

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from **remaining** questions.
 (3) Assume **suitable** data, if **necessary**.

1. (a) Differentiate the following :— 4
 - (i) Threshold and Resolution
 - (ii) Range and Span.
 - (b) Define standards of measurement and explain it's types with an appropriate examples. 4
 - (c) For a certain thermistor $\beta = 3500 \text{ k}$ and resistance at 25°C is known to be $1 \text{ k } \Omega$. The thermistor is used for temperature measurement and the resistance measured is as 2500Ω . Find the measured temperature. 4
 - (d) Explain digital type transducer. 4
 - (e) Explain bubbler level measurement method. 4
2. (a) Two resistors R_1 , and R_2 are connected in series and parallel. The value of resistors are $R_1 = 100 \pm 0.1 \Omega$ and $R_2 = 50 \pm 0.03 \Omega$. Calculate the uncertainty in combine resistance for both series and parallel arrangements. 10
 - (b) Explain classification of the transducer with examples. Also state the typical specifications for any one transducer. 10
3. (a) Explain the application of LVDT for the measurement of thickness of metal sheet and steel ball diameter by drawing proper diagram. 10
 - (b) A potentiometer has a resistance of 2500Ω is rated as 2 Watt power. What is maximum allowable excitation voltage ? Calculate the value of sensitivity and resolution if the length of pot is 0.1 m and there are 150 turns. Also calculate the percentage of loadings error of 0.67 at the travel, if meter of 5000Ω is connected across the potentiometer. 10
4. (a) Explain Law of Intermediate temperatures and Intermediate metals. Also explain Thomson, Peltier and Seebeck effect related to Thermocouple. 10
 - (b) Why there is need of compensation in RTD ? Explain the same with suitable diagram. 10
5. (a) A platinum thermometer has a resistance of 100Ω at 25°C . 6
 - (i) Find resistance at 65°C
 - (ii) Find the temperature for 150Ω resistance. Assume $\alpha = 0.00392 / ^\circ\text{C}$.
 - (b) The lens of optical pyrometer is clouded to that transmission factor is 0.8. The instrument indicates a temperature of 1200°C . What is the true temperature ? 4
 - (c) Explain the need of cold junction compensation for thermocouples and describe the different techniques for the same. 10
6. (a) Explain liquid level measurement using float and LVDT with appropriate diagram. 10
 - (b) Explain the Flapper-Nozzle transducer for displacement measurement. 10
7. (a) State fits and gauges. Explain types of fits. 10
 - (b) State the materials and temperature range for :— 10
 - (i) RTD
 - (ii) J, K, S and T types of thermocouples.