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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Midterm Examination, Spring-2026
Course Code: CSE225, Course Title: Data Communication
Level: 2 Term: 2 Batch: 67

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 large organization operates multiple branch offices connected through a shared network. During busy hours, users report that accessing centralized databases and sending large files takes noticeably longer, and responses to online requests are sometimes delayed when network traffic is high. On several occasions, a connection between two offices fails unexpectedly, but alternative paths allow communication to remain active almost 99%. At the same time, the organization enforces restricted access to confidential records, monitors unusual activities on the network, and maintains backup systems to restore data if information is lost or altered. 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)	"In data communication, there are certain rules and regulations that govern how devices exchange information." Analyze different types of the key elements of these rules and regulations.	2	
2	a)	A user sends a long document from one computer to another over a network. Before transmission, the document is broken into several smaller segments, and each part is given an identification number. At the receiving end, these parts may arrive out of order or with some missing, but the system is able to arrange them in the correct order and request any missing parts again to reconstruct the original document. Identify the OSI layer involved and briefly explain the characteristics of this layer based on the scenario.	3	CO2

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	b)	Two computers are exchanging data over a network. Each layer on the sending computer communicates with the corresponding layer on the receiving computer to ensure the information is correctly formatted, transmitted, and understood. Analyze (with figure) the process by which corresponding layers on two computers communicate in the OSI model.	2	
3	a)	What is the total delay (latency) for a frame of size 10 million bits that is being sent on a link with 20 routers each having a queuing time of 4 μs and a processing time of 2 μs? The length of the link is 4000 Km. The speed of light inside the link is 4×10^8 m/s. The link has a bandwidth of 10 Mbps.	3	CO3
	b)	The power of a signal is 10 mW and the power of the noise is 1 μW; What are the values of SNR and SNR_{dB}?	2	
4	a)	Analyze the capacity for the communication channel in which the signal-to-noise ratio is infinite? (Hint: Use Shannon's theorem.)	3	
	b)	Analyze different types of noises that might cause transmission impairment.	2	
5	a)	Analyze and Draw the Line Coding of the bits 110101010111: I. Pseudoternary II. MLT-3 III. Differential Manchester	3	
	b)	Compare & Contrast Synchronous and Asynchronous data transmission.	2	