

Con. 5442-09.

SP-6884

(3 Hours)

[Total Marks : 100

- N.B.:** (1) Question No. 1 is compulsory.
 (2) Attempt any **four** questions from remaining **six** questions.
 (3) Assume **suitable data** if **required**. State it **clearly**.

1. (a) Define the following terms :— 10
 (i) Piping geometry factor
 (ii) Choked flow
 (iii) Reynolds number
 (iv) PLC Operation cycle and scan time
 (v) Ergonomics.
 (b) What do you mean by calibration ? 10
 Explain the calibration procedure of thermocouple.
2. (a) Explain the sources of control valve noise and explain in brief the abatement techniques for aerodynamic noise. 10
 (b) Estimate the control valve noise for following conditions :— 10
 $P_1 = 114.5$ psia
 $P_2 = 54.5$ psia
 $D = 2$ inch sch 40 (2.375") ; $t = 0.154$ inches
 $C_v = 34$ (required)
 $x_T = 0.75$.
 Location : Open area, 3 feet above the ground and 35 feet from observer.
3. (a) Explain in detail the cavitation phenomenon of control valve and explain also its prevention methods. 10
 (b) Size a control valve for the following conditions :— 10
 Fluid : water $D = 8$ inches sch. 40
 Flow rate : 1600 gpm Valve style : 60° Butterfly valve
 $P_1 = 27.9$ psig
 $P_2 = 20$ psig
 $C_d = 17$.
4. (a) State and explain the forces considered while designing the spring-diaphragm type pneumatic actuator. Also give the actuator sizing steps. 10
 (b) Explain the design considerations for orifice plate. 10

[TURN OVER

Con. 5442-SP-6884-09.

2

5. Sketch and size the PLC for an elevator control. Your explain should include wiring diagram and ladder logic of PLC based elevator control system. **20**
6. (a) Explain the preparation of instrument air with block diagram. **10**
(b) Explain the phases involved in electronic product development. **10**
7. Write short notes on (any **two**) :— **20**
- (a) Control valve selection criteria
 - (b) System engineering
 - (c) Safety valve, relief valve and rupture disc.

—————S—————