



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	: CH2024250502022 CH2024250502025 CH2024250502027 CH2024250502030
Faculty	: Dr. Sivagami.M Dr. Punitha. K Dr. Neelananarayanan. V Dr. Bhavadharini. R. M	Slot	: C2+TC2
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.		<p>Local Area Network (LAN) "A" has 8 computers with Mesh topology. LAN "B" has ring topology with 4 computers. The company wants to connect these two LAN(s) in an efficient manner. Mr. Ram suggests connecting these two LANS using Point-to-Point Wide Area Network (WAN). Mr. Ravi wants to connect the same using switched WAN. You as an expert do the following for deciding the best approach:</p> <p>a) Discuss the difference between (i) Point-to-Point WAN and (ii) Switched WAN with suitable diagrams (3 marks)</p> <p>b) Draw the topologies of these two approaches (internet network of the given 2 LANs with (a) Point-to-Point WAN (b) switched WAN). (3 marks)</p> <p>c) Find the number of links and ports required in both approaches and justify the same. (3 marks)</p> <p>d) Analyse the performance of the above two approaches if the connections fail in either of the devices connected in LAN or WAN. (4 marks)</p> <p>e) Assume that node A in VIT acts as a server that provides mail services through Gmail as well as an attendance checking mechanism through VTOP. The student accesses mail and attendance information simultaneously in Node B. Now how the request from node B to the server will be handed over to the respective services in node A? Identify the layer which handles this task (either in TCP/IP or in OSI model). (2 marks)</p>	15

2.	<p>Assume that you are designing an error detection system with varying the number of data bits and code word bits using Even parity (even number of 1's in code word) technique.</p> <p>a) Find the number of (i) data words, (ii) valid and invalid code words for the error detection system $C(5,4)$. (3 marks)</p> <p>b) Generate the data words of k bits ($k=3$) and the corresponding code words using even parity. List out the valid and invalid code words for this even parity error detection system $C(4,3)$ (3 marks)</p> <p>c) Illustrate and find the minimum Hamming Distance for code word "0000" with the code words generated using odd parity (odd number of 1s in code word) technique for $C(4,3)$. Find the number of error bits detection can be guaranteed in this scenario. (4 marks)</p>	10
3.	<p>a) Design a circuit-switched network to connect telephones of two remote offices A and B of a private company. The offices A and B – each has 4 telephones. Communication is through 4-kHz voice channels between telephones and switches. Assume that each link between switches uses Frequency Division Multiplexing (FDM) to connect a maximum of two voice channels. So, the bandwidth of each link is 8 kHz between switches. Provide the facility in office A to allow communication between telephones in the same office A and can connect with telephones in B. But the office B does not have the facility to connect between telephones in the same office and only it can connect with the telephones of office A. Use appropriate switches for this design and justify the same. (5 marks)</p> <p>b) Modify the circuit design with the link which has the capacity of 16 kHz between switches to connect to offices A and B with the assumption that the link uses FDM to connect a maximum of 4 voice channels. Use appropriate switches for this design and justify the same. (2 marks)</p> <p>c) Analyse the performance of the circuit switched network, packet switched network in the given two scenarios with justification (5 marks)</p> <p>(i) At time t_1 – The computers from office A (numbered as 1 to 4) connect and transfer data simultaneously with computers (numbered as 5 to 8) in office B respectively as shows (1-4, 2-5, 3-6, 4-8).</p> <p>(ii) At time t_2 – The computer 1 from office A connects and transfers data with computer 4 in office B.</p> <p>d) Assume that the data of 4000 bits have been transferred from A to B using packet size of 400 bits through 4 virtual circuit switches. Each link between switches has a propagation delay of 20,30,40,40 micro seconds respectively with 20 Mbps rate as channel capacity. Calculate the total time taken to transfer the entire data from A to B. (3 marks)</p>	15

4.	<p>Consider a communication system using a CRC-based error detection mechanism. The sender and receiver use a generator polynomial $g(x) = x^4 + x + 1$ for error checking. The message being sent is represented by the polynomial: $M(x) = x^8 + x^6 + x^5 + x^3 + x^2 + 1$.</p> <p>a) i) Find the CRC code word $C(x)$ corresponding to the message $M(x)$ using the given generator polynomial. (3.5 marks) ii) If the transmitted code word is $C(x)$, and the received word becomes $R(x) = C(x) \oplus 1010$, determine whether the received word has an error or not. (3.5 marks)</p> <p>b) Can we apply checksum error detection technique for the above given data transfer? Say yes or no and justify your answer with proper explanation. (3 marks)</p>	10
*****All the best *****		