Continuous Assessment Test (CAT) – I - JANUARY 2025

Programme	:	B. Tech (CSE and its specialisations)	Semester	:	Winter 24-25
Course Code & Course Title	:	BCSE308L – Computer Networks	Class Number	:	CH2024250502014 CH2024250502016 CH2024250502018 CH2024250502020
Faculty	:	Dr. Sivagami.M Dr. Punitha. K Dr. Neelanarayanan. V Dr. Bhavadharini. R. M	Slot	:	C1+TC1
Duration	:	1½ Hours	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1.	a)	Consider the complex airline system that has ticketing agents, baggage checkers, gate personnel, pilots, air planes, air traffic control and a worldwide system for routing. Find an analogy with network communication model to describe the series of actions you take or others take for you when you fly on an airline. Discuss and correlate the functionalities of each layer in the network communication model. The scenario consists of a passenger purchasing an airline ticket, check bags, go to the gate and get loaded onto the plane. The plane takes off and is routed to its destination. After the plane lands, the passengers deplane at the gate and claim their bags. If the trip was bad, the passenger would complain about the flight or booking agent. (7 marks)	10
	b)	A small insurance agency consisting of an owner, a business manager, an administrator, and four agents decides to implement a network. In recent days, the business has been increasing and hence decided to hire two more new agents. Everyone in the company has a computer but only the business manager has a printer. These computers are not networked and hence for sharing the data they need to copy it to a pen drive and use it in their respective computers. Now, the company decides to network the computers. What type of network topology would be useful in this scenario and justify your answer with the diagram of the topology of the network. (3 marks)	
2.	a)	Rahul sends a Data "HELLO" to Ravi. Use 7-bit ASCII values to generate the data word for each letter in the Data. (65 represents ASCII value of A). Use even parity scheme (even number of 1's in sequence) and find the 8-bit code word for each letter in the Data. Show the final code word block that is transmitted in the network. (4 marks)	10

	b)	Assume that the letter "E" in "HELLO" has been corrupted and Ravi receives the data as "HALLO." Apply appropriate parity checking technique to detect the error. (3 marks)		
	c)	Also find out the minimum one combination of position of the bits which may be corrupted but cannot be detected as error in the code word block of the data "HELLO" by your chosen parity scheme. Highlight the corresponding bits positions in the code word block and justify the same. (3 marks)		
3.	a)	Assume that an internal examination system sends data on students' exam results to a central system for grading and record-keeping. The data includes the following details for each student, represented as 12-bit words. The sample data for a single student is given below:

Student Register Number: 8942
Course Code: 1308
Marks Obtained: 85
Attendance Percentage: 92.
To ensure data integrity during transmission, the system uses an error detection method which uses checksum.

i. Calculate the checksum using binary representation of the above given data. (3.5 marks)

ii. During transmission, the course code changes to 1318. How does the receiver detect the change in the data using checksum method? Illustrate the same. (3.5 marks) | 10 | |
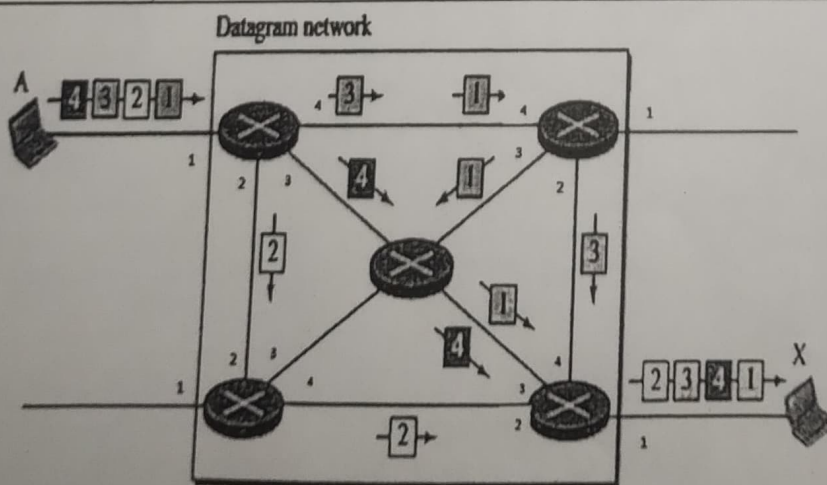| | b) | A sender wants to transmit a message of size 8 MB across a packet-switched network. The message is divided into packets, each of size 2,000 bytes with the 10 Mbps rate, 10 msec of propagation delay per packet, and 2 msec of processing delay per packet. Calculate the total time required to send the complete message, assuming packets are sent one after another. (3 marks) | | |
| 4. | | Datagram network

Figure 1: Datagram Network | 10 | |

The node A sends the data to X in a datagram network. The source and destination IP addresses are (12.4.5.6 and 23.4.5.6). Assume that every router has 4 ports (numbered as 1 to 4). According to the diagram source A sends the data to X as 4 packets in different paths.

(i) Identify and write the path of each packet from A to X from the given diagram. (2 marks)

(ii) Write the routing table entries for each router in the diagram for this data transfer (5 marks)

(iii) Discuss the reason why the packets are in different order in the node X. (2 marks)

(iv) Identify the layer in which datagram network operates in OSI reference model. (1 mark)
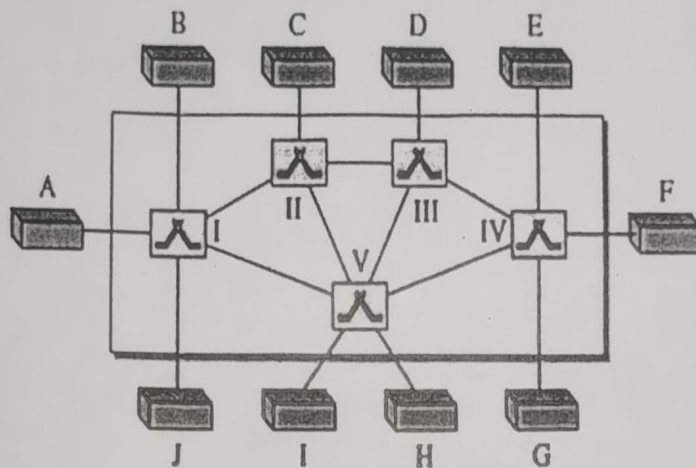
5. a)

Figure 2: Virtual Circuit Network

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The virtual circuit diagram has switches (I, II, III, IV and V). Assume that the switch ports are numbered from 0 to 3 or 0 to 4 according to the number of ports shown in Figure 2. The data transfer takes places between A and F as follows in a virtual circuit network. Discuss in detail the three phases of data transfer and make the switch table entries accordingly in the corresponding switches and highlight with the diagram mentioning the port numbers. The VCI(s) used in this connection is also mentioned (source A – VCI in the respective switches -switch name -... destination F) as follows. (7 marks)

A to F: A—4—S1—6—S2—14—S3 —8—S4—5—F; (S1 to S4 are shown in Figure 2 as I to IV).

b) Discuss the efficiency of the virtual circuit switched network in comparison with circuit switched network with an example. (3 marks)

**********All the best ************