


VIT

Vellore Institute of Technology

Final Assessment Test – November 2025

Course: BITE305L - Computer Networks

Class NBR(s): 3124/3128/3130

Time: Three Hours

Slot: B2+TB2

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Demonstrate the knowledge of fundamental concepts related to data communication and networks.
CO2	Describe computer transmission media and signaling mechanisms.
CO3	Identify and analyze data link layer error, flow control and MAC issues.
CO4	Develop multiple options for host to network addressing, managing sub networks and internetworking.
CO5	Evaluate communication services and transport protocols.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Map the flow of data through all seven OSI layers where two computers communicate over a network and explain the role of each layer in ensuring reliable communication with the required diagrams. CO1 BL3
2. Compare packet switching and circuit switching in terms of efficiency, delay, and reliability. In which scenarios, would packet switching be more advantageous? Justify with examples. CO2 BL2
3. Consider that there is a network having a bandwidth of 1 MBps. A message of size 1000 bytes has to be sent. Packet switching technique is used. Each packet contains a header of 100 bytes. Out of the following, in how many packets the message must be divided so that total time taken is minimum. CO2 BL3
 - a) 1 packet
 - b) 5 packets
 - c) 10 packets
 - d) 20 packets
- 4.a) Analyze the impact of a single-bit error on the CRC calculation. Suppose the generator polynomial is $G(x) = x^4 + x + 1$, and the data to be transmitted is 1101011011. Calculate the CRC for the original data and the data with a single-bit error in the fifth-bit, and explain the difference. CO3 BL3

OR

- 4.b) Given a received string "COMPUTER" with a hexa decimal checksum of 6E (calculated using ASCII values), determine if there is an error in the transmission. Calculate the expected checksum for the given string and compare it with the received checksum. If there's an error, explain how to handle it. CO3 BL3

5. Consider a Wi-Fi network where multiple devices are transmitting simultaneously. Draw the CSMA/CA process flow and evaluate how backoff timers affect throughput and fairness among users. CO3 BL3
- 6.a) Assume that you have been appointed as a network administrator for the NetShare ISP Company. Your company was allocated the IP address of 155.156.0.0/16. Your company requires planning minimum of 3 groups of sub service providers with the following details. CO4 BL5
- i) Group 1 has 32 customers; each customer requires 1024 addresses.
 - ii) Group 2 has 16 customers; each customer requires 512 addresses.
 - iii) Group 3 has 8 customers; each customer requires 256 addresses.
- Being the network administrator of the ISP service provider, design the sub-blocks of your company with proper range and slash notation representation, and identify the subnet mask of each group. Also, identify the remaining IP address to be used.
- OR**
- 6.b) An IPv4 datagram has arrived with the following information in the header (in decimal): 4500 0028 0001 0000 0417 0000 1012 1405 1206 0709 CO4 BL5
- i) What is the size of the data?
 - ii) How many more routers can the packet travel to?
 - iii) What is the identification number of the packet?
 - iv) What is the type of service?
 - v) Find the checksum.
- And also, highlight the key differences and similarities between IPv4 and IPv6.
7. Given the network below with link costs: CO4 BL5
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graph TD
 A ---|2| B
 B ---|5| C
 C ---|3| G
 A ---|3| D
 D ---|5| E
 E ---|2| F
 B ---|4| E
 C ---|4| F
 F ---|1| G

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- i) Show the initial distance-vector tables for each router (only neighbors known).
  - ii) Show table updates and state the final converged table of router A.
  - iii) Now assume the link B-C fails (cost  $\rightarrow \infty$ ). Show the next few update rounds and explain the count-to-infinity issue that may occur.
8. Analyze the three phases of TCP communication — connection establishment, data transfer, and connection termination — using suitable sequence diagrams. Then, justify how TCP differs from UDP in terms of reliability, connection management, and performance for real-time applications. CO5 BL4
9. Explain how different QoS mechanisms such as traffic shaping, resource reservation, and priority queuing work together to improve network performance. Use a suitable diagram to illustrate your explanation. CO5 BL2
10. Suppose an organization experiences issues where emails are not being delivered due to relay restrictions. Apply your understanding of SMTP command flow and relay rules to diagnose and propose a solution for this problem. CO5 BL3

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