

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024****Subject Code:3151709****Date:23-05-2024****Subject Name:Process Instrumentation****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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| Q.1 | (a) Draw and describe flow characteristic of process control valve | 03 |
| | (b) Draw ISA Symbols of (1) Venturi Tube (2) Target Flow Meter (3) Plug (4) Butterfly Valve | 04 |
| | (c) Define the following terminology - i) Bellow seal ii) Plug iii) Yoke iv) Relief Valve v) Rangeability vi) Safety Valve | 07 |
| Q.2 | (a) Draw and explain rupture disc | 03 |
| | (b) Describe with the net sketch, design layout for control room panel. | 04 |
| | (c) Draw ISA symbols for following (any seven)
(1) Safety valve (2) Electric Line (3) Water cooled condenser (4) Damper (5) Pressure relief valve (6) Capillary tube (7) Variable area flow indicator | 07 |
| | OR | |
| | (c) List out various control valve accessories. Explain any three control valve accessories with figure and its role in control valve. | 07 |
| Q.3 | (a) Explain P to I convertor in detail. | 03 |
| | (b) State various advantages and disadvantages of recorders | 04 |
| | (c) List types of recorders and explain any one in detail | 07 |
| | OR | |
| Q.3 | (a) Explain I to P convertor in detail. | 03 |
| | (b) Explain with circuit diagram the working of V to F converter | 04 |
| | (c) Explain instrumentation air supply in detail | 07 |
| Q.4 | (a) Describe following control valve design consideration
(1) Dead band (2) Valve Response Time (3) End connection | 03 |
| | (b) Explain in detail an application of Angle and Needle types control valves in process plant control system. | 04 |
| | (c) Explain different types of annunciators in detail | 07 |
| | OR | |
| Q.4 | (a) Classify different types of compressors | 03 |
| | (b) Draw P&ID of any temperature control loop with necessary ISA symbols and tags. | 04 |
| | (c) Describe safety relief valve with its construction, working and design benefits. Also state its application in industry. | 07 |
| Q.5 | (a) Explain the role of after cooler in compressor with example. | 03 |
| | (b) Explain in detail graphic display | 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 |
| | OR | |
| Q.5 | (a) What is cavitation? Explain different valve noise problem. | 03 |
| | (b) Discuss instrument power requirements in brief. | 04 |
| | (c) Explain difference between 2-wire transmitter and 4-wire transmitter. | 07 |
