/sem-IV/INST / Paper / Subject Code: 41102 / Transducers -II / May - 2019

choice based.

Duration: 3 Hours **Total Marks : 80**

Note:

1. Question one is compulsory.

2. Solve any three from remaining and assume suitable data wherever necessary.

Q1. Attempt any four **20**

a. Define strain and gauge factor. What is Poisson's ratio? Explain why it is always negative.

b. Explain "Vena Contracta" and draw its pressure flow diagram.

c. State Piezo resistive effect and piezo electric effect.

d. Derive Bernoulli's equation.

e. Explain construction and working of Bourdon tube.

Q2. a Explain different arrangements of strain gauges for better sensitivity and temperature compensation. **10**

Q2. b A strain gauge is bonded to a steel beam 0.1 m long and has a cross sectional area of 4 cm2. Young's modulus of elasticity for steel is 207 GN/m^2. The semiconductor strain gauge has a unstrained resistance of 240Ω and gauge factor 2.2 when load is applied the gauge's resistance changes by 0.013Ω. Calculate force applied to the beam. **10**

Q3.a State the basic principle and explain McLeod gauge. **10**

Q3.b. Classify pressure transducer. Describe working of different types of manometer with advantages and limitations of each type. **10**

Q4.a. Explain working of variable area flow meter. **10**

Q4.b. Derive an expression for fluid flow discharge in variable head type flow meters (Venturi, Orifice, Nozzle). **10**

Q5.a. Describe in detail with neat sketch pH measurement also give its applications. **10**

Q5.b. A venturi tube of throat diameter 60mm is placed in a water pipe of diameter100 mm to measure the volumetric flow. The volumetric flow rate through the tube is 0.08 m^3/s and the water has a density of 1000 kg/m^3 and viscosity of 10^{-3} NS/m^2. **10**

a) Determine the Reynold's number for these conditions.
b) The coefficient of discharge is 0.99. Determine the upstream to throat differential pressure.

Q6. Write a short note on (Any two) :- **20**

a. Dead weight tester
b. Smart sensor
c. Viscosity meter
