



VIT
Vellore Institute of Technology

Final Assessment Test – November 2025

Course: BCSE312L - Programming for IoT Boards

Class NBR(s): 2384/2385

Time: Three Hours

Slot: B1

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Investigate various challenges and explore open source hardware prototyping platforms for designing IoT devices
CO2	Understand basic circuits, sensors and interfacing, data conversion process and shield libraries to interface with the real world
CO3	Program SBC by exploring protocols, data conversion process, API and expansion boards for practical IoT devices using Python
CO4	Learn embedded programming constructs and constraints in real time systems for real world socio-economic problems

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Write short notes on the Internet of Things (IoT). Explain in detail the design challenges, security challenges, and implementation challenges faced in IoT systems. CO1 BL1
2. A smart room temperature control system uses a microcontroller to read data from a temperature sensor, control a fan or heater actuator based on the readings, and display the temperature on an LCD shield. Explain the circuit design, wiring with passive components, sensor and actuator interfacing, read/write operations, and the role of software libraries and shields in implementing this system. Illustrate your answer with examples. CO3 BL4
3. Explain the setup and configuration of a Raspberry Pi. Discuss the use of RPi.GPIO and PWM library to access and control pins, for simple interactive applications. CO2 BL2
4.
 - i) Compare and contrast API versus SDK [5] CO3 BL4
 - ii) Compare and contrast MQTT versus HTTP versus COAP. [5]

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| 5. | Draw and explain the block diagram of a 8051 microcontroller. Describe the interrupt handling mechanism, including types of interrupts, interrupt vector, and how the microcontroller responds to an interrupt. Illustrate your answer with examples. | CO2 | BL2 |
| 6. | Write an arduino program to read analog values from a potentiometer, convert them to a digital range, and display the result on an LCD. | CO2 | BL6 |
| 7. | Design a cloud-based Smart Automation System for a building, explaining its IoT architecture from sensor and camera data capture through preprocessing, cloud processing, database integration, and report generation, along with considerations for security, scalability, and real-time operation. | CO3 | BL5 |
| 8. | Explain how a Pi Camera can be interfaced with a microcontroller or Raspberry Pi to capture images and videos. Discuss the use of a servo motor for positioning and controlling the camera, and describe the APIs used for data conversion from the captured images for further processing. | CO3 | BL3 |
| 9.a) | With a neat diagram, explain the operation of a Universal Asynchronous Receiver/Transmitter (UART). Also, discuss the structure of a UART data frame, describing the function of the start bit, data bits, parity bit, and stop bits. | CO1 | BL2 |
| OR | | | |
| 9.b) | Describe in detail the architecture and key features of the Arduino Uno board explaining all the hardware components. Additionally, discuss the role of the Arduino IDE and how it is used to write, compile, and upload code to the board. | CO1 | BL2 |
| 10.a) | Discuss the factors to consider when choosing an RTOS for an embedded application, focusing on task management, synchronization, and resource constraints. | CO4 | BL2 |
| OR | | | |
| 10.b) | Explain threads with reference to POSIX Threads (Pthreads). Discuss thread preemption, including how it occurs, its impact on multitasking, and how it is managed in a real-time or multitasking system. | CO4 | BL2 |

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