ourdiu.com | Shared by Abdullah Tawsif (CSE-232)

Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Summer 2025

Course Code: CSE233 **Course Title: Embedded System and IoT**

Level: 4 **Term: 2** **Batch: 61**

Time: 2:00 Hrs **Full Marks: 40**

Answer all the following Three questions

[All portions of each question must be answered sequentially]

Q1.	*a.*	**Explain** any two communication modules used in IoT.	**5x2= 10**
	b.	**Explain** the features that make ESP32 suitable for IoT applications.	
	c.	**Interpret** the IoT architecture by drawing and labeling its major layers.	
	d.	**What** does the acronym 'CIA' stand for in IoT Security?	
	e.	**Identify** the meaning of an IoT attack.	
Q2.	*a.*	**Develop** an Arduino sketch to interface a Bluetooth module using software serial. The code should enable two-way communication between the Bluetooth module and the Arduino Serial Monitor through serial data exchange. Provide the complete Arduino code and a clearly labeled circuit diagram showing all necessary connections.	4
	b.	A remote agricultural facility needs a wireless communication solution to connect sensor nodes spread several kilometers apart without using GSM or Wi-Fi. **Develop** a wireless transmitter node and a central receiver node setup using a low-power, long-range RF communication module operating in sub-GHz frequencies suitable for rural environments to send and receive simple text messages. Provide the complete Arduino code for both transmitting and receiving nodes, along with clearly labeled circuit diagrams showing all necessary connections.	6
Q3.	*a.*	Daffodil Smart City plans to deploy IoT-enabled waste bins that send fill-level data to a central system and issue real-time alerts when bins are full. **Evaluate** and justify the selection of communication and messaging protocols to ensure efficient, low-power, and reliable operation. Also **evaluate** the most appropriate security measures to safeguard the system and transmitted data.	5

OVER

ourdiu.com | Shared by Abdullah Tawsif (CSE-232)

	b.	**Design** an ESP32-based Factory Intrusion Alert System to safeguard restricted zones during non-operational hours. The prototype should: • Detect when a person enters a restricted area using a sensor that senses human presence without physical contact. • Provide an instant visual warning to alert nearby personnel emitting a loud audible signal at the same time to deter intruders. • Automatically reset to standby mode after the event, enabling continuous monitoring throughout off-hours. In your answer, provide: 1. Selection of components with justification. 2. Explanation of the entire system operation along with a clearly labeled circuit diagram showing all necessary connections. 3. The complete Arduino code to operate the system.	7	
	c.	**Design** an STM32 and ESP32-based smart traffic control system inspired by real-world urban congestion challenges in Dhaka City. The prototype should dynamically adjust traffic signals based on real-time traffic flow and environmental conditions. The system must prioritize emergency vehicles and provide clear visual feedback indicating traffic status levels—such as heavy, medium, or low. It should also include a mechanism to capture visual data from intersections to support emergency vehicle detection and continuous traffic monitoring. Explain the system's purpose, system requirements, and the components used. Provide a complete block diagram illustrating the system architecture. Additionally, describe how cloud services are used for data processing and remote monitoring, and explain how users (e.g., traffic authorities or citizens) can interact with the system.	8	