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Printed Page:-3 **Subject Code:- BCSIOT0303N**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: III - THEORY EXAMINATION (2025- 2026)
Subject: Introduction to IoT Systems

Time: 2 Hours **Max. Marks: 50**

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 15

1. Attempt all parts:-

1-a. IoT conceptual framework includes: (CO1, K1) 1

(a) Only hardware components
(b) Hardware + connectivity + cloud + applications
(c) Only software components
(d) Only network protocols

1-b. A transducer converts (CO2, K1) 1

(a) Electrical energy to mechanical energy
(b) One form of energy to another
(c) Digital data to analog data
(d) Mechanical energy to heat

1-c. The clock speed of Arduino Uno is (CO3, K1) 1

(a) 8 MHz
(b) 12 MHz
(c) 16 MHz
(d) 32 MHz

1-d. MQTT follows (CO4,K1) 1

(a) Push-only model
(b) Peer-to-peer
(c) Circuit switching
(d) Publish–subscribe model

1-e. Node discovery is essential for (CO4,K1) 1

(a) Routing and connectivity
(b) Game scores
(c) Fashion styling
(d) Parking tickets

2. Attempt all parts:-

2.a.	State the function of the Network Layer in IoT architecture. (CO1,K1)	2
2.b.	Mention one example of an actuator. (CO2, K1)	2
2.c.	Name the block in Arduino code that runs only once. (CO3,K1)	2
2.d.	Give the use of the 5V pin on Arduino. (CO3, K1)	2
2.e.	Give two examples of a smart city service. (CO4, K1)	2

SECTION-B 15

3. Answer any three of the following:-

3-a.	Discuss the differences between IoT and M2M systems in terms of communication technologies, architecture, scalability, purpose, interoperability, and application domains. (CO1, K3)	5
3-b.	A retail store needs automatic billing using tags on each item. Explain how RFID tags and an RFID reader can be integrated to create a checkout-free smart counter. (CO3, K3)	5
3-c.	A smart farm requires continuous soil-moisture tracking and auto-irrigation. Describe a system using sensors, Arduino/NodeMCU, and cloud data sync. (CO3, K3)	5
3.d.	Write a program using Arduino uno to generate a random number in between 0 to 25. Use 4 LEDs (Red, Green, Blue, Yellow) and design LED patterns as (i) if random number is less than 5 then only Red LED should glow. (ii) if random number is in between 5-10 then only Blue LED should glow. (iii)if random number is in between 11-20 then only Yellow LED should glow. (iv) if random number is greater than 20 then only Green LED should glow. (CO3, K3)	5
3.e.	Explain layered IoT protocols by relating them to a smart home system that manages lights, fans, and security. (CO4, K3)	5

SECTION-C 20

4. Answer any five of the following:-

4-a.	Explain significance of cyber-physical interaction in IoT. (CO1, K2)	4
4-b.	Describe how application layer supports end-user services. (CO1, K2)	4
4-c.	Describe the main Components of Raspberry Pi board. (CO2, K2)	4
4-d.	Describe how analog sensors differ from digital sensors in signal form. (CO2, K2)	4
4-e.	Explain the main steps to add a library in Arduino IDE . (CO3, K3)	4
4-f.	Give a short note on the following. (CO3, K2) (a) Type of Messages in COAP (b) QoS Levels of MQTT Protocol	4
4-g.	Give a brief note on ZigBee use in low-power network setups.(CO4, K2)	4
4-h.	Describe the steps in creating an IoT mini project idea which can be applicable to smart cities. Include the design challenges and conceptual framework equation in	4

your solution. (CO4, K4)