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Question Paper Code : 82323

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Sixth Semester

Computer Science and Engineering

CS 3691 — EMBEDDED SYSTEMS AND IoT

(Common to Computer Science and Engineering (Artificial Intelligence and Machine Learning)/Computer and Communication Engineering/
Artificial Intelligence and Data Science)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate microprocessor and microcontroller.
2. How to program 8051 timers?
3. Specify the types of memory components used in the design of embedded systems.
4. Highlight the benefits of priority based process scheduling.
5. Point out the challenges faced by Internet of Things.
6. Why Arduino is considered versatile for various projects?
7. List any two key features of ZigBee communication protocol.
8. State the applications of Raspberry Pi.
9. What is the role of wearable device in the context of smart healthcare?
10. Mention any two challenges faced in the deployment of IoT solutions in agriculture.

PART B — (5 × 13 = 65 marks)

11. (a) List and explain the types of instructions available in 8051 microcontroller.

Or

- (b) Explain the steps involved in interrupt execution and enabling/disabling interrupts in embedded systems.

12. (a) Discuss the advantages of using C over assembly language in embedded systems programming. Demonstrate how to write and compile a C program for the 8051 microcontroller to interface with an LED and a push button.

Or

- (b) Explain how multiple tasks and processes are managed in an embedded system with RTOS.

13. (a) Compare and contrast IoT devices with traditional computing devices and explain why IoT devices are preferred for specific embedded applications.

Or

- (b) Discuss the significance of Arduino shields in the integration of sensors and actuators.

14. (a) Describe the architecture and interfacing capabilities of the Raspberry Pi with diagram.

Or

- (b) Explain how GPS and GSM modules are integrated into IoT systems for tracking and communication purposes.

15. (a) Elaborate the complete design methodology of an embedded system used in IoT applications.

Or

- (b) Illustrate the architecture, key components, communication protocols and data flow from sensors to the cloud of an IoT based home automation system with diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Evaluate the performance metrics of IoT communication models and APIs and examine how do these models influence the architecture and responsiveness of IoT systems across different used cases.

Or

- (b) Design an end-to-end process of connecting an IoT device to the cloud and analyze the technical challenges and solutions in terms of protocol selection, data transmission, API integration and real-time communication reliability.