connected links. Generate the distance vector tables after one exchange of routing information.	5	3	L3
14.b	A link has a capacity of 10 Mbps. Under congestion, only 60% of capacity is effectively used. If the average packet size is 1000 bytes, calculate the effective throughput in packets/second.	4	3	L3

Module IV

Qn No.	Question	Marks	CO	B L
15.a	Compare Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) with respect to reliability, connection establishment, and applications.	4	4	L2
15.b	Explain the role of Simple Mail Transfer Protocol (SMTP) in electronic mail communication. Illustrate the process of sending an email using SMTP.	5	4	L2

OR

16. a	Explain the functions of the Transport Layer and its significance in end-to-end communication.	4	4	L2
16. b	Describe the purpose of HTTP and FTP in the Application Layer	5	4	L2

