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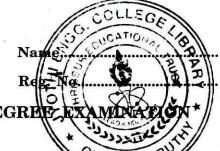
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SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION MAY 2013

AI 09 605—INDUSTRIAL INSTRUMENTATION

(2009 Admission onwards)

Time : Three Hours

Maximum : 70 Marks

Part A

*Answer **all** questions.*
Each question carries 2 marks.

1. State Peltier effect.

2. Where are bimetallic elements used as temperature sensors ?

3. Why elastic element type gauges are preferred over liquid column manometers in industry ?

4. Define Reynolds number.

5. Differentiate between float type and displacer type liquid level gauges.

(5 × 2 = 10 marks)

Part B

*Answer any **four** questions.*
Each question carries 5 marks.

1. How is liquid level is a boiler drum measured ?

2. A resistance thermometer is made of nickel wire. Thermometer resistance at 20°C is 100 Ω. If the resistivity is 0.8 mΩ m, what would be length of the wire if 2 mm diameter wire is used. If the resistance varies linearly with temperature what would be the resistance at temperatures $t = -50$°C and $t = 100$°C. Assume sensitivity as 0.2 Ω/°C.

3. Why is cold junction compensation necessary in temperature measuring schemes using thermocouples ? Discuss a recent trend in making such compensation.

4. Explain working principle of a thermal conductivity gauge for low pressure measurement.

5. Discuss how a dead weight tester can be employed for pressure calibration.

6. Explain the working of a positive displacement type flow meter.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **one** *question in Each Module.*

Module I

1. (a) Explain the working principle of an optical pyrometer with a neat block diagram.

Or

(b) Discuss the working of RTD. How temperature can be measured using a 4-lead RTD arrangement.

Module II

2. (a) Describe in detail about the principle of an elastic type Bellows element with suitable sketches.

Or

(b) Explain the working of a capacitive type differential pressure transmitter.

Module III

3. (a) Explain the principle of operation of a rotameter.

Or

(b) Describe a mass flow meter that uses the principle of conservation of angular momentum.

Module IV

4. (a) Discuss the working principle of a ultrasonic flow meter.

Or

(b) Describe a technique for the measurement of liquid level or solid level using radioactive sources and detectors.

(4 × 10 = 40 marks)