ourdiu.com | Shared by Abrar Hasan Chowdhury

# Daffodil International University

**Faculty of Science & Information Technology**
**Department of Computer Science & Engineering**
**Mid Semester Examination, Fall 2024**
**Course Code: CSE233, Course Title: Embedded Systems and IoT**
**Level: 3 Term: 1 Batch: 62**

**Time: 01:30 Hrs** **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)* | **Characterize** fixed and variable resistance with applications. | [1] | CO1 |
| | *b)* | State and **Explain** Ohm's law. | [2] | |
| | *c)* | **Compare** BJT and MOSFET with proper examples. | [2] | |
| | *d)* | You want to interface a **5V** development board with a **3.3V** sensor/actuator. **Elaborate** the appropriate technique. | [1] | |
| 2. | *a)* | If 40 V are applied across a 4.7 mF capacitor, **Compute** the charge on the plates. Also, **Approximate** the charging time if a 1 kΩ resistor is connected in series with capacitor. | [4] | CO1 |
| | *b)* | **Calculate** the base current ($I_B$) if the transistor is in active mode and the collector current ($I_C$) is **222 mA**. The transistor has a common-base current gain ($\alpha$) of **0.99** . | [3] | |
| | *c)* | **Demonstrate** the applications of basic electronics components in IoT systems. | [3] | |
| 3. | *a)* | How would you design an automated system using appropriate microcontrollers, sensors, and actuators to monitor and maintain temperature and humidity levels in a storage area for perishable goods, triggering alerts if conditions move beyond acceptable limits? **Develop** a detailed schematic of the system and **Provide** a list of required components. | [4] | CO3 |
| | *b)* | **Design** a smart lighting control system for an energy-efficient building that adjusts the lighting automatically based on ambient light levels, occupancy detection, and user preferences. The system should integrate various sensors, support wireless communication, and ensure robust error handling. Provide a detailed design plan, including hardware components, software architecture, communication protocols, and error management strategies. **Evaluate** the design against performance, scalability, and safety criteria. | [5] | |