Reg. No:

VIT
Vellore Institute of Technology

Final Assessment Test – November 2026

Course: **BCSE308L - Computer Networks**

Class NBR(s): **2535, 2539, 2542**

Slot: **C1+TC1**

Time: **3 Hours**

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

General Instruction

Course Outcomes:

CO1: Interpret the different building blocks of Communication network and its architecture.

CO2: Contrast different types of switching networks and analyze the performance of network

CO3: Identify and analyze error and flow control mechanisms in data link layer.

CO4: Design sub-netting and analyze the performance of network layer with various routing protocols.

CO5: Compare various congestion control mechanisms and identify appropriate transport layer protocol for real time applications with appropriate security mechanism.

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

PART-A (10 X 10 = 100 Marks)

Answer all Question(s)

Q1.	A company is setting up a new network and wants to use the TCP/IP model. The network will consist of multiple devices, including servers, workstations, and printers. Explain how the TCP/IP model would be used to enable communication between these devices, including the role of IP addresses, port numbers, and protocols.	10M	CO1	BL2
Q2.	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.	10M	CO2	BL2
Q3.	A path in a digital circuit-switched network has a data rate of 1 Mbps. The setup and teardown phases require the exchange of 1000 bits. The distance between two parties is 5000 km. Answer the following questions if the propagation speed is 2×10^8 m/s. a) What is the total delay if 1000 bits of data are exchanged during the data transfer phase? b) What is the total delay if 100,000 bits of data are exchanged during the data-transfer phase? c) What is the total delay if 1,000,000 bits of data are exchanged during the data-transfer phase? d) Find the delay per 1000 bits of data for each of the above cases and compare them. What can you infer?	10M	CO2	BL3

Q4.	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.	10M	CO3	BL3
		(OR)			
	b)	Given a received Hamming code word 1101001, determine if there is an error in the transmission. If so, identify the position of the error and correct it.	10M	CO3	BL5
Q5.		Five prisoners are locked up in adjacent cells in a prison. They would like to communicate with each other, but the walls and doors are too thick. One day, one prisoner discovers that if he hits the water pipe in his cell with a metal spoon, the sound travels to two cells in each direction; that is, noise from cell i can be heard in cells i-2, i-1, i+1, and i+2, if those cells exist. After some experiments, they discover this holds for all cells. Over lunch, they decide to define a protocol that will allow efficient communication. One of the prisoners has taken a computer networks course and argued that this is very much like Ethernet, so they decide to use the Ethernet protocol over their Water Pipe Network. The prisoners planning the break are in five adjacent cells that are lined up in a row. Unfortunately, there are some problems. Can you help them? Explain how the following three concepts map onto specific aspects of this network: Carrier Sensing, Multiple Access, and Collision Detection.	10M	CO3	BL4
Q6.	a)	The IP packet has arrived with the following information in the header (hexadecimal): 66 01 da 31 00 20 06 80 fe 80 00 00 00 00 00 00 dd af a2 5c 7c 55 1a 8d fe 80 00 00 00 00 00 00 e5 52 80 1f a5 bb aa 38. Compute the following: i) Version of the packet ii) Hop Limit of the packet iii) Size of the Payload data bytes iv) Identify the Next Header field and its type. v) Priority of a traffic class vi) Source address vii) Destination address. Also, highlight the key differences and similarities between the header formats of IPv4 and IPv6 Packets.	10M	CO4	BL3
		(OR)			
	b)				

Suppose a TCP message that contains 5080 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks interconnected by a router. The first network is Ethernet; the second is X.25. Each network's MTU gives the size of the largest IP datagram that can be carried in a data-link-layer frame. Find the identification, total length, D bit, M bit, and offsets of the sequence of fragments delivered to the network layer at the destination host. Assume all IP headers are 20 bytes. **10M CO4 BL4**

Q7. Assume that you have been appointed as a network administrator for the NetShare ISP Company. Your company was allocated the IP address 155.156.0.0/16. Your company requires planning a minimum of 3 groups of subservice providers with the following details. **10M CO5 BL3**

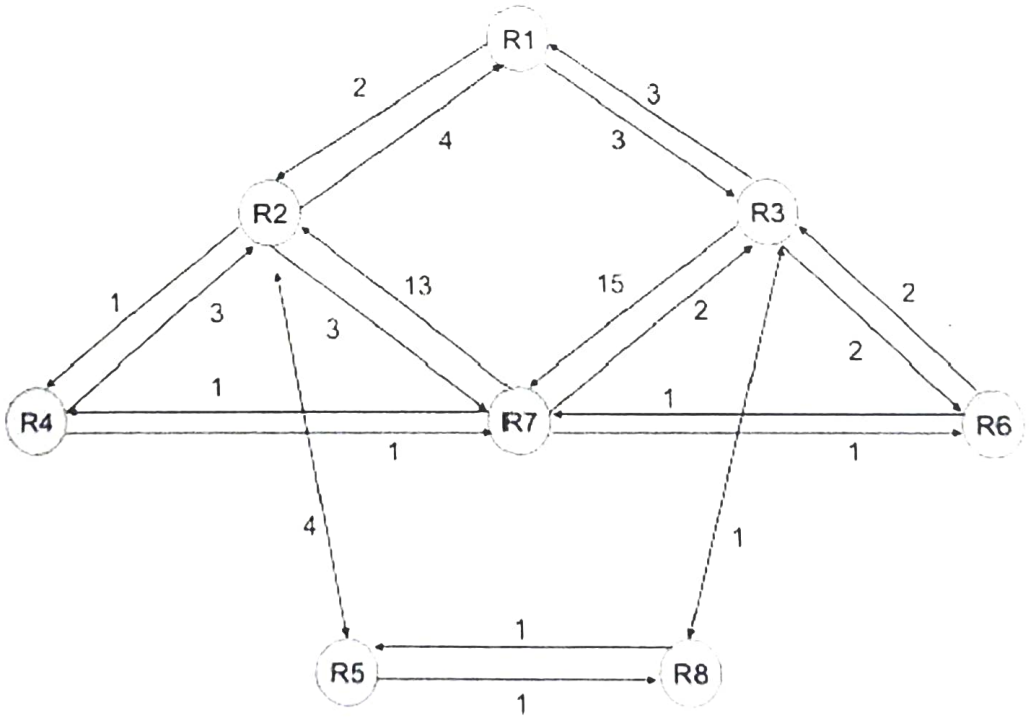
i) Group 1 has 32 customers; each customer requires 1024 addresses.

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 addresses to be used.

Q8. Consider the network of eight routers below, with edge weights labelled **10M CO5 BL5**



Show how the step-by-step operation of the Distance Vector routing algorithm works for router ***R1*** by computing an iteration table. Compute the Shortest Path tree for router R1 and the routing table entries in each router.

Q9. Analyze the importance of the sequence number and acknowledgment number fields in ensuring ordered and reliable delivery of data in TCP. How would communication be affected if either of these fields were missing or

corrupted? Use an example to illustrate your answer with TCP segment format | 10M | CO5 | BL2

Q10. | 10M | CO5 | BL3

A company has branch offices across different countries. Employees need secure remote access, centralized email service, and continuous network management and monitoring. Identify and justify the most appropriate application-layer protocols for each requirement. Analyze and explain how these protocols interact to provide a secure and efficient network environment.

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