



Continuous Assessment Test (CAT) – I - JAN 2025

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| Programme | : B.Tech (CSE) | Semester | : WS 2024-25 |
| Course Code & Course Title | BCSE3051 EMBEDDED SYSTEMS | Class Number | CH2024250501657 CH2024250501661 CH2024250501663 CH2024250501666 CH2024250501668 CH2024250501670 |
| Faculty | VIJAYKUMAR P NITISH KATAL P. LATHA M. SINDHUJA KIRAN KUMAR M SUHASINI | Slot | E2 + TE2 |
| Duration | : 90 Minutes | Max. Mark | 50 |

General Instructions: Write only your registration number on the question paper in the box provided and do not write other information.

- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

| Q. No | Sub Sec. | Description | Marks | Blooms Taxonomy Level |
|-------|----------|---|-------|-----------------------|
| 1 | | Identify a microcontroller that features a load and store type of architecture and multi-stage pipelined operation. Discuss the architecture of the same in detail with required architecture diagrams. [Marks: 2+5+3] | 10 | K2 |
| 2 | | Design an embedded system for a smart garden. The system should monitor environmental conditions (temperature, humidity, soil moisture, light), control irrigation and fertilization, and provide personalized gardening advice based on plant species and user preferences. It should also allow for remote monitoring and control through a mobile app. With required block diagrams, construct the hardware and software architecture of the system that enables the above-given functionality. Consider the hardware components as per the above-given requirements | 10 | K3 |
| 3 | | Design a smart waste management system using an Arduino Uno, an ultrasonic sensor, a push button, a servo motor, and a red LED. The system should automatically detect the level of waste in a trash bin and alert users when the bin is full. The system should operate under the following conditions: i. The ultrasonic sensor continuously monitors the fill | 15 | K3 |

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| | | <p>level of the trash bin which is 50 cm deep.</p> <ul style="list-style-type: none"> ii. When the waste level reaches 80%, a servo motor automatically closes the bin's lid to prevent further disposal. iii. The bin has a push button which enables the lid to open by 90° (using a servo motor) when the waste has to be collected. iv. A red LED starts blinking to alert users that the bin is full. v. The current fill level is displayed on the serial monitor. <p>Based on the requirements above, complete the following:</p> <ul style="list-style-type: none"> A. Write a code for the system to manage the waste bin efficiently and ensure users are alerted when the bin needs to be emptied. [12 Marks]. B. Also draw the connection diagrams with pin configuration [3 Marks]. | | |
| 4 | | <p>Design and develop an automated climate management system for a small indoor garden using Arduino Uno. This system should monitor environmental factors and adjust ventilation based on temperature. Required components include an DHT11 Sensor, Servo Motor, and an ADC connected to an LDR (Light Dependent Resistor) for light intensity measurement. The system should operate under these conditions:</p> <ul style="list-style-type: none"> i. The DHT11 sensor tracks the temperature inside the garden. When the temperature surpasses 35°C, the servo motor opens a vent to allow ventilation for 10 minutes. ii. The light level is monitored by an LDR connected to an ADC with a 0-5V range and 10-bit resolution. The system has an approximate sensitivity of 10 mV per lux. When light levels fall below a threshold (around 200 lux), the system turns on supplemental lighting. iii. Display real-time values for temperature, humidity, light intensity, and vent status (open/closed) on the serial monitor. <p>Based on the requirements above, complete the following:</p> <ul style="list-style-type: none"> A. Write the Arduino code to implement this system. [12 Marks] B. Provide a schematic showing the connection of the sensors and actuators to the Arduino. [3 Marks] | 15 | K3 |