

22332

21819

3 Hours / 70 Marks

Seat No.

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- 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.

**Marks**

**1. Attempt any FIVE of the following :**

**10**

- (a) Compare transducers and sensors (any two points).
- (b) State Seebeck effect and Peltier effect.
- (c) Compare LED and LCD (any two points).
- (d) Convert 40 °C to °F and °K.
- (e) Define :
  - (i) Atmospheric pressure
  - (ii) Vacuum pressure
- (f) Define :
  - (i) Reynolds number
  - (ii) Vena contracta
- (g) A pressure gauge measures the P gauge reading as 30 psi. If the atmospheric pressure is 14.696 psi, calculate the corresponding absolute pressure.

- 2. Attempt any THREE of the following :** **12**
- (a) Explain with neat sketches the construction and working principle of capsule used for pressure measurement.
  - (b) Explain with neat sketch, the working principle of capacitive transducer using the concept of variable area.
  - (c) Identify a suitable type of recorder used for plotting the Resistance – temperature characteristics of an RTD. Justify your selection.
  - (d) Explain with sketches the operating principle of LVDT.
- 3. Attempt any THREE of the following :** **12**
- (a) List any two examples for the following :
    - (i) Non-elastic pressure transducers
    - (ii) Elastic pressure transducers
  - (b) Explain with sketches the principle of operation of capacitive type hygrometer.
  - (c) Identify the temperature transducer for an application where high sensitivity is required for measurement. Justify your selection.
  - (d) State any two advantages and disadvantages of voltage telemetry system.
- 4. Attempt any THREE of the following :** **12**
- (a) Explain with sketches the construction and working of 'C' type Bourden tube.
  - (b) State any two advantages and disadvantages of Rotameter.
  - (c) Calculate the output resistance of PT100 RTD for following temperature values :
    - (i) 30 °C
    - (ii) 50 °C
  - (d) Explain with neat sketches the construction and principle of operation of strip chart recorder.
  - (e) Suggest a suitable transmission method to transmit temperature of process liquid measured in a plant to control room situated far away. Justify your selection.

- 5. Attempt any TWO of the following : 12**
- (a) State Piezo electric effect. Give any two examples of (i) Natural piezo electric material (ii) Synthetic Piezo electric material.
  - (b) List various types of Data Acquisition System (any two). Draw the block diagram of a multichannel data acquisition system and explain the function of each block.
  - (c) Explain with sketches the principle of operation of orifice plate. State its advantages and disadvantages.
- 6. Attempt any TWO of the following : 12**
- (a) Identify whether the following are active or passive transducer. Justify your answer.
    - (i) Potentiometer
    - (ii) Photovoltaic cell
    - (iii) Thermistor
  - (b) (i) Distinguish between laminar flow and turbulent flow (any two points). **2**  
(ii) Calculate the Reynolds number if a fluid with viscosity  $0.56 \text{ NS/m}^2$  and density  $750 \text{ kg/m}^3$  is flowing with a velocity of  $3 \text{ m/s}$  through a pipe of diameter  $30 \text{ mm}$ . Based on Reynold's number identify the type of flow. Justify your answer. **4**
  - (c) (i) Define :
    - (1) Absolute humidity **2**
    - (2) Relative humidity **2**(ii) Explain with neat diagram, the working of Hair type Hygrometer for Humidity measurement. **4**
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