

(b) How do microcontrollers with integrated sensors differ from those without sensors in IoT applications, and what are the key benefits of using a microcontroller with integrated sensors? (7.5)

7. (a) How has the use of Arduino and cloud technology transformed the field of telemedicine, and what are some specific examples of its use in remote patient monitoring and diagnosis? (7.5)

(b) What are the key components of an Embedded C program for reading and sending sensor data, and how can these components be optimized for efficient performance? (7.5)

Roll No.

Total Pages : 4

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**B. Tech. (EEIOT) VIth Semester
Embedded IOT (EE-IOT-602)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Assume data wherever required.*

PART-A

1. (a) What are the different types of microcontrollers used in IoT applications, and what are their unique features? (1.5)
(b) What is pipelining? How does it improve the performance of IoT microcontrollers? (1.5)
(c) How do real-time embedded systems handle time critical events and what techniques are used to ensure timely response to these events? (1.5)

- (d) What are the key factors to consider when designing a custom microcontroller for an IoT device? (1.5)
- (e) How does the Arduino programming language differ from other programming languages? (1.5)
- (f) What are the typical program memory requirements for IoT controllers, and how do they vary across different types of applications and use cases? (1.5)
- (g) What are the main design challenges in developing embedded systems? (1.5)
- (h) What are the different categories of embedded systems? Give suitable examples? (1.5)
- (i) How can the relay switch be controlled through the Arduino board's digital output pins? (1.5)
- (j) What are the main cloud service providers for IoT, and how do they differ in terms of features, pricing, and availability? (1.5)

PART-B

- 2. (a) How do different programming languages and development tools impact memory access and instruction execution in IoT controllers, and what are the tradeoffs involved in selecting between them? (7.5)
- (b) What is an embedded system? Discuss the advantages and disadvantages of Harvard and Von Neumann architectures. In case of Harvard architecture, why there is no need for multiplexing the address and data buses. (7.5)

- 3. (a) What is a Microcontroller? Compare Microcontroller with Microprocessor? Enlist the important features of a microcontroller also explain various flags available in its PSW register. (7.5)
- (b) How do cloud service providers handle data storage and processing for IoT applications, and what are the best practices for managing data in the cloud? (7.5)
- 4. Design a complete hardware and software scheme for Interfacing different sensors like Temperature or Humidity with Arduino and display the measured values on an LCD display. (15)
- 5. (a) What are the different addressing modes available in IoT microcontrollers? Describe each addressing mode and provide examples of their usage. (7.5)
- (b) What are the different communication protocols used in IoT devices, and how do microcontrollers with integrated communication capabilities compare to those without communication capabilities? (7.5)
- 6. (a) What essential libraries should every Arduino programmer know about, and what are their functions? Can a programmer create his own custom library in Arduino, and if so, what are the steps involved?