Roll No: | | | | | | | | | | | |

GAIN MORE KNOWLEDGE
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PRESIDENCY UNIVERSITY

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Bengaluru

Mid Term Examinations - October 2026

Date: 05/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: ECE3053 **Course Name:** Data Communication and Networking

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	44	26	20

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Identify the components of a Data Communication System.	2	CO1	BT2
2	What will be the propagation time and the transmission time for a 2.56kbyte message when the bandwidth of the network is 1 Gbps? Assuming the distance between sender and receiver is 12, 000 km and speed of light is 2.4 * 10^8 m/s.	2	CO1	BT2
3	In a bit-oriented protocol, the flag pattern is 01111110. A sender needs to transmit the data sequence 01111110. Apply the bit-stuffing technique to obtain the transmitted bit sequence and show how the receiver retrieves the original data.	2	CO2	BT3
4	Given data units, calculate the parity bit assuming even parity for each of the following: a. 1001011 b. 0001100 c. 1000000 d. 1110111	2	CO2	BT2
5	Explain how Hamming distance is obtained for the following pairs of codewords and state the resulting distance: a)d(10000,00000) b)d(10101,10000)	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Explain how the OSI model organizes and standardizes network communication. Identify the protocols operating at the different layers and illustrate the communication between User A in Network A and User B in Network B using a suitable diagram.	10	CO1	BT2
7	Differentiate the major network topologies—Bus, Star, Ring, Mesh, and Hybrid—based on their advantages, disadvantages, and practical applications.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT

PTO (Please Turn Over)

8	(i) A packet of 10,000 bits is transmitted from Sender A to Receiver B over a 20 Mbps link. The distance between them is 2000 km, and the propagation speed of the signal is 2×10^8 m/s. Calculate: a)Transmission delay b) Propagation delay c) Total latency of the packet Assume that queuing and processing delays are negligible. (ii) Consider the communication requirements of the following systems: • System A: A keyboard sending data to a computer. • System B: Two-way radio communication where only one person can speak at a time. • System C: A telephone call where both persons can speak and listen simultaneously. a) Identify the appropriate transmission mode for each system: Simplex, Half-Duplex, or Full-Duplex. b) Explain how data transmission takes place in each mode. c) Draw a simple diagram representing the direction of data flow for all three modes.	10	CO1	BT2
9	Explain and illustrate the functionalities of each layer in TCP/IP and how they contribute to data transmission over a network.	10	CO1	BT2

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is x^3+x+1. What is the actual bit string transmitted? Suppose the second bit from the left is inverted during transmission. How will receiver detect this error?	10	CO2	BT3
11	Apply the Stop-and-Wait protocol to explain how the sender and receiver handle each of the three scenarios (i)Normal transmission. (ii) Data Frame Loss . (iii) ACK Loss. Draw suitable flow diagrams/timing diagrams showing the transmission of data frames, ACKs, timer expiry, and retransmission wherever required.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Apply channelization techniques to a multi-user communication system and show how FDMA, TDMA, and CDMA allocate resources among users. Draw suitable diagrams and compare the three techniques based on frequency, time-slot, and code allocation.	10	CO3	BT3
13	Demonstrate the operation of the CSMA protocol for a shared communication channel. Explain how a station senses the channel before transmitting a frame, and compare its operation with ALOHA in terms of channel sensing, collision occurrence, and retransmission.	10	CO3	BT3