

(OLD COURSE) Q.P. Code : 12010

(3 Hours)

[Total Marks : 60

- N.B. :** (1) Question number 1 is **compulsory**
 (2) Solve any **four** questions from remaining **six** questions
 (3) Assume suitable **data** if **required**.
 (4) Draw **neat** sketches wherever **necessary**.

1. (a) A dead zone of certain pyrometer is 0.15% of the span. The calibration is 500°C to 850°C .
 What temperature change might be occurred before it is detected. 5
- (b) Calculate the limits of tolerances and allowance for 25mm shaft and hole pair designated $H_{8}d_{9}$. 5
- (c) Distinguish between mechanical and electrical comparator. 5
- (d) Write short note on Load cell. 5
2. (a) Explain generalized measurement system elements with block diagram. Describe its function with suitable example. 10
- (b) Define strain gauge. Explain different types of strain gauge. What is gauge factor? Why temperature compensation is needed in strain measurement? Explain any one method of temperature compensation. 10
3. (a) The resistance of copper wire is expressed as $R = R_0 [1 + \alpha (T - 20)]$ 10
 Where $R_0 = 60 \Omega \pm 0.3\%$ is the resistance at 20°C
 $\alpha = 0.004 \text{ per } ^{\circ}\text{C} \pm 1\%$ is the temperature coefficient of resistance
 $T = 30^{\circ}\text{C} \pm 1^{\circ}\text{C}$ is the temperature of wire
 Calculate resistance of wire and its uncertainty.
- (b) Explain the construction, working, operating principle, range of operation and limitations of the following: 10
- i) Brigideman gauge, ii) Thermal conductivity gauge
4. (a) Compare thermoelectric sensors on the basis of basic principle of working, materials used, characteristic behavior, range of operation and their types available. 10
- (b) Discuss the elements of surface roughness. 5
- (c) Write short note on interchangeability and its importance 5