

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

22CS/AI/CA/CD52

Fifth Semester B.E. Degree Examinations, February 2025

COMPUTER NETWORKS

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1.	a. Describe the mechanisms of ASK, FSK, and PSK, and illustrate their application for encoding the digital data 101101 using suitable signal representations.	07	(2 : 1 : 1.2.2)
	b. Illustrate how each of the four network topologies can be applied in designing a network for an office environment. Highlight the advantages and disadvantages in your design.	07	(2 : 1 : 1.2.2)
	c. Outline the transmission impairments in the data communication network.	06	(2 : 1 : 1.2.2)
(OR)			
2.	a. Using polar and bipolar line coding schemes, represent the binary sequences 101011100 and 10110011 . Explain the steps involved in encoding these sequences and discuss how each scheme influences the transmission of data.	07	(2 : 1 : 1.2.2)
	b. Explain the working of a PCM encoder, describe each step of PCM encoding process with suitable representation in a neat diagram.	07	(2 : 1 : 1.2.2)
	c. Define data communication. Illustrate the components of a data communication system with a detailed diagram.	06	(2 : 1 : 1.2.2)
<u>Module-2</u>			
3.	a. Explain the concept of CRC with a block diagram and illustrate its operation using an example.	07	(2 : 2 : 1.2.2)
	b. Explain the HDLC frame format in detail. Describe the three types of frames used in HDLC, and analyze their roles in ensuring reliable communication and link management.	07	(2 : 2 : 1.2.2)
	c. Describe the reservation, polling, and token passing controlled access protocols.	06	(2 : 2 : 1.2.2)
(OR)			
4.	a. Explain the concept of checksum in data communication. Provide an example of how the checksum is calculated and verified during data transmission to ensure data integrity.	07	(2 : 2 : 1.2.2)
	b. Explain framing and the transition phases in the Point-to-Point Protocol (PPP). Discuss their significance in the communication process and the role they play in ensuring efficient data transmission between two devices.	07	(2 : 2 : 1.2.2)
	c. Describe the various persistent methods of CSMA.	06	(2 : 2 : 1.2.2)

Module-3

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| 5. | a. | Discuss the concepts of broadcast routing and multicast routing, compare their uses and how they affect network performance. | 07 | (2 :3 : 1.2.2) |
| | b. | Apply the concept of link-state routing to describe how routers exchange information to construct a complete network topology and determine the best paths for data transmission. | 07 | (2 :3 : 1.2.2) |
| | c. | Describe IPv6 datagram format and explain the fields with a neat diagram. | 06 | (2 :3 : 1.2.2) |

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| 6. | a. | Illustrate the IPv4 datagram format and explain how each field is utilized in data transmission between devices. | 07 | (2 :3 : 1.2.2) |
| | b. | Discuss the concept of distance vector routing and apply it to explain how routers use distance and direction information to determine optimal routing paths. | 07 | (2 :3 : 1.2.2) |
| | c. | Explain why ICMP messages are used in network communication. Analyze three ICMP message types, their codes, and descriptions. | 06 | (2 :3 : 1.2.2) |

Module-4

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| 7. | a. | Construct the TCP segment structure and explain the purpose of each field in the segment and how they contribute to reliable communication. | 07 | (2 :4 : 1.2.2) |
| | b. | Illustrate the concepts of multiplexing and demultiplexing in the transport layer and explain how they manage communication between multiple processes over a network. | 07 | (2 :4 : 1.2.2) |
| | c. | Demonstrate the TCP three-way handshake process for connection establishment and termination, and explain how it ensures reliable communication between devices. | 06 | (2 :4 : 1.2.2) |

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| 8. | a. | Explain the ATM ABR congestion control mechanism and illustrate how it manages congestion in high-speed networks using a neat diagram. | 07 | (2 :4 : 1.2.2) |
| | b. | Explain the Go-Back-N protocol and apply it to a practical scenario, demonstrating how it handles packet loss and retransmission in communication. | 07 | (2 :4 : 1.2.2) |
| | c. | Explain fairness in network communication, and show how the concepts contribute to efficient and fair network resource usage. | 06 | (2 :4 : 1.2.2) |

Module-5

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| 9. | a. | Construct the general format of HTTP request and response messages, and explain the role and significance of each field in ensuring proper communication between a client and server. | 07 | (2 :5 : 1.2.2) |
| | b. | Explain RSA and Diffie-Hellman public key encryption protocols, and discuss how they ensure secure communication over an unsecured channel. | 07 | (2 :5 : 1.2.2) |
| | c. | Write short notes on (i) Secure Hash Algorithm (ii) Digital Signature (iii) Firewalls | 06 | (2 :5 : 1.2.2) |

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| 10. | a. | Compare and apply the concepts of DES and AES secret key encryption protocols, demonstrating how each ensures data confidentiality and the differences in their security mechanisms. | 07 | (2 :5 : 1.2.2) |
| | b. | Explain the functions of POP and IMAP in email retrieval, and compare how each protocol handles message access and management | 07 | (2 :5 : 1.2.2) |
| | c. | Compare non-persistent and persistent HTTP connections, explaining the key differences between them in terms of how they handle connections. | 06 | (2 :5 : 1.2.2) |

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