Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 09- 12-2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B. Tech	
Course Code: ECE3053	**Course Name:** Data Communication and networking	
Semester: VII	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	**14**	**16**	**18**	**20**	**18**	**14**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

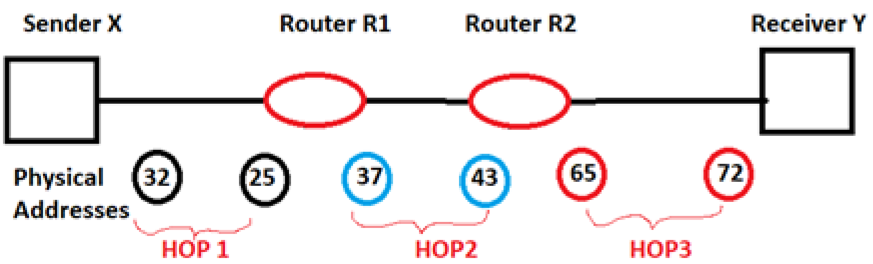
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Exchange of data between two devices through a transmission medium, such as a wire or cable is known as data communication. For this communication to occur, the devices involved must belong to a communication system that consists of a combination of hardware components, software programs, or both. What are the components of Data communications?	**2 Marks**	**L2**	**CO1**
2.	An address serves as an identifier for a node or host on a telecommunications network. It is typically designed to be unique across the entire network, though some networks also support private or locally administered addresses that may not be globally unique. What are the types of addresses used in TCP/IP?	**2 Marks**	**L2**	**CO1**
3.	Framing in computer networks refers to the data link layer process of encapsulating network-layer packets into frames so they can be transmitted across a physical medium.. What are different framing types?	**2 Marks**	**L2**	**CO2**
4.	Define Vulnerable period of Slotted Aloha and Pure Aloha with equation.	**2 Marks**	**L2**	**CO2**
5.	By sharing the link's resources, this protocol allows multiple stations to access the same channel at the same time. What are different channelization protocols?	**2 Marks**	**L2**	**CO3**

6.	CSMA, is a network protocol that allows multiple devices to share a communication channel. Draw the flow chart for 1-persistent CSMA?	**2 Marks**	**L2**	**CO3**
7.	Find the class of each address. i) 10000000 00001010 00001010 11100001 ii) 15.26.120.9	**2 Marks**	**L2**	**CO4**
8.	Change the following IPv4 addresses from binary notation to dotted-decimal notation. i) 00000001 00001011 00001011 11101111 ii) 00000011 10000011 00011011 11111111	**2 Marks**	**L2**	**CO4**
9.	The transport layer refers to the set of methods and functions within the layered network architecture of the Internet protocol suite.. What are the protocols used in transport layer of TCP/IP Protocol Suite?	**2 Marks**	**L2**	**CO5**
10.	Using IP headers length, Write an equation for UDP length.	**2 Marks**	**L2**	**CO5**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Main features of TCP/IP model are end node verification and dynamic routing. What are the layers in TCP/IP Model? Explain in detail?	**10 Marks**	**L3**	**CO 1**
	b.	Pure aloha network transmits 200-bit frames on a shared channel of 200 kbps. What is the total vulnerable time? What is the throughput if the system (all station together) produces? Calculate number of frames that are received correctly at the receiver for the following cases. a) 1000 frames per second b) 500 frames per second **c)** 250 frames per second	**10 Marks**	**L4**	**CO 2**
		Or			
12.	**a.**	Let a route between Sender with NL address "X" and Receiver NL address "Y" be going through 2 routers, R1 and R2. As we know, at DLL, only the MAC Layer gets encapsulated and de-capsulated at each router, while the logical addresses of NL gets encapsulated and de-capsulated only at the End Machines. Let the route be shown as follows. Show Encapsulation and de-encapsulation at all stages. 	**10 Marks**	**L3**	**CO 1**
	b.	In a particular scenario assume that channel between sender and receiver is completely free from errors but there may be problems of delay and flow so the receiver should make the sender wait. Identify the most suitable protocol from datalink layer and explain it in detail with flow and architecture figures?	**10 Marks**	**L4**	**CO 2**

13.	**a.**	In Controlled access, the stations check the status of the channel before transmission. What are different controlled access protocols?	**2 Marks**	**L2**	**CO 2**
	b.	Let us assume we have four stations 1, 2, 3, and 4 connected to the same channel. The data from station 1 is bit 0, from station2 is bit 0, from station3 no transmission and from station4 is bit 1.Explain the procedure in CDMA with encoding and decoding, if Station3 wants to listen to station1. The codes assigned to station 1 is C1 [+1 +1 +1 +1], station 2 is C2 [+1 -1 +1 -1], station 3 is C3 [+1 +1 -1 -1] and station 4 is C4 [+1 -1 -1 +1].	**14 marks**	**L3**	**CO 3**
	c.	Identify the errors in the following IPv4 addresses. a. 111.56.045.78 b. 221.34.7.8.20 c. 75.45.301.14 d. 11100010.23.14.67	**4 marks**	**L4**	**CO 4**
Or					
14.	**a.**	In Controlled access, the stations check the status of the channel before transmission. What are different random access protocols?	**2 Marks**	**L2**	**CO 2**
	b.	Channelization techniques divide a communication link's bandwidth for simultaneous use by multiple stations. Explain CDMA technique with an example?	**14 marks**	**L3**	**CO 3**
	c.	A block of addresses is granted to a small organization. We know that one of the addresses is 105.26.137.39/28. What is the first address, last address in the block and how many addresses are there in the block?	**4 marks**	**L4**	**CO 4**

15.	**a.**	An ISP is granted a block of addresses starting with 150.120.0.0/16. The ISP needs to distribute these addresses to three groups as follows I) 128 customers, each needs 64 addresses II) 128 customers with each needs 128 addresses III) 64 customers with each need 256 addresses. How many total number of addresses can be generated, design the sub blocks of addresses for each group of customers and find out how many addresses are allotted to each group and how many addresses are still available after these allocations?	**12 Marks**	**L4**	**CO 4**
	b.	Explain Header Translation techniques for address transition from IPv4 to IPv6 with neat sketch?	**4 Marks**	**L3**	**CO 5**
	c.	Domain Name System maps Host name to IP address. What are components of DNS Explain?	**4 Marks**	**L2**	**CO 6**
Or					
16.	**a.**	IPv4 was the primary version brought into action for production within the ARPANET in 1983.Explain the IPv4 datagram format with all fields with neat sketch?	**12 Marks**	**L4**	**CO 4**

	b.	The expansion of users in the Internet and the devices connecting to it, the Internet Protocol version 4 (IPv4) having 32-bit address is running out of capacity. Explain Dual stack techniques for transition of IPv4 to IPv6?	**4 Marks**	**L3**	**CO 5**
	c.	DNS servers convert URLs and domain names into IP addresses that computers can understand and use. What are the types of Servers used in DNS? Define with typical examples.	**4 Marks**	**L2**	**CO 6**

17.	**a.**	Delivery of segments between two processes (identified by port numbers) running on different hosts is handled at the Transport layer. It operates using a reliable, connectionless protocol, allowing data to be transferred without first establishing a virtual connection, while still ensuring correct and dependable delivery. What is that protocol? Explain the message format with all fields used for this protocol?	**10 Marks**	**L4**	**CO 5**
	b.	Domain Name System (DNS) converts human-readable domain names into IP addresses, enabling browsers to locate and access websites and other online resources. What are the types of messages that DNS has? Explain in Details with neat sketch?	**10 Marks**	**L3**	**CO 6**
		Or			
18.	**a.**	Segment delivery between two processes (identified by port numbers) running on different hosts is handled at the Transport layer. It operates using a reliable, connectionless protocol, allowing data to be transferred witht first establishing a virtual connection. What is that protocol? Explain the message format with all fields used for this protocol?	**10 Marks**	**L4**	**CO 5**
	b.	The conversion of domain names and URLs into machine-readable IP addresses is handled by DNS servers. What are the types of resolvers in DNS?	**10 Marks**	**L3**	**CO 6**