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Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring-2023
Course Code: CSE225, Course Title: Data Communication
Level: L2 Term: T1 Batch: 61

Time: 1 Hour and 30 Minutes **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	*a)*	Functionality is a top concern when creating a business's computer network. The network topology's design can easily boost performance and data efficiency, improve how resources are distributed among departments, and do all of this while costing less to run. For analyzing network slowdowns, detecting connection difficulties, and doing general troubleshooting, a software-created network topology diagram might be helpful. One of the most important business considerations should be developing a local area network (LAN) architecture that is safe, resilient, and simple to manage. The size of the network and other operational needs may influence the network topology you select for your company. Therefore, as a student of the data communication course, you are instructed to build a modern LAN using the appropriate topology. Hence, apply your knowledge to analyze the performance of that topology in terms of the type of connectivity, advantages, disadvantages, and applications. Besides, what will happen if one connection or link gets disconnected? Use the figure if appropriate.	[5]	CO1
2.	*a)*	In a network transmission model, communication between two devices begins with the identification of their unique addresses. Essentially, for two devices to communicate, they must first identify themselves within the network. In the internet using the TCP/IP protocol, four types of addresses are utilized in different layers: Physical address (MAC), Logical address (IP), Port address (service point), and Specific address (domain). Now answer the following questions. Explain the difference between a physical and logical address.	[1]	CO2
	b)	Discuss the procedure of sending data from host to destination using physical address with the proper figure.	[2]	
	c)	Illustrate the logic using proper figure, "physical addresses change from hop to hop, but the logical addresses remain the same".	[2]	
3.	*a)*	A signal is sent from point 1 to point 2. At position 1, the signal intensity is 250 mW. At point 2, the power is 190 mW, and at point 3, it becomes 240 mW after using an amplifier. There is 200 mW of power at point 4. Calculate the overall attenuation in decibels?	[3]	CO3
	b)	A signal has passed through three cascaded amplifiers, each with a 5 dB gain. Estimate the total gain? Calculate how much the signal is amplified?	[2]	
4.	*a)*	We know that a digital signal is superior to an analog signal. Therefore, an analog signal, which is created by a microphone or camera, is needed	[2]	CO3

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		to be converted into a digital signal. There are two popular techniques for conversion named pulse code modulation (PCM) and delta modulation (DM). So, compare and contrast PCM and DM.		
	b)	We know that line coding is the process of converting digital data to digital signals. Suppose, we have the following data $(AE)_{16}$ to send. Evaluate this digital data into the following line coding schemes. i. NRZ-I ii. Differential Manchester iii. MLT3	[3]	
5.	*a)*	We have an available bandwidth of 100 kHz which spans from 200 to 300 kHz. Calculate the carrier frequency and the bit rate if we modulate our data by using FSK with d = 1?	[1.5]	CO3
	b)	Estimate the above-mentioned problem if we modulate our data by using ASK instead of FSK.	[1.5]	
	c)	Evaluate the bandwidth for the following situations if we need to modulate a 7-KHz voice. i. FM (wideband) ii. AM	[2]	

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