Printed Page:- 03 **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 (2023 - 2024)

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. Smallest change which a sensor can detect is known as_____. (CO1) 1

(a) Resolution
(b) Accuracy
(c) Precision
(d) Scale

1-b. The principle of operation of LVDT is based on the variation of (CO1) 1

(a) Self Inductance
(b) Mutual Inductance
(c) Reluctance
(d) Permanence

1-c. Thermocouple generate output voltage according to _____. (CO2) 1

(a) Circuit parameters
(b) Humidity
(c) Temperature
(d) Voltage

1-d. Which one is non contact type temperature measuring device? (CO2) 1

(a) Thermometers
(b) Pyrometer
(c) Thermocouple

(d) Thermistor

1-e. What does VI stands for? (CO3) 1

(a) Visible Items

(b) Visible Information

(c) Virtual Information

(d) Virtual Instrumentation

1-f. A cluster is _____ (CO3) 1

(a) A multi-variable containing different variables having various data types

(b) A multi-variable containing different variables having equal data types

(c) Just a displaying effect(to make a number of controls or indicators) appear as one unit

(d) All of the above

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

(a) Low

(b) High

(c) Medium

(d) Zero

1-h. A counter circuit is usually constructed of _____ (CO4) 1

(a) A number of latches connected in cascaded form

(b) A number of NAND gates connected in cascaded form

(c) A number of flip-flops connected in cascaded

(d) A number of NOR gates connected in cascaded form

1-i. Signal Conditioning is carried out in _____. (CO5) 1

(a) Transducer housing

(b) Processor

(c) Network Interface

(d) None of the above

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

(a) Transducer

(b) Network interface

(c) Processor

(d) None of the mentioned

2. Attempt all parts:-

2.a. What is Sensor? CO1 2

2.b. Enlist the types of all thermocouples. CO2 2

2.c. What do you understand by virtual instruments? (CO3) 2

2.d. What do you understand by the term data selector? 2

2.e.	Enlist the characteristic of smart sensors. (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain with example - Accuracy, Precision, Error, Sensitivity resolution, linearity.(CO1)	6
3-b.	Differentiate between (i) Primary and Secondary Transducers, and (ii) Analog and digital Transducers, explain with suitable examples. (CO1)	6
3-c.	Enlist the proximity sensor. Define only one. (CO2)	6
3-d.	Explain in detail the peltier and Thomson effect. (CO2)	6
3.e.	Explain the operation of software based Virtual Instruments. (CO3)	6
3.f.	What is data logger? How can we used the data loggers as stand alone device? (CO4)	6
3.g.	What is Self - Communication? Why it is required? (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the input, transfer and output characteristics of transducer. (CO1)	10
4-b.	Explain the construction and working principle of LVDT along with its applications. (CO1)	10

5. Answer any one of the following:-

5-a.	Explain RTD with diagram, construction, principle, working, merits, demerits and application. (CO2)	10
5-b.	Discuss the basic principle of the Thermistor with its types and characteristics. Write its advantages, disadvantages and applications. (CO2)	10

6. Answer any one of the following:-

6-a.	What is Sequence structure? Explain all the types of the sequence structure. (CO3)	10
6-b.	Why Virtual Instrument is necessary and how the virtual instruments is better than traditional instruments? (CO3)	10

7. Answer any one of the following:-

7-a.	Discuss the working & construction of Successive Approximation type ADC with its advantages, disadvantages and applications. (CO4)	10
7-b.	Expalin the working & construction of flash type ADC. Also explain the advantages and applications.(CO4)	10

8. Answer any one of the following:-

8-a.	Explain the function of Smart Sensors with the help of block diagram. Where can they be used? (CO5)	10
8-b.	How can you define the Self -Testing characteristics of smart sensor? Explain in brief. (CO5)	10