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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Midterm Examination, Fall-2026
Course Code: CSE225, Course Title: Data Communication
Level: 2 Term: 2 Batch: 68

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)	A university is establishing a network for a newly built computer laboratory with 40 computers. The network administrator wants the network to be easy to manage and troubleshoot. If one student's computer or its connection fails only that connection will be disrupted, the remaining computers should continue communicating. The administrator also expects that computers may be added or removed from the laboratory in the future. However, the university wants to avoid installing multiple connections between every pair of computers because of cost and maintenance complexity. From the above scenario, analyze and explain the network topology. And what could be the possible advantages, disadvantages and applications of using this topology?	3	CO1
	b)	A manufacturing plant uses two different communication arrangements. In System A, a sensor sends production measurements to a control computer, while the computer never transmits information to that sensor. In System B, two industrial controllers exchange commands and responses, and both can send and receive information simultaneously Analyze the appropriate transmission mode (simplex, half-duplex, or full-duplex) for this scenario and justify your selection.	2	
2	a)	Identify the following functions to the appropriate OSI model A. It uses a mechanism to recognize duplicate frames. B. A web application requests information from the remote server. C. The communication interaction between two applications is unexpectedly terminated. D. Data translation, encode and conversion. E. Determining the best route to forward packets across the internet. F. Breaks the data into manageable segments and provides mechanisms for reliable delivery.	3	CO2

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	b)	Assume that the communication is between a process running at computer A with port address i and a process running at computer D with port address j. Illustrate the contents of segments, packets and frames at the network, data link, and transport layer for each hop. Explain with appropriate figure.	2	
3	a)	A non-periodic composite signal contains frequencies ranging from 10 kHz to 50 kHz. The peak amplitude is 25V at 10 kHz and 50 kHz, while it reaches 40V at 30 kHz. Assuming a gradual change in amplitude from the minimum to maximum, Illustrate the frequency spectrum for this signal and discuss the range of amplitudes.	3	CO3
	b)	If the bandwidth of the channel is 16 Kbps, how long does it take to send a frame of 500,000 bits out of this device?	2	
4	a)	A signal has passed through three cascaded amplifiers, each with a 4dB gain. What is the total gain? How much is the signal amplified? If the original signal power is 200 mw, what is the power of the amplified signal?	3	
	b)	Analyze the capacity for the noise less communication channel.	2	
5	a)	Analyze and Draw the Line Coding of the bits $(BD)_{16}$ I. NRZ-I II. Differential Manchester. III. MLT-3	3	
	b)	A telecommunications engineer is designing a digital communication system to transmit voice signals over a digital network. The engineer converts the continuous voice signal into digital form before transmission. Examine the steps of the PCM modulation technique used in this process.	2	

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