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# Daffodil International University

**Department of Computer Science and Engineering**
**Faculty of Science & Information Technology**
**Midterm Examination, Spring 2025**
**Course Code: CSE 225, Course Title: Data Communication**
**Level:2 Term:2 Batch: 65**

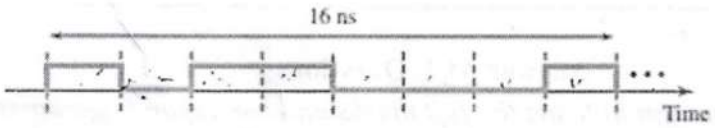
**Time: 1.5 Hours** **Marks: 25**

**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.]***

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|---|---|---|---|---|
| 1 | a | You have been hired as a network engineer to design a network for a new medium-sized company. The company is divided into three departments: Sales, HR, and IT. The company's office has a single floor with three sections dedicated to each department. Each department has 25 employees, and each employee needs a computer with internet access. The company also plans to expand and add more employees in the future. Which network topology will you choose for the company? And **apply** your knowledge to describe possible benefits and limitations of that topology and provide appropriate diagram if necessary. | 3 | CO1 |
| | b | A manufacturing plant has multiple machines that need to communicate with a central monitoring system to report operational status and receive commands. Now **examine**<br>a) Which connection type (point-to-point or multipoint) would be more effective for communication between each machine and the central system? Justify your choice<br>b) If the central system needs to send commands to multiple machines, which connection type would be preferable? | 2 | |
| 2 | a | **Relate** the following functions to the appropriate OSI model<br>a) Interface to transmission media<br>b) Ensures reliable transmission of data<br>c) Format and code conversion services<br>d) Creating user datagrams.<br>e) Communication between two processes either half-duplex or full-duplex mode<br>f) Compression is important in transmitting multimedia such as audio, video and text. | 3 | CO2 |
| | b | In data Communication the two addresses physical and logical are needed for transferring data between sender and receiver. **Compare and contrast** these addresses. | 2 | |

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|---|---|---|---|---|
| 3 | a | **What** is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2 μs and a processing time of 1 μs. The length of the link is 2000 Km. The speed of light inside the link is $2 \times 10^8$ m/s. The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible? | 3 | CO3 |
| | b | **What** is the bit rate for the signal in Figure:<br> | 2 | |
| 4 | a | Suppose you need to send $(65)_{10}$. **Analyze** and draw the signal using the following line coding schemes:<br>i. Differential Manchester<br>ii. NRZ (I)<br>iii. MLT-3 | 3 | CO3 |
| | b | **Analyze** between synchronous & asynchronous serial transmission. | 2 | |
| | a | Briefly **explain** the causes of transmission impairment with proper diagram. | 3 | CO3 |
| | b | A signal has passed through three cascaded amplifiers, each with a 4 dB gain. **What** is the total gain? How much is the signal amplified? | 2 | |