BHAGWAN MAHAVIR UNIVERSITY

Effective From (2025-2026)

MASTER OF COMPUTER APPLICATION

Semester: I

Subject Code	Subject Title	Teaching Scheme					
		(Hours/Week)		Credits	Examination Marks		Total Marks
		Theory	Tutorial		Internal	External	
3050302103	**Data Communication and Computer Network**	3	0	3	40	60	100

Duration of Exam: 2:30 Hours

Objective of the course:

- To understand data communication principles, layered network architecture, and protocols for efficient data transmission and routing.

Course Outcomes:

Upon completion of the course, the student shall be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand network fundamentals, types, models, and topologies.	25
CO-2	Describe physical layer technologies including transmission media, signals, and switching.	25
CO-3	Apply error detection and correction techniques and understand flow control mechanisms.	15
CO-4	Analyze IP addressing, subnetting, and routing techniques used in network layer.	20
CO-5	Compare and implement transport layer functionalities including TCP/UDP and congestion control.	15

Detail Content:

Sr. No.	Topic	Total Hrs.
1	**Introduction to Data Communication and Computer Networks** ● Computer Network – Overview ● Applications of Computer Networks ● Network Types – LAN, MAN, and WAN ● Network Models – OSI Model and TCP/IP Model ● OSI Model – Layers and Functions ● TCP/IP Model – Layers and Comparison with OSI ● Network Topologies – Bus, Ring, Star, Mesh, Tree, and Hybrid ● Categories of Networks – Peer-to-Peer and Client-Server ● Overview of Internet, Intranet, and Extranet.	12
2	**Physical Layer** ● Transmission Media – Guided and Unguided Media ● Twisted Pair Cable, Coaxial Cable, Fiber Optic Cable ● Wireless Transmission – Radio, Microwave, and Infrared ● Analog and Digital Signals – Concepts and Differences ● Encoding Techniques – Line Coding (NRZ and Manchester) ● Signal Conversion – Digital-to-Analog and Analog-to-Digital ● Multiplexing Techniques – FDM, TDM, and WDM ● Switching Techniques – Circuit Switching, Packet Switching, and Message Switching ● Transmission Modes – Simplex, Half-Duplex, and Full-Duplex.	12
3	**Data Link Layer** ● Data Link Layer – Design Issues and Services ● Framing – Techniques for Frame Detection ● Error Detection Techniques – Parity Check ● Longitudinal Redundancy Check (LRC) ● Cyclic Redundancy Check (CRC) ● Checksum ● Error Correction – Hamming Code ● Flow Control – Stop-and-Wait and Sliding Window Protocol ● Protocols – HDLC (High-Level Data Link Control)	07
4	**Network Layer** ● Network Layer Functions –Logical Addressing, Routing, and Forwarding ● Internet Protocol (IP) – IPv4 and IPv6 ● Addressing Concepts – Classful Addressing ● Classless Addressing, and Subnetting	10

	• Routing Algorithms – Distance Vector Routing, Link State Routing, and Hierarchical Routing • Network Devices – Router, Switch, Hub, Gateway, and Bridge • Datagram and Virtual Circuit Approaches • ICMP (Internet Control Message Protocol).	
5	**Transport Layer** • Transport Layer Functions – Process-to-Process Delivery • Protocols – TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) • Connection Establishment and Termination – 3-Way Handshaking • Port Addressing and Sockets • Congestion Control – Principles and Techniques	**07**

CO-PO Mapping Matrix with Bloom's Levels

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	2	-	-	-	2	-	2
CO2	3	2	-	-	-	2	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	2
CO4	3	3	2	2	-	-	-	-	-	2	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	2

Scale: 3 = Strong, 2 = Moderate, 1 = Slight, - = No relation

Text books:

1. **Data Communications and Networking** – Behrouz A. Forouzan – McGraw-Hill Education – 5th Edition
2. **Computer Networks** – Andrew S. Tanenbaum & David J. Wetherall – Pearson Education – 5th Edition
3. **Data and Computer Communications** – William Stallings – Pearson Education – 10th Edition
4. **Data Communications, Computer Networks and Open Systems** – Fred Halsall – Pearson Education – 4th Edition
5. **Computer Networking: A Top-Down Approach** – James F. Kurose & Keith W. Ross – Pearson Education – 7th Edition

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