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Vellore Institute of Technology

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Reg. No. : 23MCA1056.

Final Assessment Test (FAT) - May 2024

Programme	**M.C.A.**	Semester	**WINTER SEMESTER 2023 - 24**
Course Title	**DATA COMMUNICATION AND NETWORKING**	Course Code	**PMCA505L**
Faculty Name	**Prof. SENDHIL R**	Slot	**C1+TC1**
		Class Nbr	**CH2023240501381**
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. a. Design and illustrate the topologies based on the requirement specified below: **[10]**
    i. A network in which seven nodes are connected via point to point link. (2 marks)
    ii. A network with six devices using the multipoint connection. (2 marks)
    iii. A network with eight devices using tokens. (2 marks)

    b. Discuss the above topologies with their Pros and Cons. Identify the best suited topology for connecting LAN. (4 marks)

02. a. Assume you are working as an network engineer whose responsibility is setting up a local area network (LAN) for a medium-sized company. Consider this scenario to discuss the functionalities of OSI seven layers in setting up the network.(7 marks) **[10]**
    b. A networking device is designed in such a way that, it forwards the packet out of every valid outgoing link. Identify the networking devices that helps to transfer data only to the respective destination and discuss the drawbacks while the network is connected with more number of systems. (3 marks)

03. a. Assume a propagation speed of 4×10^8 m/s and a 5ms delay of a channel. Determine the length of a bit in a channel and the number of bits on a link if the channel bandwidth is as follows. **[10]**
    i. 100 Mbps (3 marks)
    ii. 200 Mbps (3 marks)

    b. An email message of size 205 kilobyte is transmitted with a bandwidth of network 1Gbps. Assume that the distance between the sender and the receiver is 12000 km., and the light travels at 2.4×10^8 m/s. Calculate the Propagation time and transmission time. (4 marks)

04. i) Switching techniques play a crucial role in determining the efficiency, reliability, and performance of various applications. Let's explore and justify appropriate switching techniques for the following scenarios: **[10]**

a) E-Commerce Shopping Application (4 marks)

b) Video Games (4 marks)

ii) Differentiate between circuit switching and packet switching. (2 marks)

05. A bit stream 10011101 is transmitted using the standard error detection method. The generator polynomial is x^3+1. **[10]**

i) Show the actual bit string transmitted. (4 marks)

ii) Suppose the third bit from the left is inverted during transmission. Show how the receiver detects this error. (6 marks)

06. Consider the binary sequence 00101100 **[10]**

a) Apply hamming method to find the paritybit and show the whole data sequence transmitted. (5 marks)

b) Flip the 6th bit from the right and check whether the receiver identifies this single bit error or not. (5 marks)

07. An organization has been granted a block of addresses starting from **176.140.0.0/18**. The network administrator needs to distribute these addresses into three groups as stated below: **[10]**

- The first group has 30 subnets; each need 120 addresses.
- The second group has 64 subnets; each need 118 addresses.
- The third group has 32 subnets; each need 30 addresses.

a. Help the administrator to design the subnetworks with the slash notation for each subnet. (6 marks)

b. Calculate the total number of unused addresses. (4 marks)

08. a. In a network, there are 100 systems and every system uses the TCP protocol. Due to heavy traffic, the performance of the network gets slowed down. How does TCP overcome this situation to increase the performance of the network? [5 Marks] **[10]**

b. Host A sent a datagram to Host B. Host B never received the datagram and Host A never received notification of failure. Give explanations for the two different conditions happened. Also, state the solution for the issue identified. [5 Marks]

09. Identify the suitable mechanism used to "managing the rate of data transmission between two nodes to prevent a fast sender from overwhelming a slow receiver". (2 marks) **[10]**
Elaborate the different mechanisms available for this management.(8 marks)

10. Praveena is interested to visit www.SaiTecksolutions.com to download some files. When she types the website name in the web browser, an IP address for the given name is retrieved from an authoritative domain name server to facilitate the requested services. **[10]**

a. Identify the protocol which provides the IP address for the given name. (2 marks)

b. Discuss the operations involved in the background with a neat diagram. (8 marks)