

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9229

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.**
4. **All questions carry equal marks.**

1. Attempt **all** questions. **All** questions carry equal marks. (3×6=18)
 - (a) Discuss any three key characteristics of IoT systems.
 - (b) Define a Wireless Sensor Network (WSN).
 - (c) Discuss any two domain-specific applications of IoT with examples.
 - (d) Differentiate between IoT and M2M systems.
 - (e) Differentiate between Structured and unstructured data.
 - (f) What is the difference between IPv4 vs. IPv6 in IoT?
2.
 - (a) Give the generic block diagram of an IoT device. Explain the concept of things in the context of physical design of IoT. (6)
 - (b) Explain the IoT Protocol Stack. Describe the key layers involved and their respective functions. (6)
 - (c) Explain Publisher Subscribe communication model with relevant diagram. Give example of IoT System in reference to this. (6)
3.
 - (a) Define IoT levels and deployment templates. Compare the levels of IoT with suitable examples. (6)
 - (b) Discuss various challenges faced in IoT and suggest ways of overcoming these challenges. (6)
 - (c) Explain Software defined Networks (SDN) and Network function virtualization (NFV). How do they differ in IoT context? (6)
4.
 - (a) What are actuators? Discuss any three types of classification of actuators with suitable examples. (6)
 - (b) Explain how sensors are classified. Discuss any three methods of classification with appropriate examples. (6)
 - (c) Describe the characteristics and working of DHT11 sensors. What parameters does it measures and how is it useful in IoT. (6)

P.T.O.

5. (a) Explain the structure of an Arduino sketch. Describe the roles of setup() and loop() functions with a suitable example. OR Explain how to set up GPIO pins in Raspberry Pi using Python. Illustrate with an example to blink an LED. (6)
- (b) What are Arduino shields? Name any two shields and explain their functions. (6)

Or

What are Raspberry Pi HATs? Describe any two with applications.

- (c) Write a program measure the distance using ultrasonic sensor along with circuit diagram. (6)
6. (a) What is cloud computing? Different between various cloud service models with examples. (6)
- (b) Discuss the importance of IoT security. Explain the difference between symmetric and non-symmetric encryption with suitable examples. (6)
- (c) Describe basics of IoT system management using SNMP and NETCONF-YANG. What are the limitations of SNMP? (6)
7. (a) A smart home system is developed to monitor indoor air quality, focusing specifically on the levels of Carbon Dioxide (CO₂) and Particulate Matter (PM2.5). The system includes sensors and actuators and operates in two modes:
 Automatic Mode: The system automatically activates ventilation or an air purifier when pollution levels exceed safety thresholds.
 Manual Mode: The user can manually control the air purification system via a mobile application.
 Purpose: To ensure a healthy indoor environment by continuously monitoring CO₂ and PM2.5 levels and automatically or manually managing the air purification system.
 Requirements :
 Functional Requirements:
 • Real-time sensing of CO₂ and PM2.5 levels
 • Automatic control of exhaust fan or air purifier based on threshold values
 • Manual override capability via mobile application.
 Non-Functional Requirements:
 • Accurate sensor readings and reliable data logging
 • Wireless communication between sensors and microcontroller
 • User-friendly application interface for control and data display.
 Give the process model specification for auto mode and manual mode for the indoor air quality monitoring system. (6)
- (b) Explain **any two** of the following IoT application in details : (6+6)
- (i) Smart Agriculture (ii) Smart Healthcare (iii) IoT in Retail