

Sem-IV / Transducers-II

INST / 10-6-14

QP Code : NP-19839

(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 **necessary**.

1. Attempt the followings:— 20
 - (a) Classify different types of density measurement methods along with their principles.
 - (b) What is ORP? why it is require to measure.
 - (c) Explain "Vena contract" & draw its pressure flow diagram.
 - (d) Draw neat sketch of pressure sensing elastic elements.
2. (a) Derive Bernouli's Equation. 10
 (b) Give types of manometers. Derive final expressions for each type of manometer for differential pressure measurement (any **four**)
3. (a) Explain with diagram Electromagnetic flow meter. Also give its applications. 10
 (b) In the resistive strain Gauge; strain gauge resistance $R_1=R_2=R_3=R_4=120\Omega$, $E_b=9V$. If the output voltage of the bridge is 20 mV, find the value of force applied to the strip. Thickness "t" of the strip = 1mm, width "b" of strip = 10mm. Young's modulus E of strip material = $8 \times 10^{10} \text{ N/m}^2$. Length $L=50 \text{ mm}$.
 Strain at root of cantilever = $6 PL/Eb t^2$. Assume output resistance as infinity. Gauge factor = 2.4. 10
4. (a) Explain the following with respect to strain gauge:— 10
 - (i) Working principle
 - (ii) Materials
 - (iii) Types
 - (iv) Applications
- (b) Draw neat sketch of Pirani Gauge & explain the same with applications. 10
5. (a) State the working principles of following for pressure measurement along with their characteristics. 10
 - (i) Piezo-electric transducer
 - (ii) LVDT
 - (iii) Capacitive transducer
 - (iv) Strain gauge.
- (b) A nozzle is fitted in horizontal pipe diameter 15 cm, carrying gas of density 1.15 Kg/m^3 , for the purpose of flow measurement. The differential pressure head indicated by a U-tube manometer containing oil of specific gravity 0.8 is 10 cm. If the coefficient of discharge & diameter of nozzle are 0.8 & 5 cm, respectively. Determine the flow of gas through the nozzle flowmeter. 10
6. Write a short note on:— 20
 - (a) Viscosity measurement.
 - (b) Positive Displacement flow meter.

Con. 13344-14.