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Subject Code:- AOE0868

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VIII - THEORY EXAMINATION (20 - 20.....)

Subject: Internet of Things

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- 1-a. The Conceptual Framework of IoT primarily deals with:(CO1, K2) 1
- (a) Technical specifications of IoT devices
 - (b) Market analysis of IoT products
 - (c) Theoretical foundations and applications of IoT
 - (d) Legal regulations regarding IoT implementation
- 1-b. In IoT architecture, what does the Perception Layer consist of? (CO1, K1) 1
- (a) Sensors and actuators
 - (b) Cloud servers
 - (c) Mobile devices
 - (d) User interfaces
- 1-c. Arduino is a popular IoT hardware platform known for its:(CO2, K1) 1
- (a) Compatibility with complex algorithms
 - (b) Low cost and ease of use
 - (c) Advanced security features
 - (d) High processing speed
- 1-d. Node MCU is based on which microcontroller architecture? (CO2, K1) 1
- (a) PIC
 - (b) AVR
 - (c) ARM

- (d) ESP8266
- 1-e. Arduino code is written in a language similar to:(CO3, K1) 1
- (a) Java
 - (b) C++
 - (c) Assembly Language
 - (d) Python
- 1-f. An actuator is a device that: (CO3, K1) 1
- (a) Senses changes in the environment
 - (b) Converts electrical signals into physical actions (movement, light, etc.)
 - (c) Stores and processes data
 - (d) Powers other components in the circuit
- 1-g. BLE stands for: (CO4, K1) 1
- (a) Basic Level Emulator
 - (b) Bluetooth Low Energy
 - (c) Binary Link Encryption
 - (d) Base Line Editor
- 1-h. ZigBee operates on: (CO4, K1) 1
- (a) Wi-Fi
 - (b) Bluetooth
 - (c) IEEE 802.15.4
 - (d) GSM
- 1-i. Smart meters allow for: (CO5, K1) 1
- (a) Real-time energy monitoring
 - (b) Monthly billing only
 - (c) Lower energy consumption
 - (d) All of the above
- 1-j. What technology is often used for communication in smart metering systems? (CO5, K1) 1
- (a) Cellular networks
 - (b) Bluetooth
 - (c) Wi-Fi
 - (d) All of the above

2. Attempt all parts:-

- 2.a. Discuss the significance of integrated development environments (IDEs) in IoT application development. (CO1, K2) 2
- 2.b. What are the main components of an RFID system? (CO2, K1) 2
- 2.c. Describe the role of sensors in IoT devices. (CO3, K2) 2
- 2.d. Mention two properties of Zigbee. (CO4, K1) 2

2.e. What is the purpose of using smart grids in a smart city? (CO5, K1) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Discuss the role of data enrichment and consolidation in IoT systems. What are the advantages of data enrichment? (CO1, K2) 6

3-b. Name the layers of the IoT architectural framework. Describe the significance of each layer. (CO1, K1) 6

3-c. Evaluate the advantages and disadvantages of RFID technology in IoT applications in terms of the factors such as range, data transmission speed, and security. (CO2, K4) 6

3-d. Compare the features and functionalities of Arduino and Node MCU as hardware computational platforms for IoT applications. Also mention their similarities. (CO2, K1) 6

3.e. Describe the importance of Arduino platform in IoT. Describe one example of Arduino based mini-project with proper flow diagram. (CO3, K3) 6

3.f. Explain the concept of publish-subscribe model in MQTT. (CO4, K2) 6

3.g. Design a smart streetlight system using IoT technology. Describe its advantages in terms of energy savings compared to a manual street light system. (CO5, K5) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Describe the five main components of an IoT system and explain their roles in data collection, processing, and communication. Design with clean schematic diagram of IoT based home automation system. (CO1, K2) 10

4-b. Provide two real-world examples of IoT applications in healthcare. Discuss their benefits, challenges, and implications for patient care and medical research in details. (CO1, K2) 10

5. Answer any one of the following:-

5-a. Describe five key factors to consider when selecting a sensor for a specific IoT application. Provide five examples of sensor applications in different domains. (CO2, K2) 10

5-b. What action might an actuator take in response to a control signal in a smart home? Briefly describe a piezoelectric transducer and its function. Which platform, Arduino or NodeMCU, offers built-in Wi-Fi connectivity? Mention two benefits of edge computing. (CO2, K4) 10

6. Answer any one of the following:-

6-a. Develop an Arduino sketch that turns on an LED connected to pin 8 when a pushbutton connected to pin 2 is pressed and turns it off when the button is released. (CO3, K5) 10

6-b. Design a water level monitoring system using Arduino and ultrasonic sensors. Develop the logic to program the Arduino to measure water levels in tanks or 10

reservoirs and activate pumps or valves accordingly. (CO3, K6)

7. Answer any one of the following:-

- 7-a. Discuss the challenges associated with using HTTP for IoT device management. How does HTTP handle device configuration and firmware updates in IoT deployments? (CO4, K2) 10
- 7-b. Discuss the importance of data dissemination protocols in IoT. Explain the concept of multicasting in data dissemination. What role do caching mechanisms play in data dissemination? (CO4, K2) 10

8. Answer any one of the following:-

- 8-a. Explain how data analytics can be utilized to enhance urban mobility and transportation systems in smart cities. Analyse the role of Artificial Intelligence (AI) in improving driver assistance systems and predictive maintenance in smart cars. (CO5, K2) 10
- 8-b. Describe the concept of adaptive lighting control. Mention its use in smart streetlight design and its benefits for energy conservation and public safety. Discuss the integration of sensors such as motion detectors and ambient light sensors in smart streetlighting systems to optimize energy usage. (CO5, K1) 10

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