Printed Page:-04 **Subject Code:- AEC0304**

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: Sensors 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. An inverse transducer is a device which converts (CO1, K1) 1

(a) An electrical quantity into a non electrical quantity
(b) Electrical quantity into mechanical quantity
(c) Electrical quantity into thermal energy
(d) Electrical quantity into light energy

1-b. Change in output of sensor with change in input is _____ (CO1, K1) 1

(a) Threshold
(b) Slew rate
(c) Sensitivity
(d) None

1-c. When no magnetic field is present across the conductor in Hall effect sensor, the output will be _____. (CO2, K1) 1

(a) 0
(b) Finite
(c) Infinite
(d) none

1-d. J, K, T, E and N type thermocouple are known as _____ (CO2, K1) 1

(a) Base metal type
(b) Rare metal type

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(c) Noble metal type

(d) All of the above

1-e. Which chart update mode should be used to show running data continuously scrolling from left to right across the chart? (CO3, K1) 1

(a) Strip Chart

(b) Scope Chart

(c) Sweep Chart

(d) Step Chart

1-f. A _____ allows a VI to run until a certain condition is met, such as pressing a Stop button on the front panel. (CO3, K1) 1

(a) While Loop

(b) Case structure

(c) For Loop

(d) If statement

1-g. Digital acquisition system are used when bandwidth is _____. (CO4, K1) 1

(a) Low

(b) High

(c) Medium

(d) Zero

1-h. At what condition error occurs in the servo tracking A/D Converter? (CO4, K1) 1

(a) Slow change input

(b) Rapid change in input

(c) No change in input

(d) All of the mentioned

1-i. Which of the following is not a configuration of a smart sensor? (CO5, K1) 1

(a) Transducer

(b) Network interface

(c) Processor

(d) None of the mentioned

1-j. The combination of electronics & sensors to produce a creative sensor is known as a ____. (CO5, K1) 1

(a) Smart sensor

(b) Optical sensor

(c) Temperature sensor

(d) Pressure sensor

2. Attempt all parts:-

2.a. How Sensor different from a transducer? (CO1, K1) 2

2.b. List out the applications of accelerometer. (CO2, K1) 2

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2.c.	What do you understand by virtual instruments? (CO3, K1)	2
2.d.	What do you mean by Bistable Multivibrator? (CO4, K1)	2
2.e.	Define the term sampling and quantization? (CO5, K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Differentiate with suitable examples (i) Primary and Secondary Transducers (ii) Analog and digital Transducers (CO1, K1)	6
3-b.	Explain the concept of piezoelectric sensor. Also write down some important applications of sensors. (CO1, K1)	6
3-c.	Briefly describe the 'Capacitive-type' Level Sensor? (CO2, K1)	6
3-d.	Discuss the applications of Proximity sensor as accelerometer and Vibration sensor. (CO2, K1)	6
3.e.	How to build and sizing an array on the block diagram ? (CO3, K1)	6
3.f.	Define the following term with respect to performance characteristics of ADC: (a) Resolution, (b) dynamic range, (c) conversion time, (d) settling time. (CO4, K1)	6
3.g.	What is Self - Diagnosis? What is it significance in smart sensor. (CO5, K1)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What do you understand by optical encoder? Explain the absolute optical encoder with the help of neat diagram with advantages and disadvantages. (CO1, K2)	10
4-b.	What is Infra-red sensor? Discuss the working principle of infra-red sensor with its applications. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	Explain Resistance Temperature Detector with diagram, construction, principle of working, merits, demerits and application. (CO2, K2)	10
5-b.	Discuss the working principle and features of Electromagnetic Flow Meters. (CO2, k2)	10

6. Answer any one of the following:-

6-a.	What is Sequence structure? Explain all the types of the sequence structure. (CO3, K2)	10
6-b.	Explain the concept of WHILE and for loop. Also discuss the need of software based instruments for industrial automation. (CO3, K2)	10

7. Answer any one of the following:-

7-a.	Describe the working & construction of dual slope integrating ADC. Also explain the advantages and applications. (CO4, K2)	10
7-b.	What is counter? Discuss the operations of synchronous and asynchronous counter with advantages and disadvantages. (CO4, K2)	10

8. Answer any one of the following:-

8-a.	Explain all the components of smart sensors in detail. (CO5, K2)	10

8-b.	Explain the following sensor for Automobile Engine Control: MAP sensor, Oxygen Sensor, Throttle Position Sensor, Crankshaft Position Sensor and Engine Coolant Temperature Sensor. (CO5, K2)	10

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