QP Code : 22898

(3 Hours) **(Total Marks : 80**

N.B : (1) Question **No.1** is **compulsory**.
(2) Solve **any three** questions out of remaining **five** questions.
(3) Assume suitable **data** if **required**.

1. (a) What is mean by calibration of Instrument and explain calibration of Thermometer. **6**
   (b) The length of the mercury column in an uncalibrated mercury thermometer is 2cm when its bulb is immersed in melting ice and 20cm when the bulb is in steam above boiling water. The thermometer is used to measure the temperature of a water in a glass. The length of the mercury column is 11 cm? What is the temperature of the water in the glass? **8**
   (c) Explain Sizing of control valve. **6**

2. (a) An L VDT is used to measure displacement. The LVDT feeds a Voltmeter of 0-5 V range through a 250 gain amplifier. For a displacement 0.5 mm the output of LVDT is 2 m V. Calculate the sensitivity of the instrument. **5**
   (b) Write short notes on : **15**
   (i) Mechanical amplifier
   (ii) Thermistors
   (iii) Pneumatic Sensor.

3. (a) Give ladder Logic for on and off of a indicator bulb. **5**
   (b) Differentiate between piezoelectric and elastic sensing element. **5**
   (c) Write short notes on : **10**
   (i) SIL classification
   (ii) Relief valve.

4. (a) An equal percentage valve has a maximum flow 50 cm^3/s and a minimum of 2 cm^3/s. If the full stem travel is 2 cm, what is the flow rate (in lit/hr) at a 7.5 mm opening? If the flow rate is 40 cm^3/s, determine the stem travel from fully open position. **6**
   (b) Explain in detail Wheatstone bridge. **6**
   (c) Write short notes on : **8**
   (i) Hot wire anemometer
   (ii) LVDT.

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5. (a) Distinguish between gross error, systematic error and random error with examples. What are the methods for their elimination/reduction? **5**

   (b) A resistance is measured by voltmeter-ammeter method. The voltmeter is 0-250V, ± 1 % accuracy and ammeter is 0-5 A, ± 1 % accuracy. The readings of voltmeter and ammeter are 100 V and 2 A respectively. What is the error in the measured resistance? **5**

   (c) Explain how a capacitive sensing element can be used to measure the level of liquid in a container. **5**

6. Write a short note on **(any four)** : **20**

   (a) Signal conditioning.
   (b) Data acquisition.
   (c) Basic process control schemes.
   (d) Thermo electric sensing element.
   (e) Diaphragm pressure gauge.
