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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid Semester Examination, Spring 2025
Course Code: CSE233, Course Title: Embedded Systems and IoT
Level: 3 Term: 1 Batch: 63

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)*	State and Explain Ohm's law.	[2]	CO1
	b)	Compare between Von Neumann and Harvard architecture.	[2]	
	c)	A DC motor driver circuit is designed using a capacitor (1000μF, 25V), an N-channel MOSFET, and an NPN BJT to ensure smooth operation. The capacitor is connected across the power supply to stabilize voltage fluctuations. The MOSFET is used to control the motor's operation, while the BJT is used as an intermediate switching device to drive the MOSFET. **Demonstrate** I. The role of the capacitor in this circuit. How does it help during the motor's startup and sudden load changes? II. The MOSFET requires a certain gate voltage to turn ON. How does this gate voltage influence the motor's operation? III. Apply your understanding of BJT and MOSFET operation to explain the difference between them.	[6]	
2.	*a)*	**Develop** a sketch in embedded C program for an indicator circuit using an Arduino and LED. If the alarm is triggered LED must turn on for 10 seconds to perform blink operation.	[5]	CO2
3.	*a)*	A manufacturing plant wants to design an automated system to monitor critical parameters (temperature, vibration, pressure) of its machines. The system should trigger alerts and shut down machines if any parameter exceeds predefined thresholds. **Interpret** the system design with appropriate components list.	[4]	CO3
	b)	The authority of Daffodil International University aims to enhance campus security by implementing a smart security system. The system should ensure authorized access to restricted areas, effectively monitor entry points, and alert security personnel in the event of unauthorized access. **Explain** how microcontrollers can be used to develop a smart security system for Daffodil International University. List the components, design steps, and technologies to ensure secure access control, real-time monitoring, and alert mechanisms for campus safety. Provide a detailed system schematic, block diagram with proper explanation.	[6]	