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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2025 - 2026)

Subject: IoT in Life Sciences

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:-

- | | | |
|-------|---|---|
| (1.1) | The most essential characteristic of an IoT device is (CO1) (K1) | 1 |
| | <ul style="list-style-type: none"> (a) Large physical size (b) Ability to connect and communicate over internet (c) Manual data entry requirement (d) Dependency on human interaction | |
| (1.2) | IoT applications cover (CO1) (K1) | 1 |
| | <ul style="list-style-type: none"> (a) Only military and defense (b) Only academic research (c) Only healthcare and agriculture (d) Healthcare, smart cities, manufacturing and environment | |
| (1.3) | Pulse oximeter measures (CO2) (K1) | 1 |
| | <ul style="list-style-type: none"> (a) Body mass index (b) Blood pressure (c) Oxygen saturation (d) Blood viscosity | |
| (1.4) | Biological data acquisition refers to (CO2) (K1) | 1 |
| | <ul style="list-style-type: none"> (a) Collecting physiological signals (b) Encrypting files (c) Mechanical calibration (d) Generating random values | |
| (1.5) | Technology used to manage huge IoT data efficiently (CO3)(K1) | 1 |

- (a) Typewriter
 - (b) Fax machine
 - (c) Cloud computing
 - (d) Local notebook
- (1.6) Ready-to-use browser applications belong to (CO3) (K1) 1
- (a) SaaS
 - (b) Edge layer
 - (c) PaaS
 - (d) IaaS
- (1.7) IoT-enabled smart irrigation systems trigger watering based on (CO4)(K2) 1
- (a) Fixed time schedules
 - (b) Crop height measurement
 - (c) Soil moisture and weather data
 - (d) Pest movement detection
- (1.8) NPK sensors in smart agriculture detect which soil nutrients (CO4) (K1) 1
- (a) Calcium, Magnesium, Sulfur
 - (b) Iron, Zinc, Copper
 - (c) Carbon, Oxygen, Hydrogen
 - (d) Nitrogen, Phosphorus, Potassium
- (1.9) Data privacy in IoT healthcare means (CO5) (K1) 1
- (a) Sharing patient data freely
 - (b) Selling data to third parties
 - (c) Keeping patient data confidential and secure
 - (d) Making health data publicly available
- (1.10) ISO standards for IoT medical devices are developed by (CO5) (K1) 1
- (a) Indian Organization for Standardization
 - (b) International Organization for Standardization
 - (c) International Organization for Structure
 - (d) Indian Organization for Structure

2. Attempt all parts:-

- (2.1) Describe the perception layer in brief. (CO1) (K1) 2
- (2.2) Mention two examples of biosensors. (CO2)(K2) 2
- (2.3) Define data velocity in IoT. (CO3) (K1) 2
- (2.4) List two environmental sensors. (CO4) (K2) 2
- (2.5) Define encryption. (CO5) (K1) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Describe IoT with a suitable example. (CO1) (K1) 6
- (3.2) State the need for layered architecture in IoT. (CO1) (K1) 6

Answer any one of the following:-

(3.3)	Describe the design of wearable healthcare devices. (CO2) (K2)	6
(3.4)	Explain the use of ECG sensors in biological monitoring. (CO2) (K2)	6
Answer any one of the following:-		
(3.5)	Describe cloud computing in IoT. (CO3)(K1)	6
(3.6)	Discuss IoT data processing steps. (CO3) (K1)	6
Answer any one of the following:-		
(3.7)	Explain IoT frameworks in drug development process. (CO4) (K2)	6
(3.8)	Draw water quality monitoring system using IoT. (K2)	6
Answer any one of the following:-		
(3.9)	Describe the role of firewalls in IoT security.(CO5) (K1)	6
(3.10)	Discuss role of AI in future IoT healthcare. (CO5) (K2)	6
<u>SECTION-C</u>		50
4. Answer any <u>one</u> of the following:-		
(4.1)	Explain connectivity, intelligence, and automation in IoT.(CO1) (K1)	10
(4.2)	Discuss real-life applications of IoT based on its architecture and layers. (CO1)(K1)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Explain the integration of microfluidics and IoT in Lab-on-a-Chip systems. (CO2)(K2)	10
(5.2)	Compare physical, chemical, and biosensors used in life sciences.(CO2) (K2)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	Discuss challenges in IoT data management. (CO3) (K1)	10
(6.2)	Describe supervised, unsupervised, and reinforcement learning. (CO3)(K1)	10
7. Answer any <u>one</u> of the following:-		
(7.1)	Describe IoT-based pharmaceutical manufacturing system. (CO4) (K2)	10
(7.2)	Discuss Air pollution monitoring usecase using IoT.(CO4) (K2)	10
8. Answer any <u>one</u> of the following:-		
(8.1)	Describe blockchain-based secure IoT healthcare model. (CO5) (K2)	10
(8.2)	Discuss future trends such as digital twins, 5G, and smart wearables in life sciences. (CO5) (K2)	10