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SF-7121

B. E. III (Sem. VI) (IC) Examination

May / June – 2011

Process Equipment Design

Time : **3** Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :
☛ **B. E. 3 (Sem. 6) (IC)**

Name of the Subject :
☛ **Process Equipment Design**

☛Subject Code No. : **7 1 2 1** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Black figures to the right indicate full marks.
(3) Figure to the right indicate maximum marks.
(4) Draw neat figure wherever required.

1 Answer the short questions :

(i) Find the proper C_v for a value that must allow 150 gallons of ethyl alcohol per minute with a specific gravity of 0.8 at a maximum pressure drop of 50 psi. **2**

(ii) State any two-performance criteria for valve positioner. **2**

(iii) Draw signal pressure Vs stem travel graph for **2**
(a) No plug forces and
(b) With plug forces.

(iv) What is water hammer ? How it can be corrected ? **2**

(v) Explain : Trim of control valve. **2**

(vi) What is valve noise ? **2**

(vii) State the differences between single port body design and double port body design. **3**

2 (a) What is 'slow' process ? Discuss effects of positioner on slow process as well as on controller setting used to control slow process. State the different type of valve positioner. **6**

(b) Explain methods to eliminate cavitation. **9**

OR

(c) Explain 'split range' operation in detail. **5**

(b) Define valve coefficient. Discuss various flow characteristics of control valve. **5**

3 (a) Discuss various globe body designs for control valve. **8**

(b) What is mixed phase flow ? Explain it's effect on gas control valve sizing and how sizing of valve is carried out for mixed phase flow. **7**

OR

3 (a) Explain the butterfly valve with its characteristics. **7**

(b) Brief about valve failure positions achieved by various actuator and inner valve combinations. **4**

(c) Brief about control valve testing. **4**

4 Answer the short questions :

(i) Explain following term for solenoid valve. **2**
   (a) Maximum differential pressure
   (b) Response time

(ii) State the purpose of yoke and bonnet. **2**

(iii) What do you mean by high recovery characteristics of valve ? Give example of such valves. **2**

(iv) What is Control chart ? State their uses. **2**

(v) Why guiding is required for plug assembly ? How it is provided in control valve ? **2**

(vi) Define : **2**
   (i) Built up back pressure,
   (ii) Blow down.

5 (a) According to SPC explain five principles for process control. **8**

(b) What is rupture disc ? Explain composites and reverse bukling type rupture disc. **6**

OR

(b) Explain Rupture disc versus Relief valves. **6**

(c) What is $\bar{X}R$ chart ? Brief the steps required preparing it. **6**

6 (a) What is the use of pressure vacuum relief valves ? Explain pallet type vacuum relief valves. **9**

(b) Explain different methods used to control valve noise. **7**

(c) Brief about valve body material. **2**

OR

6 (a) How effect of backpressure is minimized in bellow-type safety relief valve. **6**

(b) 10 samples, each of size 50, of a pipe were inspected in pressure testing. The results of inspection are given below : 8

Sample No	1	2	3	4	5	6	7	8	9	10
No.of Defectives	3	3	2	0	3	3	1	1	2	23

Draw a p-chart and state your conclusion.

(c) Discuss following accessories of control valve. 4

(i) Hand wheel

(ii) Air sets