

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)**

Data communication: definition and objectives, Components of data communication systems, Data flow: simplex, half-duplex, full-duplex, Transmission modes: parallel and serial communication, Communication models: OSI and TCP/IP models, Network categories: LAN, MAN, WAN, Network topologies: bus, star, ring, mesh, Protocols and standards

Module 2 (14 hrs)

Guided transmission media: twisted pair, coaxial cable, optical fiber, Unguided transmission media: radio waves, microwaves, infrared, Characteristics and applications of transmission media, Analog and digital signals, Digital-to-digital encoding: line coding schemes, Digital-to-analog modulation techniques, Analog-to-digital conversion, Performance metrics: bandwidth, throughput, latency, noise.

Module 3 (14 hrs)

Types of transmission errors: single-bit and burst errors, Error detection techniques: parity check, cyclic redundancy check (CRC), checksum, Error correction techniques, Automatic Repeat Request (ARQ) mechanisms, multiplexing techniques: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Wavelength Division Multiplexing (WDM), Circuit switching, packet switching, and message switching.

Module 4 (14 hrs)

Functions of the data link layer, framing techniques: character count, byte stuffing, bit stuffing, Flow control mechanisms, Error control strategies, Data link layer protocols: Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, High-Level Data Link Control (HDLC) protocol, Introduction to point-to-point and multiple access protocols.

Text Books:

1. Behrouz A. Forouzan. (2022). *Data Communications and Networking (6th ed.)* McGraw-Hill Education.
2. William Stallings. (2021). *Data and Computer Communications (10th ed.)*. Pearson Education.

Reference Books:

1. Andrew S. Tanenbaum and David J. Wetherall. (2020). *Computer Networks (6th ed.)* Pearson Education.
2. Leon-Garcia and Widjaja (2004) *Communication Networks (2nd ed.)*. McGraw-Hill Education.
3. Fred Halsall. (1996). *Data Communications, Computer Networks and Open Systems (4th ed.)*. Pearson Education.

END SEMESTER EXAMINATION – MODEL QUESTION PAPER

Course Code	25MCST402
Course Name	DATA COMMUNICATION
Max. Marks: 60	Duration: 2.5 Hours

Part A <i>(Answer all questions. Each question carries 3 marks)</i>				
Qn No.	Question	Marks	CO	BL
1	Explain the difference between parallel transmission and serial transmission.	3	1	L2
2	Differentiate between LAN, MAN, and WAN networks.	3	1	L2

3	A remote-control device uses infrared communication. Demonstrate how infrared transmission is applied in this scenario.	3	2	L3
4	Given a communication requirement with high bandwidth and low signal attenuation, choose a suitable transmission medium and explain why it is appropriate.	3	2	L2
5	Explain how Wavelength Division Multiplexing (WDM) is used in optical fiber communication.	3	3	L2
6	Explain the concept of Automatic Repeat Request (ARQ).	3	3	L2
7	Differentiate between byte stuffing and bit stuffing.	3	4	L2
8	Explain how flow control improves communication efficiency.	3	4	L2
Part B <i>(Answer any one full question from each Module. Each carry 9 marks)</i>				
Module I				
Qn No.	Question	Marks	CO	BL
9	Explain Network security model with a neat diagram. Explain the components of a data communication system and describe how they work together to enable communication between devices.	9	1	L2
OR				
10	Describe the communication process in a computer network using the OSI model and explain the role of each layer in data transmission.	9	1	L2
Module II				
Qn No.	Question	Marks	CO	BL
11	A multinational company plans to connect its headquarters with branch offices located across different cities. The network must support high-speed communication, reliability, and future expansion. Analyze the suitable transmission media options and recommend the most appropriate one based on bandwidth, latency, and noise considerations.	9	2	L4
OR				
12	A network administrator notices that a digital transmission system using a particular line coding scheme suffers from synchronization issues and increased error rates. Analyze the possible causes and evaluate how alternative line coding schemes could improve	9	2	L4

	communication reliability.			
Module III				
Qn No.	Question	Marks	CO	BL
13	A file transfer application requires reliable delivery of data over an unreliable channel. Demonstrate how an ARQ mechanism can be used to ensure error-free communication.	9	3	L3
OR				
14	A service provider plans to improve channel utilization in its communication network. Apply an appropriate multiplexing technique and explain how it enhances bandwidth usage.	9	3	L3
Module IV				
Qn No.	Question	Marks	CO	BL
15.a	Explain the functions of the Data Link Layer and discuss how it ensures reliable node-to-node communication.	5	4	L2
15.b	Describe the role of error control in the Data Link Layer and explain the techniques used to detect and recover from transmission errors. .	4	4	L2
OR				
16	Explain the need for flow control in data communication and discuss the mechanisms used to regulate data transmission.	9	4	L2
