Printed Page:- 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 (2021 - 2022) (ONLINE)

Subject: Sensor and its Applications

Time: 02:00 Hours Max. Marks: 100

General Instructions:

1. *All questions are compulsory. It comprises of two Sections A and B.*

- *Section A - Question No- 1 has 35 objective type questions carrying 2 marks each.*
- *Section B - Question No- 2 has 12 subjective type questions carrying 3 marks each. You have to attempt any 10 out of 12 question.*
- *No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.*

SECTION A 35 x 2 = 70

1. Attempt ALL parts:-

1.1.a Which of the following is a digital transducer? (CO1) 1

(a) Strain gauge
(b) Encoder
(c) Thermistor
(d) LVDT

1.1.b An inverse transducer is a device which converts 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

1.1.c The transducers that converts the input signal into the output signal, which is a discrete function of time is known as _____ transducer. 1

(a) Active
(b) Analog
(c) Digital
(d) Pulse

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

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

1.1.e Change in output of sensor with change in input is _____ 1

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

1.1.f The principle of operation of LVDT is based on the variation of 1

(a) Self Inductance
(b) Mutual Inductance

(c) Reluctance
(d) Permanence

1.1.g Strain Gauge, LVDT and Thermocouple are examples of 1
(a) Active Transducers
(b) Passive Transducers
(c) Analog Transducers
(d) Primary Transducers

1.2.a Thermocouple generate output voltage according to _____. (CO2) 1
(a) Circuit parameters
(b) Humidity
(c) Temperature
(d) Voltage

1.2.b The following is (are) type(s) of Hall Effect sensors. 1
(a) Linear Hall Effect sensor
(b) Threshold Hall Effect sensor
(c) Both (A) and (B)
(d) None of the above

1.2.c Which of the following is not an analog sensor? 1
(a) Potentiometer
(b) Force-sensing resistors
(c) Accelerometers
(d) None of the mentioned

1.2.d _____ has a negative temperature coefficient? (CO2) 1
(a) Thermistor
(b) Platinum
(c) RTD
(d) Thermocouple

1.2.e When no magnetic field is present across the conductor in Hall effect sensor, the output will be _____. 1
(a) 0
(b) Finite
(c) Infinite
(d) none

1.2.f In thermal imaging, the infrared radiations(heat) emitted by an object called as _____ 1
(a) Heat Signature
(b) Source Signature
(c) Heat Source
(d) Heat Sink

1.2.g Which of the following devices are used for level to force conversion? 1
(a) Load Cell
(b) membrane
(c) Voltmeter
(d) Bellows

1.3.a What does VI stands for? 1
(a) Visible Items
(b) Visible Information

(c) Virtual Information

(d) Virtual Instrumentation

1.3.b What is cluster? 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

1.3.c Suppose you will have a real time plot (being continuously updated) on the front panel. Which kind of plotting indicator would you use? 1

(a) X-Y graph

(b) Chart

(c) T-Y graph

(d) None

1.3.d Which operations cannot be used in Formula Node? 1

(a) Linear Algebraic Operations

(b) If statements

(c) Switch -Structure

(d) None

1.3.e You set a Breakpoint in the code contained within the False case of a Case structure. Will the VI execution pause if the code in True case of the Case structure is being executed? 1

(a) YES

(b) NO

1.3.f Which of the following expressions are correct if used in Formula Node. (CO3) 1

(a) y=a+b

(b) y=a+b;

(c) y=a_1+b

(d) y=a^1+b

1.3.g Which chart update mode should be used to show running data continuously scrolling from left to right across the chart? 1

(a) Strip Chart

(b) Scope Chart

(c) Sweep Chart

(d) Step Chart

1.4.a What is a data acquisition system? (CO4) 1

(a) system used for data processing, conversion and transmission

.

(b) accepts data as an input.

(c) removes noise

(d) boosts the signal

1.4.b For Lower Accuracies, _____. 1

(a) Digital acquisition system is used

(b) both digital and analog acquisition systems are used

(c) Analog acquisition system is used

(d) Mechanical data acquisition system

1.4.c Digital acquisition system are used when bandwidth is _____. (CO4) 1

(a) Low

(b) High

(c) Medium

(d) Zero

1.4.d A counter circuit is usually constructed of _____ 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

1.4.e A decimal counter has _____states. 1

(a) 5

(b) 10

(c) 15

(d) 20

1.4.f The main operations that are basically performed in a SAR ADC are? 1

(a) logic to control the operation

(b) some way of generating the voltages, for comparison

(c) logic to control the operation and finding some way of generating the voltages for comparison

(d) none of above

1.4.g Which of the following are used in DAC? 1

(a) Ladder network

(b) Successive approximation technique

(c) Both

(d) None of the above

1.5.a Input signal to smart sensor is fed from_____. (CO1) 1

(a) Power supply

(b) Transducer

(c) Voltmeter

(d) All of the above

1.5.b Signal Conditioning is carried out in _____. (CO1) 1

(a) Transducer housing

(b) Processor

(c) Network Interface

(d) None of the above

1.5.c Which type of sensor is used to measure the distance between the vehicle and other objects in its environment: 1

(a) Ultrasonic sensor

(b) Tactile sensor

(c) Motion sensor

(d) None of these

1.5.d Which sequential circuits are applicable for counting pulses? 1

(a) Counters

(b) flip-flops

(c) latches

(d) Registers

1.5.e The smart sensors are classified on the basis of 1

(a) Functions

(b) Performance
(c) Output
(d) All of the above

1.5.f Analog to digital conversion takes necessary steps of 1
(a) Sampling
(b) Quantization
(c) Coding
(d) All of the above

1.5.g Amplification is a type of signal conditioning. 1
(a) True
(b) FALSE

SECTION B 10 X 3 = 30

2. Answer any TEN of the following:-

2.1.a	What do you understand by the term precision? (CO1)	2
2.1.b	How Sensor different from a transducer?	2
2.2.a	Discuss the type of thermocouple, which is most commonly used in industrial applications. (CO2)	2
2.2.b	Define Seeback Effect. How it is related with thermopiles?	2
2.2.c	Why is platinum considered most suitable material for RTDs for most laboratory work and for industrial material measurements of high accuracy?	2
2.3.a	What is Virtual Instrumentation?	2
2.3.b	what is front panel?	2
2.3.c	Define flexibility in terms of virtual instrumentation techniques.	2
2.4.a	What is data logger?	2
2.4.b	Explain with example what is a sample and Hold circuit?	2
2.5.a	What is Calibration?	2
2.5.b	What is the function of S/H circuit?	2