Instructions –

1. All Questions are Compulsory.
2. Answer each next main Question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of Non-programmable Electronic Pocket Calculator is permissible.
7. Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. Attempt any FIVE of the following: 10

a) Define active and passive transducers.
b) List any four units of pressure.
c) Define laminar and turbulent flow.
d) List any two non-contact type level measurement methods.
e) State any two advantages of ultrasonic flow meters.
f) State seeback and peltier effect.
g) What is Pt-100?
2. Attempt any THREE of the following: 12
   a) State the selection criteria for transducers (any eight points).
   b) Draw constructional details of C-types Bourdon tube and explain its working.
   c) What is piezo electric effect? Name two piezo electric materials.
   d) Explain the process of calibration of pressure gauge by Dead Weight Tester.

3. Attempt any THREE of the following: 12
   a) Compare orifice plate with venturi tube with reference to:
      (i) Working principle
      (ii) Construction
      (iii) Cost
      (iv) Pressure loss
   b) Draw and explain block diagram of instrumentation system.
   c) Write one example of each type:
      (i) Active transducer
      (ii) Primary transducer.
      (iii) Electrical transducer.
      (iv) Digital transducer.
   d) Draw the following and write one application of each:
      (i) Well type manometer
      (ii) Bellows.
4. **Attempt any THREE of the following:**

a) Explain the principle of operation of Doppler type ultrasonic flow meter with a neat labeled sketch.

b) A capacitive type level sensor is to be used for measuring the level of water in the tank. With a neat labeled diagram. Explain the construction of this transducer. Also state the reason for change in capacitance with change in level of water.

c) Compare RTD and thermistor on the basis of:
   (i) temperature coefficient
   (ii) linearity
   (iii) temperature
   (iv) range and cost

d) State any two advantages and disadvantages of electromagnetic flow meter.

e) Suggest a suitable level transducer for following application:
   (i) Level control of liquid, powders and fine grained solids within mining
   (ii) Chemical processing and food industries
   (iii) Tank level monitoring in chemical, water treatment
   (iv) Oil level in transformer.
5. **Attempt any TWO of the following:**

   a) Draw constructional diagram of LVDT. State its working principle. What is residual voltage, explain with neat diagram.

   b) Why Rotameter is called variable area flowmeter? Explain the working of rotameter with neat diagram. State its one advantage and one disadvantage.

   c) Explain the following troubles and related remedies in ultrasonic flow meter:
      
      (i) Meter does not show reading
      
      (ii) Meter show less value of flow measured.
      
      (iii) Meter show high value of flow measured.

6. **Attempt any TWO of the following:**

   a) What is pyrometry? Explain working of optical pyrometer with neat diagram. State its one application.

   b) Convert 200°F into Celsius (°C) Kelvin (°K) and Rankine (°R).

   c) Compare between:
      
      (i) Ultrasonic and Radar type level measurement (any three points)
      
      (ii) U-tube and well type manometer (any three points)