Daffodil International University

Faculty of Business and Entrepreneurship

Department of Business Administration

Semester: Spring-2026 Examination: Final

Time: 2:00 hours Full Marks: 40

Course Code: MIS-0612-325

Course Title: Data Communication and Networking for Business

[Answer all the questions (10 marks each; 4x10=40)]

1. a) **Write** the binary form of the generator polynomial $G(x) = x^4 + x + 1$ and explain the meaning of each bit in relation to the polynomial terms. Then **explain** the CRC (Cyclic Redundancy Check) mechanism for error detection in communication systems by addressing the following: (7 Marks) **[CLO-2, L2]**

i. **Outline** CRC implementation using shift registers and feedback paths.

ii. **Describe** the role of XOR operations in generating the remainder.

b) **Analyze** how the selected polynomial supports transmission error detection and how the receiver verifies the frame to decide whether it should be accepted or discarded. (3 Marks) **[CLO-2, L4]**

2. A coastal disaster-resilient university campus is being planned to support digital student ID verification, smart classroom connectivity, campus surveillance, emergency warning systems, free Wi-Fi in open areas, inter-building broadband links, and backup communication during cyclones. The campus authority must select appropriate mobile generations (1G to 5G) and wireless technologies such as WiMAX, Bluetooth, Wi-Fi, Li-Fi, and Satellite to ensure uninterrupted, secure, and efficient communication across the campus.

a) **Identify** any two mobile communication generations from 1G to 5G that would be most suitable for this university campus project. For each one, mention one important feature and one practical campus use. Then, using your knowledge of wireless and mobile communication, **select** suitable technologies for the following services: free open-area internet access, student ID verification at entry/control points, smart classroom high-speed indoor data transfer, inter-building connectivity, and emergency backup communication during cyclones. (7 Marks) **[CLO-3, L3]**

b) **Compare** any two wireless technologies from WiMAX, Bluetooth, Wi-Fi, Li-Fi, and Satellite in terms of coverage area, speed, and suitable application for the campus communication system. (3 Marks) **[CLO-2, L4]**

3. a) **Define** cryptography and **mention** its roles in ensuring confidentiality and integrity in data communication and network security. (3 Marks) **[CLO-1, L1]**

b) A company wants to secure its email communication, user login system, and office network. **Evaluate** how digital signatures can protect email communication by ensuring authenticity, integrity, and non-repudiation. Then **evaluate** how entity authentication and firewalls help secure user access and protect network traffic in the company's office environment. (7 Marks) **[CLO-4, L5]**

4. A medium-sized organization depends on routers, switches, servers, and firewalls for its daily operations. The network administrator observes slow response time, packet loss, suspicious access attempts, and difficulty in monitoring all devices centrally. To improve visibility, control, and problem detection, the organization plans to strengthen its Network Management System (NMS) and use SNMP-based monitoring.

a) **State** the meaning of a Network Management System (NMS) and **mention** any two performance parameters that should be monitored by a network administrator. (4 Marks) **[CLO-1, L1]**

b) **Apply** your knowledge of security management to propose any two suitable measures that can help reduce suspicious access attempts and improve protection in this network environment. (3 Marks) **[CLO-3, L3 – Apply]**

c) **Analyze** how SNMP and its main components support the NMS in collecting information, identifying abnormal conditions, and enabling centralized network monitoring. (3 Marks) **[CLO-4, L4]**