

FOURTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, JUNE-2018

SUBJECT: INDUSTRIAL INSTRUMENTATION [ICE-2202]

Time: 3 Hours

MAX. MARKS: 50

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Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- **1A.** Explain the operation of helix type bimetallic thermometer and list its limitations.
- 1B. An iron-constantan thermocouple has its measuring junction in a bath whose temperature can vary between 100°C-200°C reference junction maintained with the ambient temperature. If the EMF developed is to correspond to that with reference junction at 0°C what will be the maximum error, expressed as a percentage of the EMF developed, due to ambient temperature variation in the range 0°C to 45°C? (Sensitivity of iron constantan is 54microV/°C
- **1C.** Classify liquid filled thermal systems based on their operation.
- 2A. The differential U tube mercury manometer is shown in FIG:2A. Let the difference in height of meniscus between two limbs be Δh meters and the vertical height between point A in the pipe and the level of meniscus in the right limb be 'x' meters. Find the value of Δ h when density of oil and mercury are 800 kg/m³ and 13600 kg/m³ respectively. PA-PB=30x103N/m².
- **2B.** Explain the working of dead weight tester for the calibration of the pressure gauges. **3**
- 2C. With neat figure, explain the operation of ionization gauge for the measurement of low pressure.
- 3A. Derive an expression for the volumetric flow rate for the Rotameter with its 4 construction details
- 3B. With neat figure explain the working of Coriolis flowmeter. Also draw and explain 4 the signal processing diagram for the same.
- **3C.** Identify the flow measurement technique shown in FIG: 3C and explain its working. **2**
- **4A.** Elaborate on the principle and working of the following level sensors:
 - (i) Float operated voltage potential divider method
 - (ii) Gamma ray based method.

4B. What is reed switch? How it can be used for measurement of level.

- **4C.** What is relative humidity? Explain its measurement using dry and wet bulb **3** temperature.
- 5A. Derive an expression for viscosity in terms of shear stress. Also explain the 4 ICE 2202 Page 1 of 2

measurement of viscosity using capillary tube method with neat figure and necessary equations.

- **5B.** Explain the measurement of speed using AC tachometer. List its drawback
- **5C.** With neat figure, explain the measurement of speed using photoelectric tachometer.



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