Register Number.....

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Fifth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI501 Industrial Instrumentation – I

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

Answer ALL the questions:-

PART A (10 x 1 = 10 Marks)

1. In the in-line rotating torque sensor, the strain gauges are kept on the shaft precisely at

   A. 45^0 to the shaft axis B. 60^0 to the shaft axis

   C. 30^0 to the shaft axis D. 90^0 to the shaft axis

2. Revolution counter is used for the measurement of

   A. displacement B. speed

   C. acceleration D. velocity

3. Piezo-electric accelerometer has high frequency response of

   A. 10 to 50 Hz B. 10 kHz to 50 kHz

   C. 100 to 500 Hz D. 100 kHz to 500 kHz

4. When seismic transducers are used in the acceleration mode they should be designed with

   A. stiff springs and small mass B. heavy mass and weak springs

   C. weak mass and heavy springs D. weak springs and small mass

5. Which gauge measures pressure by sensing changes in the density of a gas?

   A. pirani gauge B. slack diaphragm gauge

   C. McLeod gauge D. ionization gauge

6. What type of manometer is best for measuring low pressures?

   A. well B. inclined

   C. U-tube D. multiple tube

7. The principle of working of the constant volume thermometer is based on:

   A. Boyle's law B. Charle's law

   C. Gay-Lussac's law D. equation of state

8. Which of the following temperature sensors has excellent linear characteristics?

   A. RTD B. thermocouple

   C. radiation pyrometer D. silicon-based I.C. chip

9. Which instrument can be used for the measurement of temperature of oil fired furnaces?

A. Gas thermometer B. Mercury thermometer

C. Optical pyrometer D. thermistor

10. Which thermocouple material can be used for measurement of temperatures above 1000^0C?

A. copper-constantan B. silver-constantan

C. alumel-chromel D. iron-constantan

PART B (10 x 2 = 20 Marks)

11. Explain the stroboscopic method of measuring speed.
12. What are the different types of velocity transducer?
13. A piezoelectric type accelerometer has a sensitivity of 100 mV/g. The transducer is subjected to a constant acceleration of 5g. Calculate The steady state output of the transducer.
14. Define: kinematic viscosity.
15. What are the different types of errors in manometers?
16. What is the principle of working of ionization gauge?
17. Name any two materials used for RTD.
18. Why mercury is the most common liquid utilized in liquid-in-glass thermometers?
19. What is the need of compensation in thermocouples?
20. What is a pyrometer, and how does it work?

PART C (5 x 14 = 70 Marks)

21. (a). (i) Explain with neat sketch the operation of pneumatic load cell. Discuss its advantages and disadvantages. (8)

(ii) Compare an elastic load cell and a strain gauge load cell. (6)

(OR)

(b). (i) Explain the working principle of strain gauge torsion meter with sketch. (8)

(ii) Explain how the revolution counter is used to measure speed? (6)

22. (a) Explain the working of LVDT type and piezoelectric type accelerometers used for the measurement of acceleration. State their advantages and disadvantages. (7+7)

(OR)

b) Explain the construction and working principles of ultrasonic densitometer and rotameter type viscometer with neat sketches. (7+7)

23. (a). Describe the methods of measuring pressure using

(i) Piezo resistive pressure sensor (7)

(ii) Ionization gauge. (7)

(OR)

(b). (i) Explain the principle of operation and working of a strain gauge pressure transducer. (8)

(ii) What are the steps to be followed during calibration of a pressure gauge? (6)

24. (a) Explain with neat sketch, the construction and working principle of a resistance thermometers. Describe the advantages of 3-wire and 4-wire constructions

(OR)

(b) With neat diagram explain the principle of operation and working of filled-system thermometer.

25. (a) (i) Explain the construction and working principle thermocouple with neat sketch.(7)

(ii) Explain the commercial circuit for cold junction compensation. (7)

(OR)

(b) With the neat sketch explain the operation of optical pyrometer. State its advantages.

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