B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.
Branch: **CSE (IoT & Cybersecurity including Blockchain)**
Course Code: **23IC3PCEDS**
Course: **EMBEDDED SYSTEMS**

Semester: **III**
Duration: **3 hrs.**
Max Marks: **100**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

				CO	PO	Marks
			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Explain the concept of Big Data Analytics in IoT and its importance in processing IoT-generated data	*CO2*	*P02*	**10**
	b)		Explain the differences between the Request-Response and Publish-Subscribe communication models in IoT systems with and provide a relevant example scenario where each model would be most appropriate.	*CO2*	*PO2*	**10**
			OR			
2	a)		Analyze which IoT level can be considered for designing Smart Irrigation system. Explain with a neat diagram.	*CO2*	*PO2*	**10**
	b)		Explain the different layers of IoT protocol stack and their significance in IoT communication with a neat diagram.	*CO2*	*PO2*	**10**
			UNIT - II			
3	a)		Compare microcontroller-based systems and microprocessor-based systems. Analyze and justify how you choose among these when designing a system/application.	*CO2*	*PO2*	**10**
	b)		Explain the role of timers in the Arduino UNO and their modes of operation.	*CO1*	*PO1,3*	**10**
			OR			

4	a)		Spot the errors and rewrite the corrected sketch and predict the operation it performs.
			void setup()
			{ pinMode(10, input); //Push Button
			   Serialbegin(9600);
			   pinMode(2,) ; //Buzzer
			}
			void loop()
				CO2	*PO2*	**10**

			``
			{ int s = readDigital(10);
			    serial.Println(s);
			   if (s == 1) { writeDigital (2, HIGH); }
			   else { writeDigital (2, LOW); }
			   Delay(1000);
			}
			``			

	b)	Compare and contrast between sensors and actuators in detail with necessary examples	CO1	PO1	**10**
		UNIT - III			
5	a)	Design a system where ultrasonic distance sensor to control an LED. Turn on the LED if the distance is less than 10 cm.	CO1	PO1,3	**10**
	b)	Create a program to simulate a traffic light using three LEDs (red, yellow, green) with appropriate timing.	CO1	PO1,3	**10**
		OR			
6	a)	Design an automatic irrigation system that activates when soil moisture is below a threshold and deactivates otherwise.	CO1	PO1,3	**10**
	b)	Design a circuit using an Arduino and a PIR sensor to turn on an LED when motion is detected.	CO1	PO1,3	**10**
		UNIT - IV			
7	a)	Design a program that uses the Raspberry Pi's GPIO pins to simulate traffic lights.	CO3	PO1,2,3,5	**10**
	b)	Analyze the following: 1. Python's RPi.GPIO library with other libraries like wiringPi for controlling Raspberry Pi GPIO pins. 2. The hardware features and specifications of the Raspberry Pi.	CO3	PO2	**10**
		OR			
8	a)	Compare between GPIO.BCM vs GPIO.BOARD pin numbering for Raspberry Pi projects.	CO3	PO2	**10**
	b)	Design a program for Raspberry Pi to implement an LED blinking functionality using GPIO.	CO3	PO2,3,5	**10**
		UNIT - V			
9	a)	You are tasked with designing an IoT-based Smart Waste Management System for a city. The goal is to monitor the fill level of waste bins in real time, send alert to nearby waste collection unit and optimize the waste collection process using ultrasonic sensors. Design a flow diagram and write an Arduino code based on the flow diagram.	CO3	PO1,2,3	**10**
	b)	Consider a Scenario of designing a smart home which has multiple IoT devices. Provide the following details: a) List the IoT devices and components of smart home b) Identify the appropriate communication model	CO3	PO1,2	**10**

			c) List two potential security vulnerabilities d) Propose appropriate security measures			
			OR			
	10	a)	Propose an IoT-based system to monitor the water quality in a river. Identify the sensors required for measuring parameters of water quality and explain their role and use with a flow diagram.	*CO3*	*PO1,2, 3*	**10**
		b)	Design a flow diagram for an Intrusion Detection System (IDS) based on Passive Infrared (PIR) sensors in an IoT environment. Write an Arduino code based on the flow diagram. With the help of circuit diagram discuss the components involved, the process of detecting an intruder, and how the system can respond to potential threats.	*CO3*	*PO1,2, 3*	**10**

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