Register Number……

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Fourth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI401: Transducer Engineering

Time: Three Hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. The dimension for power is

   A. $M^2L^2T^{-2}$ B. $M^2L^2T^2$ C. ML^2T^{-3} D. ML^2T^{-2}

2. The voltage measured by a 0 –150V voltmeter having a guaranteed accuracy of I percent of full scale reading is 75V. the limiting error in percent is

   A. 0.2% B. 2 % C. 0.02 % D. 20%

3. The closeness with which an instrument reading approaches the true value of the quantity being measured is called

   A. Precision B. Accuracy C. Repeatability D. Reproducibility

4. A liquid - in – glass thermometer is a

   A. I order instrument B. II order instrument

   C. III order instrument D. Zero order instrument

5. The maximum temperature that can be sensed by a platinum RTD is

   A. 110°C B. 1000°C C. 300°C D. 180°C

6. Which of the following is a natural piezo electric material

   A. Lithium sulphate B. Potassium phosphates C. Ammonium Phosphate D. Quartz

7. There are _____ number of secondary windings in a LVDT

   A. 3 B. 1 C. 2 D. 4

8. A microphone converts _____ energy to _____ energy

   A. Sound to electrical B. Electrical to sound

   C. Mechanical to electrical D. Electrical to mechanical

9. In fiber optic sensors the measured signal is in the form of

   A. Heat B. Voltage C. Light D. Current

10. _____ is used to sense the reverse motion

    A. LVDT B. Tachometer C. Absolute encoder D. Incremental encoder

PART B (10 x 2 = 20 marks)

11. Mention the different ways of classifying transducers and list them.
12. What is meant by multi sample test and single sample test?
13. Differentiate between accuracy and precision.
14. Sketch the step response of first order instruments with small and large time constant.
15. Give the principle of operation of pope cell.
16. Where is a hot wire anemometer used?
17. What do you infer from the frequency response of an instrument?
18. How does an induction potentiometer work?
19. What is magnetostriction?
20. Is a piezo electric crystal affected by force applied in both the directions? If so, how?

PART C (5 x 14 =70 marks)

21 a. The following 10 observations were recorded when measuring a voltage: 41.7, 42.0, 41.8, 42.0, 42.1, 41.9, 42.0, 41.9, 42.5 and 41.8 volt. Find (i) the mean (ii) standard deviation (iii) the probable error of one reading (iv) the probable error of mean (v) range

(OR)

b. In a test temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are

Temperature ° C	397	398	399	400	401	402	403	404	4051
Frequency of occurrence	1	3	12	23	37	16	4	2	2

Calculate (i) mean (ii) mean deviation (iii) standard deviation (iv) probable error of one reading (v) standard deviation and probable error of the mean.

22 a. Obtain the differential equation describing a liquid filled in glass thermometer.

(OR)

b. Detail on the static and dynamic characteristics of an instrument

23 a. Mention some physical quantities that can be measured based on the resistance change. What type of circuit is generally used for measuring the change in the resistance? Explain the operation of one instrument based on the above principle.

(OR)

b. Give the principle of operation, constructional details, working and application of a RTD.

24 a. Explain the constructional details and working of LVDT. Obtain the expression for its output voltage

(OR)

b. Explain the working principle of a variable reluctance type accelerometer

25 a. Discuss about the operation of various types of digital transducers.

List the advantages of digital transducers over analog transducers.

(OR)

b. Write notes on the following

i) fiber optic temperature sensor
ii) fiber optic pressure transducer

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