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

Question Paper Code : 23444

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electronics and Instrumentation Engineering

EI 1301/070300018 – INDUSTRIAL INSTRUMENTATION - I

(Common to Instrumentation and Control Engineering)

(Regulation 2004/2007)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the effect of temperature in strain gauge bridge circuitry? How is to be compensated?

2. Mention different types of strain gauge load cells.

3. Write the units of density, specific gravity and viscosity used in industries.

4. What is the principle of float type densitometer?

5. What is impact pressure?

6. State the difference between resistance thermometer and thermistor.

7. Give any two causes of error in filled system thermometers.

8. Name any two materials used for RTD.

9. What are the properties of materials used for piezo-electric transducers?

10. Write the temperature ranges and applications of pyrometers.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain how the revolution counter is used to measure speed. (6)

(ii) A rotating disc has five equispaced radial lines marked on it. When a stroboscope is directed at the disc a true pattern is observed at the highest flash frequency equal to 3000 flashes per seconds. What will be the other flash frequencies which produce a 5 line pattern and a 10 line pattern. (10)

Or

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

(ii) A shaft transmits a maximum power of 50 kw when running at a constant speed of 1500 rpm. Measurements of torque are made by a pair of strain gauges which are bonded on to a specially machined portion of the shaft. Each gauge has a nominal resistance of R=120 ohms gauge factor of 2 and are connected electrically two arms of a half activated wheastone bridge circuit which is energized with an excitation voltage of 6 volts. If a gauge have a maximum strain of 0.0015, calculate shaft diameter. The modulus of elasticity of the material is 200GN/mm. Calculate the output voltage and sensitivity of the measuring system. (8)

12. (a) Explain the construction and working of DC and AC tachogenerator. (16)

Or

(b) Briefly describe the working of different speed measurement methods. (16)

13. (a) (i) How do you test and calibrate pressure gauges? Explain. (8)

(ii) Explain the operation of Dead weight tester. (8)

Or

(b) (i) Explain the working of different types of manometers. (8)

(ii) Describe the operation of capacitive type pressure gauge. (8)

14. (a) (i) Explain the principle, construction and operation of Bimetallic thermometers. (10)

(ii) Write a note on calibration of thermometer. (6)

Or

(b) (i) Describe the construction of RTDs. (8)

(ii) Write a note on lead compensation in RTD bridge circuits. (8)

15. (a) Describe with neat sketches the principle of operation of total radiation and optical pyrometers used for measurement of high temperature. (8 + 8)

Or

(b) (i) Explain what is meant by cold junction compensation. (6)

(ii) How do you measure high temperature using thermocouple? (10)
