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J 3223

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Fifth Semester

Mechatronics Engineering

EE 1311 — INSTRUMENTATION AND CONTROL SYSTEM

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. An Ammeter reads 6.7 A and the true value of current is 6.97 A. Determine the error and correction for the instrument.
2. What do you mean by Limiting error?
3. In J type thermocouple what are the positive and negative wire materials and for what temperature range J type thermocouple can be used?
4. What is the principle of Thermistors?
5. How the pressure is measured using Bourdon tube?
6. Write the principle of operation of Hot wire anemometer.
7. What is meant by Load cell?
8. List the types of strain gauges.
9. Draw the circuit for electronic PI controller.
10. What are the disadvantages of Pneumatic controller?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain about the following characteristics of instrument systems :
Accuracy, Precision, Sensitivity and Hysteresis. (4 × 3 = 12)
- (ii) Explain about the concepts of calibration of instruments. (4)

Or

- (b) (i) Describe the response of first order system for unit step and unit ramp inputs. (8)
- (ii) What is a transducer? In what ways can you classify the transducers? (8)
12. (a) (i) Explain the construction and principle of working of RTDs. (8)
- (ii) Explain the construction and principle of working of Liquid filled in thermometers. (8)

Or

- (b) (i) Describe the construction and principle of working of Bimetallic thermometer. (8)
- (ii) Explain the method used for high temperature measurements with a neat diagram. (8)
13. (a) (i) Explain the calibration procedure for pressure gauges using dead weight tester. (8)
- (ii) Discuss in detail how the vacuum is measured in McLeod Gauge. (8)

Or

- (b) (i) Describe the construction and working of Turbine flow meter. (8)
- (ii) Explain the level measurement methods using change in electrical resistance and capacitance. (8)
14. (a) (i) Explain how the strain gauges are used in force and torque measurement systems. (8)
- (ii) Describe the set up for measuring pressure using LVDT with a neat diagram. (8)

Or

(b) (i) Explain the construction and working of Optical encoder. Also explain how it can be used to measure displacement and velocity. (10)

(ii) Describe how the Piezoelectric crystal used in vibration and acceleration measurement systems. (6)

15. (a) Describe the scheme for Automatic speed control of motors and in detail.

Or

(b) Explain the machine tool control achieved using Pneumatic controller with a neat sketch.

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