Printed Page:- 04 **Subject Code**:- **AOE0868**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VIII - THEORY EXAMINATION (2023 - 2024)

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. Which of the following is NOT a characteristic of IoT? [CO1] 1

(a) Scalability

(b) Limited connectivity

(c) Interoperability

(d) Heterogeneity

1-b. Integrated Development Environments (IDEs) are primarily used for: [CO1] 1

(a) Managing IoT devices remotely

(b) Developing software applications

(c) Analyzing big data generated by IoT devices

(d) Configuring communication protocols for IoT networks

1-c. What is the primary function of sensors in IoT devices? [CO2] 1

(a) Data transmission

(b) Data collection

(c) Data storage

(d) Data processing

1-d. Actuators in IoT devices are responsible for: [CO2] 1

(a) Sensing environmental changes

(b) Transmitting data wirelessly

(c) Processing data collected from sensors

(d) Initiating physical actions based on received instructions

1-e. What is the primary function of RFID technology in IoT applications? [CO2] 1

(a) To play video games

(b) To track and identify objects wirelessly

(c) To control traffic lights

(d) To make coffee

1-f. Which of the following is NOT a component of the Arduino Uno board? [CO3] 1

(a) Microcontroller

(b) Power jack

(c) Wi-Fi module (ESP8266)

(d) Analog input pins

1-g. Which communication technology is commonly used for short-range wireless communication in IoT devices? [CO3] 1

(a) LTE

(b) GSM

(c) Bluetooth

(d) Wi-Fi

1-h. Which messaging protocol is commonly used for lightweight communication in IoT applications? [CO4] 1

(a) MQTT

(b) TCP

(c) HTTP

(d) FTP

1-i. Smart grids in a smart city help in: 1

(a) Reducing energy waste

(b) Increasing overall energy consumption

(c) Only providing power to specific areas

(d) None of the above

1-j. What is a critical aspect to consider in designing smart streetlights in a smart city? [CO5] 1

(a) Making them brighter than necessary

(b) Incorporating energy-saving features

(c) Painting them in random colors

(d) Keeping them disconnected from the internet

2. Attempt all parts:-

2.a. Define IoT and briefly explain its significance in modern technology. 2

2.b. What is the primary function of a sensor in an IoT device? [CO2] 2

2.c. Explain the function of the microcontroller in an Arduino board. [CO3] 2

2.d. Mention two properties of Zigbee 2

2.e. Briefly describe two ways smart meters can help to save energy. [CO5] 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Briefly describe the vision behind the Internet of Things (IoT) with suitable example. [CO1] 6

3-b. Discuss the role of data enrichment and consolidation in IoT systems. What are the advantages of data enrichment? [CO1] 6

3-c. Name and discuss about three different types of sensors commonly used in IoT applications. Mention their use and operating principles. [CO2] 6

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

3.e. Explain the main components of an Arduino board anatomy and their respective functions. [CO3] 6

3.f. Define BLE and explain its primary use in IoT applications. [CO4] 6

3.g. What are the risk factors in IoT based automatic home security systems? What is the role of thermal sensor in home security systems? [CO5] 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Examine the key characteristics of IoT. Discuss the potential impact of IoT on various aspects of our lives. What is data consolidation? [CO1] 10

4-b. Explain the layered architecture of IoT. Mentions its applications. Discuss the potential challenges associated with the widespread adoption of IoT. [CO1] 10

5. Answer any <u>one</u> of the following:-

5-a. Explain the difference between active and passive sensors. Provide an example of each. Briefly discuss the advantages and disadvantages of using ultrasonic sensors for object detection in an IoT application. [CO2] 10

5-b. Distinguish between a sensor and a transducer. Explain how a transducer can be used in conjunction with a sensor in an IoT system. Explain the role of a piezoelectric transducer in an everyday object and how it converts energy forms. [CO2] 10

6. Answer any <u>one</u> 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] 10

6-b. Create an Arduino sketch that reads the temperature from a TMP36 temperature sensor connected to analog pin A1, converts the analog reading to Celsius using the formula ((analogRead() * 500.0) / 1024.0 - 50.0), and prints the temperature value to the serial monitor. [CO3] 10

7. Answer any <u>one</u> of the following:-

7-a. What factors should be considered when choosing a messaging protocol for IoT applications? Draw and explain any IoT network model. [CO4] 10

7-b. Explain the role of messaging protocols such as MQTT, CoAP, and HTTP in IoT applications. [CO4] 10

8. Answer any <u>one</u> of the following:-

8-a. What are the automotive applications of IoT? Mention some risks in automotive systems. [CO5] 10

8-b. Discuss the pros and cons of introducing a fully automated home environment. Describe a smart home scenario with proper schematic diagram. [CO5] 10