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Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Fall 2026

Course Code: SE225; Course Title: Data Communication and Computer Networking

Sections & Teachers: A, O(RT), B, C(AMR), D, E, F (HI), G, M, N (NAJ), H (NBA), I, J (TR), K, L (SAS)

Time: 1 Hour 30 Mins **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 telecom engineer designs a 120 km long-haul optical fiber link. The fiber link experiences attenuation of 0.175 dB/km. • The transmitter sends an optical signal with an initial power (P_{in}) of 150 mW. • At the receiver end, the ambient noise power (P_n) is 0.005 mW.		**CLO-1** *Level-3*
		i) **Calculate** the received signal power (P_{out}) in mW.	**[Marks-2]**	
		ii) **Compute** the final SNR at the receiver.	**[Marks-1]**	
	b)	A global financial firm transmits market data packets across an undersea optical connection between a stock exchange and a nearby cloud data center. The system operates at a transmission rate of 2.5 Gbps with a signal propagation speed through the optical fiber of 2.0×10^8 ms^{-1}. Each data packet has a size of 1.25 MB. As a packet traverses the network interface, hardware processing takes 0.4 ms, while router queuing accounts for 0.6 ms. If the measured end-to-end latency across the link is exactly 9.0 ms, **determine** the physical distance of the link in km. **Note:** 1 GB = 1024 MB	**[Marks-4]**	
	c)	Daffodil International University is temporarily setting up a quick, budget-friendly network to connect 8 computers placed along a single straight hallway for an upcoming student registration event. Because the event will only last two days, the administration wants to minimize cabling expenses and setup time. **Illustrate** the most suitable network topology for this scenario and **draw** a neat, fully labeled diagram representing your proposed layout.	**[Marks-3]**	
2.	***a)***	Rafi is in the DIU computer lab and tries to send his project file to his friend's PC. The file never arrives. The lab technician checks the network and finds the problem in one of the lower layers of the OSI	**[Marks-2]**	**CLO-2** *Level-2*

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		model. This layer is different from the other layers because it adds both a header and a trailer to the data before passing it on. **Explain** the mentioned layer and two tasks of this layer.		
	b)	Suppose a message is transmitted from hop to hop in a network. **Determine** which of the following addresses: port address, logical address, and physical address remain the same and which change during transmission.	**[Marks-3]**	
3.	*a)*	A network engineer is comparing the data-link protocols used in different network models. During HDLC data transmission, the data bit sequence 1011111101111110 needs to be transmitted. Using the bit-stuffing technique, **compute** the resulting bit sequence where the header and trailer flag is 01111110.	**[Marks-2]**	**CLO-3** *Level-3*
	b)	A sender wants to send data 10110010 01101100 11001010. **Construct** the checksum generated by the sender. Suppose while receiving the 5th bit is changed. **Examine** whether the receiver can identify the error or not.	**[Marks-4]**	
	c)	A sender wants to transmit the dataword 1101011011 using the Cyclic Redundancy Check (CRC) technique. The generator polynomial is represented by the bit pattern 10011. **Demonstrate** the CRC remainder generated by the sender.	**[Marks-4]**	