Reg. No. : | | | | | | | | | | |

Question Paper Code: 31633

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Instrumentation and Control Engineering

01UIC303 – SENSORS AND TRANSDUCERS

(Common to Electronics and Instrumentation Engineering)

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Why calibration needed for any measuring instrument?
2. Distinguish between active and passive transducer.
3. Define the term linearity.
4. What is meant by mathematical modeling?
5. The output of an LVDT is 5*V* for a displacement of 12.5*mm*. Determine the output voltage for a core displacement of 8*mm*.
6. Compare constant temperature type and constant current type anemometers.
7. State the principle of photoelectric Tachometer?
8. What is a SQUID sensor? List the types of SQUID?
9. Give some application of MEMS sensor.
10. List the application of seismic sensor.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Using Bourdon tube pressure as an example of measurement system, explain the function of each of a measurement system. (8)

(ii) Define standard. Classify the standards based on function and application. (8)

Or

(b) The table given below lists of sample of experimental data

Value	4	7	5	3	11	8	10	6	2
Frequency of occurance	2	6	4	2	3	9	7	8	10

Calculate the arithmetic mean, mean deviation, standard deviation, the probable error of one reading, the standard deviation of mean, the probable error of mean and the standard deviation of standard deviation. (16)

12. (a) Evaluate the mathematical model of first order with an example. Derive the first order transducer response to step and ramp input using relevant diagrams. (16)

Or

(b) (i) A Wheatstone bridge requires a change of 7^{o}c in the unknown arm of the bridge to produce a change in deflection, of 3*mm* of the galvanometer. Determine the sensitivity and deflection factor. (8)

(ii) Transducers are used for measurement of parameters like temperature, pressure, flow, level etc. The quality of measurement carried out by studying the characteristics of transducer. Explain the characteristics that are used to access the quality of measurement that remain constant or vary very slowly with time. (8)

13. (a) Describe the principle, construction, operation and types of a thermally sensitive resistor whose resistance can either increase or decrease with temperature. (16)

Or

(b) Explain the capacitive transducers that use the effect of change in capacitance due to change in overlapping area of plates and change in capacitance due to change in distance between the two plates. (16)

14. (a) Describe the working of the transducer which works on the following principle."When a magnetic field is applied to a current carrying conductor at right angles to the direction of current, a transverse electric potential gradient is developed in the conductor. Also explain the measurement of displacement and current using the same principle. (16)

Or

(b) What are digital transducers? Classify and explain the various types of digital transducer. (16)

15. (a) Discuss the operation of a sensor with interfacing circuits and capable of performing automatic ranging, auto calibration and automatic decision making. (16)

Or

(b) (i) What is a Nano sensor? Explain the different manufacturing techniques used in Nano sensors. (8)

(ii) Describe the working of an IC sensor which is used for measuring temperature. (8)

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