



**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

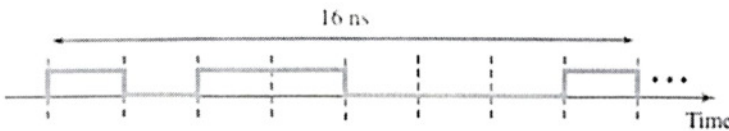
Time: 1.5 Hours

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.]*

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |     |
|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
| 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 <b>apply</b> 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 <b>examine</b><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 | <b>Relate</b> 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. <b>Compare and contrast</b> these addresses.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2 |     |

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |     |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
| 3 | a | <b>What</b> 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 $2\ \mu\text{s}$ and a processing time of $1\ \mu\text{s}$ . The length of the link is 2000 Km. The speed of light inside the link is $2 \times 10^8\ \text{m/s}$ . The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible? | 3 | CO3 |
|   | b | <b>What</b> is the bit rate for the signal in Figure:<br>                                                                                                                                                                                                                                                                                             | 2 |     |
| 4 | a | Suppose you need to send $(65)_{10}$ . <b>Analyze</b> 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 | <b>Analyze</b> between synchronous & asynchronous serial transmission.                                                                                                                                                                                                                                                                                                                                                                  | 2 |     |
| 5 | a | Briefly <b>explain</b> 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. <b>What</b> is the total gain? How much is the signal amplified?                                                                                                                                                                                                                                                                                          | 2 |     |