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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**

Course Code: 22AM3PCCNS **Max Marks: 100**

Course: Computer Networks

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Define the following with suitable example i. Repeaters ii. Hubs iii. Bridges iv. Switches v. Network Interface Card	*1*	*1*	**10**
	b)	Provide a brief overview of the functions, protocols, and services of each layer in the OSI model	*1*	*1*	**05**
	c)	List and specify how do various types of network links operate in networking with suitable example for each.	*1*	*1*	**05**
		OR			
2	a)	Depict the fiber cable and explain its components	*1*	*1*	**05**
	b)	Exemplify the types of Wireless Transmission with suitable example.	*1*	*1*	**10**
	c)	i. What is the propagation time if the distance between the two points is 12,000 km? Assume the propagation speed to be 2.4 × 10^8 m/s in cable. ii. A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?	*1*	*1*	**05**
		UNIT - II			
3	a)	Explain the perspective of connecting with help of pictorial representation.	*1*	*1*	**05**

		b)	Calculate the Cyclic Redundancy Check (CRC) using the XOR method step-by-step for the following Data word: 100100 Generator Polynomial: 1101	*2*	*2*	**05**
		c)	For the given digital data sequences, apply the following encoding techniques and illustrate the resulting waveforms: i. Use the Polar Return-to-Zero (RZ) encoding for the data sequence **110001011**. ii. Apply the Bipolar Return-to-Zero (Bipolar RZ) encoding on the data sequence **110001010**. iii. Use the Non-Return-to-Zero Level (NRZ-L) technique for the data sequence **10011010**. iv. Apply the Non-Return-to-Zero Inverted (NRZ-I) technique to the data sequence **1001110**. v. Use the Manchester encoding technique for the data sequence **10100111**	*2*	*2*	**10**
			OR			
	4	a)	Illustrate Frame format and describe it briefly.	*1*	*2*	**05**
		b)	For the given digital data sequences, apply the following encoding techniques and illustrate the resulting waveforms: i. **Polar Return-to-Zero (RZ)** encoding for the data sequence 1011001. ii. **Bipolar Return-to-Zero (Bipolar RZ)** encoding for the data sequence 0100110. iii. **Non-Return-to-Zero Level (NRZ-L)** encoding for the data sequence 1100101. iv. **Non-Return-to-Zero Inverted (NRZ-I)** encoding for the data sequence 0110100. v. **Manchester** encoding for the data sequence 1001110.	*2*	*2*	**10**
		c)	List and explain the types of errors with suitable example	*2*	*2*	**05**
			UNIT - III			
	5	a)	Differentiate the circuit and packet switching with suitable example.	*2*	*2*	**06**
		b)	Explain the role of bridges and routers with help of pictorial representation	*2*	*2*	**06**
		c)	Given the CIDR representation 100.1.2.35 / 20. Find the range of IP Addresses in the CIDR block.	*2*	*2*	**08**
			OR			
	6	a)	Differentiate Virtual Circuits and Datagram with suitable example.	*2*	*2*	**06**

		b)	Demonstrate the Broder Gateway Protocol with the help of pictorial representation.	*2*	*2*	**06**
		c)	An ISP allocates 203.179.24.0/21 to a company. The company needs to create **3 subnets** with the following requirements: **Subnet A:** 500 hosts **Subnet B:** 200 hosts **Subnet C:** 50 hosts **Tasks:** i. **Divide the** /21 **block into subnets** using VLSM to meet the requirements *without wasting more than 10% of addresses per subnet*. ii. **Show the subnet mask, network address, and usable range** for each subnet. iii. **Calculate remaining unused space** after allocation.	*2*	*2*	**08**
			UNIT - IV			
	7	a)	i. Differentiate between UDP and TCP with suitable example ii. Demonstrate the header format of TCP with neat sketch.	*2*	*2*	**10**
		b)	"Congestion is an important issue that can arise in Packet Switched Network." Can this be avoided? Provide different solutions for the same	*2*	*2*	**10**
			OR			
	8	a)	i. Explain sliding window syndrome with suitable example ii. Elaborate the Nagle's Algorithm	*2*	*2*	**10**
		b)	i. A TCP connection traverses a network with small buffer sizes or limited bandwidth. ii. A packet is lost, but subsequent packets successfully reach the receiver, triggering duplicate ACKs iii. when the sender receives three duplicate acknowledgments (ACKs) from the receiver	*2*	*2*	**10**
			UNIT - V			
	9	a)	Using the Rail Fence Cipher technique with 3 rails, encrypt the message **"IPREPAREDWELLFORTODAYEXAM"**. Show the steps involved in both encryption and decryption.	*3*	*2*	**05**
		b)	**Scenario:** You are given a **plaintext message** and a **numeric key sequence** that determines the shift value for each letter in the Caesar cipher. The key is repeated to match the length of the plaintext. **Given:** • **Plaintext:** I a t t a c k (spaces are ignored for encryption) • **Key:** 2 3 4 2 3 4 2 (repeated as needed) **Tasks:**	*3*	*2*	**05**

			1. **Apply the Caesar cipher** to each letter using the corresponding shift from the key. 2. **Write the final ciphertext** after encryption.			
		c)	Using RSA algorithm perform encryption and decryption after key identifications for p=11, q=13, e=7 and message(m) = 7.	*3*	*2*	**10**
			OR			
	10	a)	Apply the Vigenère- Cipher technique to encrypt the message **"IWILLPASSTHISEXAM"** using the shift key **"1234"**. Show the encryption process step by step	*3*	*2*	**06**
		b)	A **monoalphabetic substitution cipher** replaces each plaintext letter with a fixed ciphertext letter. For example: **Plaintext Alphabet:** A B C D E F G H I J K L M N O P Q R S T U V W X Y Z **Ciphertext Alphabet (Shifted by 3, like Caesar Cipher):** D E F G H I J K L M N O P Q R S T U V W X Y Z A B Depict the encryption and decryption.	*3*	*2*	**06**
		c)	Compare traditional and multimedia applications with detailed examples.	*3*	*2*	**08**

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