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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III THEORY EXAMINATION (2022-2023)

Subject: Introduction to IOT

Time: 3Hours

Max. Marks:100

General Instructions:

IMP: Verify that you have received question paper with 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. | Computing and communication technology that describes the idea of connecting everyday physical objects to the Internet is called - (CO1) (a). IOT (b). SPI (c). MQTT (d). COAP | 1 |
| 1-b. | Large number of devices connected to Internet of Things and communicating automatically without human intervention represents - (CO1) (a). Skynet (b). Bot to Bot (B2B) (c). Machine to Machine (M2M) (d). InterCloud | 1 |
| 1-c. | What refers to acquiring the data from IOT/M2M devices. (CO2) (a). Data acquisition (b). Data repository (c). Data collection | 1 |

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| | (d). Data transparency | |
| 1-d. | <p>The components of RFID system are (CO2)</p> <p>(a). Transceiver, data processing subsystem, middleware, applications and services</p> <p>(b). Reader, data processing subsystem, middleware, applications and services</p> <p>(c). Transceiver, reader, data processing subsystem</p> <p>(d). Transceiver, reader, data processing subsystem, middleware, applications and services</p> | 1 |
| 1-e. | <p>Arduino Uno has _____ analog pins (CO3)</p> <p>(a). 4</p> <p>(b). 13</p> <p>(c). 5</p> <p>(d). 6</p> | 1 |
| 1-f. | <p>How is power supply given to Raspberry Pi? (CO3)</p> <p>(a). USB Connection</p> <p>(b). Internal Battery</p> <p>(c). Power Adapter</p> <p>(d). HDMI</p> | 1 |
| 1-g. | <p>The job of an MQTT broker is (CO4)</p> <p>(a). To filter messages based on topics</p> <p>(b). To produce topics</p> <p>(c). To distribute topics to publishers</p> <p>(d). To deny access to subscribers</p> | 1 |
| 1-h. | <p>BLE stands for (CO4)</p> <p>(a). Bluetooth Low Energy</p> <p>(b). Bluetooth Long Energy</p> <p>(c). Bluetooth Less Energy</p> <p>(d). Bluetooth Level Energy</p> | 1 |
| 1-i. | <p>Which sensor can detect presence or absence of vehicle in smart parking system? (CO5)</p> <p>(a). Particle sensor</p> <p>(b). Ultrasonic sensor</p> <p>(c). Light sensor</p> <p>(d). DHT sensor</p> | 1 |
| 1-j. | For Smart metering project which of the following is not relevant (CO5) | 1 |

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| | (a). DHT 11 (b). Relay Board (c). Jumper wires (d). LCD Display | |
| 2. Attempt all parts:- | | |
| 2.a. | Why is IDE an important tool for embedded device development? (CO1) | 2 |
| 2.b. | What are the capabilities of a smart sensor? (CO2) | 2 |
| 2.c. | How many GPIO pins are there in Raspberry Pi 3 B. (CO3) | 2 |
| 2.d. | List the PHY and MAC layer IoT protocols based on IEEE 802.15.4. (CO4) | 2 |
| 2.e. | Write two use cases of smart cities? (CO5) | 2 |
| SECTION – B | | |
| 3. Answer any <u>five</u> of the following- | | 30 |
| 3-a. | What is the difference between M2M and IoT? Explain the M2M system architecture and communication technology. (CO1) | 6 |
| 3-b. | Discuss the role of technologies behind IoT. (CO1) | 6 |
| 3-c. | With the help of a neat diagram, explain how actuators and sensors interact with the physical world. Classify actuators based on energy type. (CO2) | 6 |
| 3-d. | Explain the ARDUINO Board in detail. Mention its applications. (CO2) | 6 |
| 3-e. | Discuss the limitations of Arduino Uno and describe NODEMCU in brief.(CO3) | 6 |
| 3-f. | Explain in detail LoRa WAN technology, illustrating the layers, MAC format and Architecture. (CO4) | 6 |
| 3-g. | Use the following examples to explain how the IoT technology is impacting the healthcare sector and changing our everyday lifestyle: (CO5) i) Health and fitness monitoring ii) Wearable smart devices | 6 |
| SECTION – C | | 50 |
| 4. Answer any <u>one</u> of the following- | | |
| 4-a. | Describe the characteristics and components of IoT. Also discuss the common applications of IoT. (CO1) | 10 |
| 4-b. | Compare in detail the OneM2M IoT Architecture and IoT World Forum standardized reference model (CO1) | 10 |
| 5. Answer any <u>one</u> of the following- | | |
| 5-a. | Explain Near Field Communication (NFC) and RFID. What are the technological and security issues in RFID IoT system design? (CO2) | 10 |

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| 5-b. | Describe the ARM cortex-A class processor. Also explain about the <i>mbed</i> platform in detail. (CO2) | 10 |
| 6. Answer any <u>one</u> of the following- | | |
| 6-a. | Explain Raspberry Pi Model B and requirements to develop on the Raspberry Pi? Illustrate how to interface a LED to Raspberry Pi and write a program to blink (CO3) | 10 |
| 6-b. | Design a breadboard circuit and write an Arduino program to complete the tasks: i) Measure and continuously display the ambient temperature using DHT sensor (temperature and humidity sensor) in °C on the serial monitor. ii) Write code to display the difference between the previous temperature and the current temperature. (CO3) | 10 |
| 7. Answer any <u>one</u> of the following- | | |
| 7-a. | Discuss the following application layer protocols of IoT protocol stack: (CO4) i) CoAP ii) MQTT | 10 |
| 7-b. | How wireless sensor networks have become one of the enabling technologies of IoT? List out the limitations of smart objects in WSNs and explain data aggregation in WSN with a neat diagram. (CO4) | 10 |
| 8. Answer any <u>one</u> of the following- | | |
| 8-a. | What are the essential elements of a smart home automation system design? Explain Service Specification model and derive services for home automation IoT system. (CO5) | 10 |
| 8-b. | Explain the implementation of IoT technology in the following areas: (CO5) i) Smart Metering ii) Smart Streetlights in Smart Cities | 10 |