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Subject Code:- BCSIOT0301

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2024 - 2025)

Subject: Sensor and Its Applications

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. _____invented the barometer in 1643. (CO1, K1) 1

(a) Evangelista Torricelli

(b) Madam Curie

(c) J. J. Thomas

(d) Wright Brothers

1-b. The magnetic sensor is also known as (CO1, K1) 1

(a) Magnifier

(b) Electrometer

(c) Magnetic Field

(d) Magnetometer

1-c. Whenever a metal object enters this magnetic field, the moving flux lines induce _____ EDDY current on the object surface. (CO2, K1) 1

(a) Maximum

(b) Minimum

(c) Both (A) and (B)

(d) None

1-d. Which type of sensor requires only a single magnetic south pole to both operate and release them as they move in and out of the magnetic field (CO2, K2) 1

(a) Unipolar Hall Sensor

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(b) Bipolar Hall Sensor

(c) Both (A) and (B)

(d) None

1-e. For Loops have auto-index output tunnels, which automatically create of data at the tunnel. (CO3, K1) 1

(a) Arrays

(b) Containers

(c) Graphs

(d) Clusters

1-f. The _____ chooses the best tool based on which the mouse pointer is placed in the LabVIEW environment. (CO3, K2) 1

(a) Wiring Tool

(b) General Tool

(c) Automatic Tool Selector

(d) Operate Tool

1-g. What type of interface does a DAQ (Data acquisition) hardware creates? (CO4, K1) 1

(a) Interface between two similar signals

(b) Interface between a computer and a signal

(c) Interface between two dissimilar signals

(d) Interface between two similar hardware

1-h. In binary weighted DAC, the lowest-value resistor corresponds to (CO4, K2) 1

(a) The highest binary weighted input

(b) The lowest binary weighted input

(c) The first input

(d) The last input

1-i. What is the use of the hot-wire sensor? (CO5, K1) 1

(a) To measure temperature

(b) To measure the smoke intensity

(c) To measure the mass flow rate

(d) To measure pressure

1-j. Which among the following is a home robot? (CO5, K1) 1

(a) Vyommitra

(b) Zenbo

(c) Athlete

(d) Valkyrie

2. Attempt all parts:-

2.a. What is role of LVDT and potentiometer? (CO1, K2) 2

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2.b.	Calculate the hall voltage when the Electric Field is 5V/m and height of the semiconductor is 2cm. (CO2, K1)	2
2.c.	What is indexing? (CO3, K1)	2
2.d.	Name the ADC which is used for highest speed of conversion. (CO4, K1)	2
2.e.	Why do we use communication interface in smart sensors? (CO5, K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain the different types of LVDT with its advantages and disadvantages. (CO1, K1)	6
3-b.	Explain the working of optical encoder with neat diagram. (CO1, K2)	6
3-c.	Explain the working principle of proximity sensor as an accelerometer with suitable diagram. (CO2, K2)	6
3-d.	Explain the working principle of J type and K type thermocouple. (CO2, K2)	6
3.e.	What are the steps to draw a loop in LABView? (CO3, K1)	6
3.f.	How does the digital processing of analog signal done? (CO4, K2)	6
3.g.	What is Self - Diagnosis? What is it significance in smart sensor. (CO5, K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the different types of sensors used in Mobile Phones. (CO1, K1)	10
4-b.	Explain the input, transfer and output characteristics of transducer. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	With the help of neat sketch, explain the working of Ultrasonic flow meter with its applications. (CO2, K2)	10
5-b.	Discuss the principle of operation of capacitive accelerometer with relevant diagram. (CO2, K2)	10

6. Answer any one of the following:-

6-a.	Define: Module, Local variables, Global Variables, Property Node and Formula Node. (CO3, K2)	10
6-b.	Explain Software based Virtual Instruments with neat and suitable diagram? Write an example of While loop in graphical programming techniques? (CO3, K3)	10

7. Answer any one of the following:-

7-a.	Discuss the operation of successive approximation and sigma-delta ADC with required block diagrams. (CO4, K2)	10
7-b.	What do you understand by the term sampler and quantizer? Why do we use them? Also explain the sample and hold circuit with waveforms. (CO4, K2)	10

8. Answer any one of the following:-

8-a.	Explain the following sensor for Automobile Engine Control: MAP sensor, Oxygen Sensor, Throttle Position Sensor, Crankshaft Position Sensor and Engine	10

Coolant Temperature Sensor. (CO5, K2)

8-b. Adaptive functional intelligent sensors can automatically adapt their own characteristics to this change in a certain range of conditions. Explain this function of smart sensor in detail. (CO5, K2) 10

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