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

Question Paper Code: 54502

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Third Semester

Electronics and Instrumentation Engineering

15UEI303 - SENSORS AND TRANSDUCERS

(Common to Instrumentation and Control Engineering)

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Systematic errors are

   (a) Instrumental error (b) Environmental error
   (c) Observational errors (d) All of the above

2. One of the following is an active transducer

   (a) Starin gauge (b) Selsyn
   (c) Photovoltaic cell (d) Photo-emissive cell

3. In measurement systems, which of the following static characteristics are desirable

   (a) Accuracy (b) Sensitivity
   (c) Reproducibility (d) All of the above

4. A pressure measurement instrument is calibrated between 10 bar and 250 bar. The scale span of the instrument is

   (a) 10 bar (b) 250 bar (c) 240 bar (d) 260 bar

5. The principle of operation of LVDT is based on the variation of

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

6. Thermocouples are

(a) Passive transducers (b) Active transducers
(c) Both active and passive transducers (d) Output transducers

7. Piezo-electric transducer work when we apply _____ to it

(a) Mechanical force (b) Vibrations (c) Illuminations (d) Heat

8. Fiber optic transducer can be used to measure

(a) Displacement (b) Power (c) Current (d) Resistance

9. Vibration is commonly expressed in

(a) Hertz (b) Volt (c) Ampere (d) Ohm

10. Humidity can be measured using

(a) Rotameter (b) Hygrometer (c) Thermometer (d) Anemometer

PART - B (5 x 2 = 10 Marks)

11. What do you mean by static calibration?

12. Differentiate range and span.

13. Mention two advantages of thermistors over resistance thermometers.

14. List out any four materials by which piezoelectric transducers are made off.

15. Name any four applications of NANO sensors

PART - C (5 x 16 = 80 Marks)

16. (b) Ten measurements of the resistance of a resistor gave 101.2 Ω, 101.7 Ω, 101.3 Ω, 101.0 Ω, 101.5 Ω, 101.3 Ω, 101.2 Ω, 101.4 Ω, 101.3 Ω, and 101.1 Ω. Assume that only random errors are present. Calculate

(i) the arithmetic mean
(ii) the standard deviation of the readings
(iii) the probable error (16)

Or

(b) Explain the criteria for selection of transducer for a particular application. (16)

17. (a) Discuss in detail about the static characteristics of transducers with suitable sketches. (16)

Or

(b) Derive an equation for time response of a first order system when subjected to unit step input. Draw the response curves and find the dynamic errors. (16)

18. (a) Describe the construction of different types of strain gauges and working principle. (16)

Or

(b) Discuss the principle of operation of resistance thermometers and also discuss the characteristics of different metals for resistance thermometers. (16)

19. (a) Describe the fiber optic sensor and its operation for temperature measurement. (16)

Or

(b) Discuss the theory, working and application of Hall effect Transducer. (16)

20. (a) Explain in detail about the measurement of relative motion and absolute motion using seismic instruments. (16)

Or

(b) Explain the concept of MEMS. (16)

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