Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:	22BAI1266

Continuous Assessment Test (CAT) – I - February 2024

Programme	:	**B.Tech (Computer Science and Engineering)**	Semester	:	**Winter 2023-2024**
Course Code & Course Title	:	**BCSE308L Computer networks**	Class Numbers	:	**CH2023240501647 CH2023240501655 CH2023240503360**
Faculty(s)	:	**Dr. Neelanarayanan Dr. Punitha K Prof. Priyanka Mishra**	Slot	:	**E1+TE1**
Duration	:	**One and Half Hours (90 Minutes)**	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		Identify the network model that provides a structured approach for comprehending network processes. Illustrate this model comprises of layers, and explain each with a unique role in facilitating communication between devices on a network. From the layer dealing with hardware to the layer handling user interfaces.	10
2		Network designers generally attempt to deploy networks that do not have single points of failure, though they do not always succeed. Network topologies that employ redundancy are of much interest.	10
	i)	Identify and draw a six-node network topology in which the failure of a single link does not disconnect the entire network (that is, any node can still reach any other node). (2 Marks)	
	ii)	Identify and draw a six-node network topology in which the failure of any single link cannot disconnect the entire network, but the failure of some single node does disconnect it. (2 Marks)	
	iii)	Identify and draw a six-node network topology in which the failure of any single node cannot disconnect the entire network, but the failure of some single link does disconnect it. (2 Marks)	
	iv)	Calculate the number of ports and cable links are required for a six-node star topology that have six-node network topology. (2 Marks)	
	v)	Identify a topology that is used to minimize traffic problem. Justify your answer. (2 Marks)	

3		Assume that five users are being contracted (which means multiple signals are combined into one signal through a medium) over a channel of 10 Mbps. Under the following cases below, explain the scenario of circuit switching or packet switching better.	10
	i)	Each user generates traffic at an average rate of 2.1Mbps but generates traffic at a rate of 15Mbps when transmitting. (4 Marks)	
	ii)	Each user generates traffic at an average rate of 2Mbps, generating traffic at a rate of 2 Mbps when transmitting. (3 Marks)	
	iii)	Each user generates traffic at an average rate of 0.21Mbps, generating traffic at a rate of 15 Mbps when transmitting. (3 Marks)	
4	i)	If a binary signal is sent over a 3KHz bandwidth channel whose signal-to-noise ratio is 20dB, calculate the maximum achievable data rate. (5 Marks)	10
	ii)	Due to _____, the signal at the beginning of the medium is not the same as the signal at the end of the medium. Identify the same and write a short note on the causes. (5 Marks)	
5	i)	Convert the following decimal numbers into binary numbers and the resulting values should be 32-bit representation. (4 Marks (each 1)) 153 226 36 132	10
	ii)	Perform a two-dimensional parity check by for the above-mentioned 32-bit data by dividing into four blocks of equal size (without changing the values) and provide the data to be transmitted. (3 Marks)	
	iii)	During transmission burst errors happened. The following positions are where the bits corrupted: 12^{th}, 14^{th}, 20^{th} and 22^{nd} bits. By applying the same error detection method can you detect errors? Justify your answer in detail. (3 Marks)	

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