

MAY 2017 130-05-17



Q.P.Code: 016371

(3 Hours)

[Total Marks: 80]

Note- Question 1 **compulsory** and solve **any 3** out of the remaining **5** questions

Q1. Solve **any 4**

[20marks]

- What is maximum flow for gases, explain with a graph of pressure drop ratio (x) versus flow rate (w).
- What is absolute calibration method? Give an example.
- Explain the concept and need of redundancy in product design.
- Define ergonomics. What is its purpose?
- Explain control valve actuator selection criteria.

Q2.

- A valve is required to meet the following condition-

[10marks]

Fluid – CO₂

M=44,

k=1.28

Z=0.8 pipe diameter D=3"sch 40

T=548°R

Q=4,00,000 scfh

x_T= 0.75P₁= 557.7psiaP₂= 414.7 psiaC_d = 14 Find the correct valve size.

- Explain the guidelines for design of Control room layout and environment design. [10marks]

Q3.

- Size a valve to pass 6000 lb/hr of Dry Saturated steam flowing in a 4 inch schedule 40 pipe

P₁=50 psig, P₂= 41psig

k= 1.4

Valve selected is Globe valve with x_T = 0.75 and C_d= 13

[10marks]

- Explain the design criteria of Thermocouple.

[10marks]

TURN OVER



Q4.

- a) Explain the general selection criteria for transducers. [10marks]
- b) Check if the given actuator works satisfactorily [10marks]

Type: FTO

Packing: Teflon V-ring

 $K_h = -0.16$ for opening $= -1.0$ for closingSeat diameter: ~~0.5~~ = 0.5 inches

Fluid pressure: 40 – 20 psig for opening

i. 50 – 10 psig for closing

Diagram area: 69" square

Spring rate available: 275 / 370 / 460

Air pressure: 3 – 15 psig

Q5. Write short note on

- a) Phases of Electronic product design [10marks]
- b) System engineering. [10marks]

Q6.

- a) Explain the concept of Reliability with the terms MTTF, MTTR and MTBF [10marks]
- b) Explain with methods of reducing control valve noise. [10marks]