71 : 2nd half-12-(i) JP

Con. 9476-12.

KR–5057

(3 Hours)

[Total Marks : 100

N.B.: (1) Question No. **1** is **compulsory**.
     (2) Solve any **four** from remaining.
     (3) Assume **suitable** data if **required**.

1. (a) A dead zone of a certain pyrometer is 0·18% of the span. The calibration is 600 to   5
      950°C. Find temperature change might occur before it is detected.
  (b) A McLeod gauge has a bulb volume of 100 CC and capillary diameter of 1mm. Calculate   5
      pressure in Pascals correponding to 30 mm column of mercury in the capillary.
  (c) A strain gauge is bounded to 0·1m long has a cross sectional area 4 cm^2, E = 210 GN/m^2.   5
      Unstrained Resistance = 240 Ω, gauge factor = 2·2. When load is applied the
      resistance of gauge changes by 0·013Ω. Calculate change in length and force applied.
  (d) Explain interchangeability and its importance.   5

2. (a) Explain with sketch methods of measuring the effective diameter of screw thread.   10
  (b) Explain displacement measurement with potentiometer and L.V.D.T.   10

3. (a) Define Gauge factor. Derive the equation for gauge factor.   10
  (b) Explain the working and construction of profile projector and Toolmaker's microscope.   10

4. (a) Differentiate between mechanical, optical, pneumatic comparator.   10
  (b) The stress in M.S. flat circular diaphragm.   10

$$\sigma = \frac{3D^2P}{16\,\epsilon^2} \ N/m^2 \ \text{where}$$

D = 0·02 m $\pm$ 1%
ϵ = (0·002 m $\pm$ 6 × 10^{-6}) m

$$P = 40 \times 10^4 \ \frac{N}{m^2} \pm 1\%$$

Calculate stress and maximum possible absolute error.

5. (a) Explain digital Tachometer and Stroboscopic method.   10
  (b) Explain any one method of gear measurement.   10

6. (a) Explain Thermocouple and thermisters.   10
  (b) Explain use of slip gauges. Explain measurement of cone angle of taper plug gauge   10
      by sine bar.

7. Write short notes (any **four**) :—   20
     (a) Line and end standards
     (b) Static characteristics (five)
     (c) Calibration of pressure sensors
     (d) Accelerometers
     (e) Autocollimator.