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15116

3 Hours / 100 Marks

Seat No.

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Instructions : (1) All Questions are *compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

Marks

1. (A) Attempt any THREE :

3 × 4 = 12

- (a) Define static and dynamic characteristics of an instrument.
- (b) List any four temperature scales and state the ice point and boiling point of water for each scale.
- (c) Draw labelled diagram of air purge level measurement. Enlist any four indirect method of level measurement of liquid.
- (d) Give the detailed classification of flow meter.

(B) Attempt any ONE :

1 × 6 = 6

- (a) Draw a neat sketch of L.V.D.T. and describe its working.
- (b) Explain cascade control system with block diagram.

2. Attempt any FOUR :

4 × 4 = 16

- (a) Differentiate between open and closed loop system. (Give any four points).
- (b) Draw and explain working of dead-weight tester for pressure calibration.
- (c) Give the function of valve positioner and valve actuator.

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- (d) State the functions of computer aided process control system. (Any **four**)
- (e) Give two applications each for PLC × DCS.
- (f) Explain why valve sizing is important.

3. **Attempt any FOUR :**

4 × 4 = 16

- (a) Draw a neat diagram of thermocouple and explain its working.
- (b) Give any two differences between direct level measurement and indirect level measurement.
- (c) Define elastic pressure transducer. How Bourdon tube is used for pressure measurement ?
- (d) Describe working of ultrasonic flow meter with diagram.
- (e) Draw the system inputs for :
 - (i) Step
 - (ii) Sinusoidal
 - (iii) Ramp
 - (iv) Pulse

4. (A) **Attempt any THREE :**

3 × 4 = 12

- (a) Define Pyrometer. Describe the principle of Radiation Pyrometer.
- (b) State the principle of a glass thermometer. Describe its working with a neat diagram.
- (c) What are the advantages of head flow meters over other flowmeters ?
- (d) State the principle of mass flow meter. State two advantages of thermal flowmeter.

(B) **Attempt any ONE :**

1 × 6 = 6

- (a) Draw the valve characteristics and state their equation.
- (b) With a neat sketch, explain construction and working of PID controller.

5. Attempt any FOUR :**4 × 4 = 16**

- (a) With a neat sketch, explain the construction of flowmeter which is used for high viscosity fluid material.
- (b) State the working principle of pressure gauge method. Give its disadvantages.
- (c) Suggest a device used for the pressure measurement in the range of 10^{-1} to 10^{-5} torr. Explain its working with a neat sketch.
- (d) Explain any one type of solid level measurement with sketch.
- (e) Explain construction of sight glass method with diagram.

6. Attempt any TWO :**2 × 8 = 16**

- (a) List four basic control action and give its output equation. Why 'D' action is not used alone ?
 - (b) Explain air to open and air to close control valve with diagram. Mention where it is used in industry.
 - (c) With a neat sketch, explain the construction and working of a distributed control system (DCS) used in a process industry.
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