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Vellore Institute of Technology

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Reg. No. : 22BAI1166

Final Assessment Test (FAT) - May 2024

Programme	**B.Tech.**	Semester	**WINTER SEMESTER 2023 - 24**
Course Title	**COMPUTER NETWORKS**	Course Code	**BCSE308L**
Faculty Name	**Prof. Neela Narayanan V**	Slot	**E1+TE1**
		Class Nbr	**CH2023240501647**
Time	**3 Hours**	Max. Marks	**100**

General Instructions:

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

Answer all questions (10 X 10 Marks = 100 Marks)

01. Imagine that you are using a computer to send an email to a friend. When you click "send," the email is broken down into smaller packets of data, which are then sent to the topmost layer for routing using a practical model that addresses specific communication challenges and relies on standardized protocols. When all packets have been delivered, your friend's computer can reassemble them into the original email message. **[10]**

a) Identify this network model and the layer crucial in delivering the email from your computer to your friend's computer. Also, explain how it determines the best route for the packets to take, and ensures that the packets are delivered to the correct destination. (5 Marks)

b) Illustrate the purpose of the 3-way handshake in this model. (3 Marks)

c) Can TCP work without OSI? Justify your answer. (2 Marks)

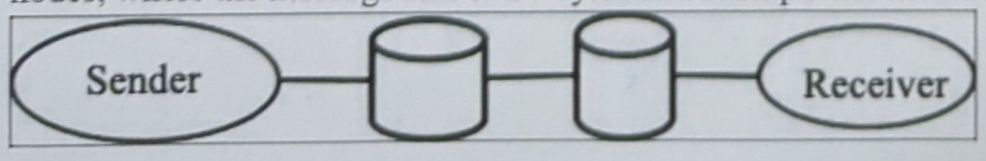
02. a) Apply the suitable line configuration and explain them in detail for the scenario given below: **[10]**

- The remote control and television for changing the channels (2 Marks)
- Two phones connected for talking (2 Marks)

b) Consider all links in the network use TDM with 12 slots and have a data rate of 2.53 Mbps. Assume that the sender takes 400 msec to establish an end-to-end circuit with a destination before beginning to transmit the file. Calculate the time taken to send the file from the sender host to the destination host, if the file is 1024 kilobytes. (6 Marks)

03. Two network companies are linked through a satellite connection operating at 1 Mbps. With the satellite positioned 36,504 km above, and the signal speed at 3×10^8 m/s, what packet size is necessary to achieve a 25% channel utilization using the go-back-127 sliding window protocol? Assume acknowledgment packets are negligible and communication errors are absent. **[10]**

04. Determine the most efficient packet size out of 1, 3, 7, and 9 considering a packet-switched network routing messages from source to destination through a single path with two intermediate nodes, where the message size is 24 bytes and each packet includes a 3-byte header. **[10]**



05. Given the generator function $G(x) = x^4 + x + 1$ and the message function $M(x) = x^7 + x^6 + x^4 + x^2 + x$: [10]

(a) Calculate the transmission function $T(x)$. (5 marks)

(b) Consider that the transmission is damaged, so the receiver receives $R(x) = x^{11} + x^9 + x^8 + x^7 + x^3 + x^2 + x + 1$. Will this error be detected? (5 marks)

06. Suppose a network with IP Address 192.16.0.0. is divided into 2 subnets, calculate the number of hosts per subnet. Also, calculate the following: [10]

a) Identifying the network and Subnet Address (2 Marks)

b) First Host ID and Last Host ID (2 Marks)

c) Broadcast Address (1 Mark)

d) Direct Broadcast Address and Limited Broadcast Address (2 Mark)

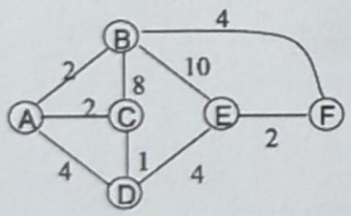
e) In this class, if the network has a subnet mask of 255.255.240.0, then calculate the maximum number of hosts per subnet. (3 Marks)

07. Construct the IPv4 header structure using the values given below and calculate the checksum value. The following data are from an IP packet received at the host whose IP address is 192.162.178.10, with a packet header is 5 bytes, the total length field of the header is 003c which uses a connection-oriented protocol. The unique packet identity of a single IP datagram is 3c46 and 5001 corresponds to the flags and fragment offset values sent by a host at 120.10.2.12 [10]

08. a) Given is an input of burst data at a rate of 2 Mbps for 5s. After a halt of 12s, again data flows at the rate of 15 Mbps for 4s. For efficient working of a Leaky Bucket algorithm, what should be the flow rate of output data provided that the bucket functions for 8s? (5 marks) [10]

b) Illustrate the working of the Leaky Bucket algorithm. (5 marks)

09. Consider the given network: [10]



a) Show the operations using an appropriate algorithm for computing the least cost path from B to all destinations after flooding. Can flooding cause an infinite looping? Justify your answer with a solution. (5 Marks)

b) From these results, show the shortest path from B to D, and briefly describe how you got that answer from your work in part a). (5 Marks)

10. a) Identify the system that allows users to connect to websites by matching website domain names chennai.vit.ac.in to the unique location of the server where the website is stored. Does failure occur when users cannot connect to an IP address via a domain name? Justify your answer. (5 Marks) [10]

b) List the potential sources of DNS Failure. Explore the strategies for troubleshooting a DNS Failure. (5 Marks)