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Paper Code : OE-EEE-801D/OE-EE 801D Sensors and Transducers

UPID : 008286

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following :

[1 x 10 = 10]

- (I) The core of LVDT is made of -
(a) brass (b) carbon (c) soft iron (d) platinum,
- (II) Capacitive transducers are normally employed for _____ measurements
(a) Static (b) Dynamic (c) Transient (d) Both static and dynamic
- (III) The dynamic characteristics of capacitive transducers are similar to those of -
(a) Low pass filter (b) high pass filter (C) notch filter (d) band stop filter.
- (IV) Which one of the following thermocouples has the highest temperature measuring range? - (a) Copper-Constantan (b) Iron-Constantan (c) Alumel-Chromel (d) Platinum Rhodium-Platinum
- (V) _____ directly converts temperature into voltage.
(a) Thermocouple (b) Potentiometer (c) Geartrain (d) LVDT
- (VI) Define the term Active Transducer
- (VII) In measurement systems which of the following static characteristics are desirable? - a) accuracy b) sensitivity c) reproducibility d) all of these.
- (VIII) The transducers which requires an external power and their output is a measure of some variation such as resistance, inductance, capacitance etc., are called as
a) Active transducer b) Primary sensor c) Passive transducer d) Self generating transducer
- (IX) Change in resistance is measured using a _____
a) Anderson's bridge b) Wheatstone's bridge c) Hay's bridge d) Maxwell's bridge
- (X) Which bridge is utilized in signal conditioning circuits for balancing purpose? (a) Maxwell Bridge (b) Wheatstone bridge (c) Wien Bridge (d) Kelvin Bridge.
- (XI) How many types of strain gauges are there?
- (XII) What is an electrical transducer?

Group-B (Short Answer Type Question)

Answer *any three* of the following :

[5 x 3 = 15]

2. Describe non-contact type very high temperature measurement process? [5]
3. What is primary & secondary transducer? Describe with proper example? [5]
4. Describe how displacement can be measured using transducer? Describe any one process? [5]
5. Describe Variable distance-parallel plate type capacitor transducer with proper example? [5]
6. What are film sensors? [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following :

[15 x 3 = 45]

7. (a) What do you mean by piezoelectric transducer? Derive the expression of output voltage of piezoelectric transducer. [15]
(b) Briefly explain the loading effect and frequency response of piezoelectric transducer.
8. Write short notes on any three. [15]
(a) semiconductor strain gauge
(b) RTD
(c) piezoelectric transducer
(d) Thermistor
9. Describe construction and working principle of RTD? What are the advantages and disadvantages of RTD? [15]
What is a thermistor? What are the resistance-temperature characteristics of NTC type RTD?

10. (a) What is capacitive transducer ? [15]
(b) Explain how by using a differential arrangement, a capacitive transducer which works on the principle of variation of capacitance with displacement between two plates, the response can be made linear
(C) What are the advantage and disadvantage of Capacitive transducer?.
11. (a)The output of an LVDT is connected to a 5 V voltmeter through an amplifier whose amplification factor is 250. An output of 2 mV appears across the terminals of LVDT when the core moves through a distance of 0.5 mm. Calculate the sensitivity of the LVDT and that of the whole set-up. The milli-voltmeter scale has 100 divisions. The scale can be read to $\frac{1}{5}$ of division . Calculate the resolution of the instrument in mm. [15]
(b) Describe one industrial use of LVDT for pressure measurement?

*** END OF PAPER ***