[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5709 **J**

Unique Paper Code : 2513012004

Name of the Paper : Internet of Things

Name of the Course : **B.Sc. (H) Electronics (DSE)**

Semester : IV

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **seven** questions in all, out of which you have to attempt any **five** questions.
3. **First** Question is Compulsory. **All** questions carry equal marks.

1.		Attempt all questions. All questions carry equal marks.	(3) x 6=18
	(a)	What is the concept of sensing and actuation in an IoT system? Explain with an example.	
	(b)	What are Bluetooth-based wireless sensors?	
	(c)	Discuss any two domain-specific applications of IoT with examples.	
	(d)	Define CoAP and compare it with HTTP in terms of IoT applications.	
	(e)	Differentiate between Structured and unstructured data.	
	(f)	What is the difference between IPv4 vs. IPv6 in IoT?	
2.	(a)	Define the Internet of Things (IoT). Discuss any four key characteristics that distinguish IoT systems from traditional computing systems. Support your answer with suitable examples.	(6)
	(b)	Explain the IoT Protocol Stack. Describe the key layers involved and their respective functions.	(6)
	(c)	Explain Request Response communication model with relevant diagram. Give example of an IoT System in reference to this.	(6)
3.	(a)	What are enabling technologies of IoT? Explain any three.	(6)
	(b)	Discuss the security threats in IoT and suggest possible preventive measures.	(6)
	(c)	How does M2M communication differ from IoT?	(6)
4.	(a)	Explain various parameters of performance for a sensor.	(6)
	(b)	What are actuators? Discuss any three types of classification of actuators with suitable examples.	(6)
	(c)	Explain the working principle of IR sensors. Give its applications.	(6)
5.	(a)	Draw the pinout diagram of Arduino Uno/ raspberry Pi board. Explain the relevance of all the pins mentioned.	(6)
	(b)	What is UART in Arduino? Explain how to communicate via serial monitor using the Serial library. Or Explain how to use serial communication in Raspberry Pi using Python.	(6)
	(c)	Write a program to measure the temperature and humidity using DHT11 sensor along with circuit diagram.	(6)
6.	(a)	Explain the services provided by cloud service provider with suitable examples in each case.	(6)

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(b) Explain the role of RESTful Web APIs and ThingSpeak API in IoT systems. How do they help in data communication and visualization? (6)

(c) Discuss three major security aspects in IoT systems. Why is ensuring security more challenging in IoT compared to traditional IT systems? (6)

7. (a) A smart irrigation system is developed to monitor environmental conditions for optimal plant watering, focusing specifically on soil moisture, ambient temperature, and humidity levels. The system includes sensors and actuators and operates in two modes: (6)

Automatic Mode: The system automatically activates the water pump to irrigate the plants when the soil moisture level falls below a predefined threshold, and adjusts watering frequency based on temperature and humidity conditions.
Manual Mode: The user can manually turn the irrigation system ON or OFF through a mobile or web-based application.

Purpose:
To optimize water usage in agriculture by automating irrigation based on real-time environmental data and also providing manual control for user intervention when required.

Requirements:
Functional Requirements:

- Real-time sensing of soil moisture, temperature, and humidity.
- Automatic control of water pump based on sensor thresholds.
- Manual override functionality through a user interface.

Non-Functional Requirements:

- Accurate sensor data acquisition and reliable actuation.
- Wireless connectivity between sensors, microcontroller, and the user interface.

Give the process model specification for Auto Mode and Manual Mode for the Smart Irrigation System described above.

(b) Explain any two of the following IoT application in detail: (6) + (6)
(i) Smart City
(ii) Home Automation
(iii) Weather monitoring system