

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3151709****Date:03/02/2021****Subject Name:Process Instrumentation****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any **FOUR** questions out of **EIGHT** questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

| | | MARKS |
|------------|---|--------------|
| Q.1 | (a) Draw and define at least three instrument symbols which usually refer in P + I diagram. | 03 |
| | (b) Describe with the net sketch of design layout for control room panel. | 04 |
| | (c) Write the necessity of Instrument Air supply (IAS) in process control. Draw standard Instrument Air supply (IAS) system and describe the role of each component of IAS system in details. | 07 |
| Q.2 | (a) Draw and describe flow characteristic of process control valve | 03 |
| | (b) Enumerate the control valve operation according to valve plug motion | 04 |
| | (c) How will the application of pneumatic control valve is advisable in hazardous process area? Explain working of air to open pneumatic control valve with its net sketch. Also discuss benefits offer over air to close type valve. | 07 |
| Q.3 | (a) Justify an application of Angle and Needle types control valves in process plant control system. | 03 |
| | (b) What is Pinching mechanism? Brief the application of this mechanism as Pinch control valve with its salient features. | 04 |
| | (c) What are the salient features of diaphragm type control valve? Draw and describe working of diaphragm valve with its actuator. Brief its benefits over conventional control valve. | 07 |
| Q.4 | (a) Describe following control valve design consideration (1) Dead band (2) Valve Response Time (3) End connection | 03 |
| | (b) List control valve accessories. Express the working of hand wheel in conjunction of valve operation | 04 |
| | (c) Define valve coefficient (Cv) and describe the function of control valve in process loop. Brief how valve co-efficient is helpful to size the capacity of control valve. | 07 |
| Q.5 | (a) Draw and describe at least two indicator | 03 |
| | (b) What are the needs of recorder? Explain the working of circular chart recorder | 04 |
| | (c) How will valve positioners are helpful for improving valve operation. Describe motion balance type Valve positioners with its net sketch and advantages offered. | 07 |
| Q.6 | (a) Draw and describe the working of 2-wire transmitter with benefits offered by it. | 03 |
| | (b) How will you design an annunciation system? Describe its operation sequences with figure. | 04 |

- (c) What are the requirements of safety relief valve in industry? Describe safety relief valve with its construction, working and design benefits. **07**
- Q.7** (a) Draw and describe the working of 4-wire transmitter with benefits offered by it **03**
- (b) Discuss the need of rupture disc as safety instrument. Describe its operation with neat sketch in detail. **04**
- (c) Draw and describe operation of pneumatic to electric converter as well as current to pneumatic converter. **07**
- Q.8** (a) Describe with neat sketch the working of force balance type pneumatic transmitter. **03**
- (b) Explain with circuit diagram the working of V to F converter **04**
- (c) What is the meaning of S.M.A.R.T. in transmitter terminology? Discuss the operation of SMART transmitter with its construction and salient features. **07**

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