G 370

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B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Applied Electronics and Instrumentation/Electronics and Instrumentation/
Instrumentation and Control Engineering

AI 010 603/EI 010 603/IC 010 603—INDUSTRIAL INSTRUMENTATION—I (AI, EI, IC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

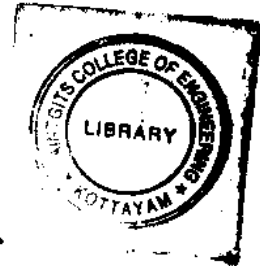Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. What is gauge factor ?

2. Explain the piezoelectric effect.

3. Enlist the various errors in manometers.

4. Define the terms : Temperature, absolute temperature and specific heat capacity.

5. State and explain Wien's displacement law.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. With a neat schematic diagram, describe an electromagnetic balance.

7. Describe the principle of density measurement using LVDT.

8. A well type U-tube manometer using a liquid of specific gravity 0.8 has a well of 50 mm. diameter and a tube of 2 mm. bore. If a scale correctly graduated in mm. is used and the datum is 0 mm., calculate the reading on scale when a pressure difference of 80 mm. of Mercury is applied. Calculate the percentage error in reading and actual error in N/m^2 Assume pressure on account of 1 mm. of mercury is 133 N/m^2 and density of water is 1000 kg./m^3

9. A Platinum thermometer has a resistance of 100 Ω at 25° C. (a) Find its resistance at 65° C, if the Platinum has a resistance-temperature coefficient of 0.00392/° C. ; (b) If the thermometer has a resistance of 150 Ω, calculate the temperature.

Turn over

10. A Chromel-Alumel thermocouple is assumed to have nearly linear operating range upto 1100° C. with an e.m.f. of 45.14 mV at this temperature, and the reference junction temperature being 0° C. The thermocouple is exposed to a temperature of 840° C. A potentiometer is used as cold junction and its temperature is 25° C. Calculate the e.m.f. indicated by the potentiometer ?

(5 × 5 = 25 marks)

Part C

*Answer **all** questions.*
Each full question carries 12 marks.

11. Describe the principle of speed measurement using (a) Stroboscope ; and (b) Drag cup tachometer.

(6 + 6 = 12 marks)

Or

12. (a) Explain how a hydraulic load cell works. (4 marks)

   (b) Explain how torque can be measured using cradle arrangement. (8 marks)

13. (a) Explain the working of a potentiometric type accelerometer. (6 marks)

   (b) Discuss any *three* methods of calibration of accelerometer. (6 marks)

Or

14. (a) Describe the differential bubbler pressure measurement system. (6 marks)

   (b) Explain how the density of a gas can be measured using a bridge type gas densitometer.

(6 marks)

15. Explain how Bourden tube is used for pressure measurement. List its merits and demerits.

Or

16. Explain the principle of an ionization gauge and illustrate a practical procedure to measure pressure using the same.

17. What is an RTD ? Explain 2-wire, 3-wire and 4-wire measurement methods.

Or

18. Describe any *two* different types of filled-in system thermometers. What are the errors and how they can be compensated ?

19. Describe the construction and working of :

   (a) Total radiation pyrometer ; and (6 marks)

   (b) Disppearing filament optical pyrometer. List their fields of applications, merits and demerits.

(6 marks)

Or

20. (a) Explain how cold junction compensation is achieved in commercial circuits. (7 marks)

   (b) With suitable examples, explain the principle of IC temperature sensors. (5 marks)

[5 × 12 = 60 marks]