

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3170516****Date:16-12-2023****Subject Name: Process Auxiliaries and utilities****Time: 10:30 AM TO 01:00 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**

- Q.1**
- |     |  |           |
|-----|--|-----------|
| (a) | What is purging? Why is nitrogen purging required? List out nitrogen gas applications. | <b>03</b> |
| (b) | Discuss types of material and its characteristics for piping design.                   | <b>04</b> |
| (c) | Short note: Cooling Tower  | <b>07</b> |

- Q.2**
- |     |   |           |
|-----|---|-----------|
| (a) | Enlist different types of valves.   | <b>03</b> |
| (b) | Discuss selection criteria of valves for various systems.                                 | <b>04</b> |
| (c) | What is water softening? List out various methods for water softening and explain anyone. | <b>07</b> |

**OR**

- |     |                        |           |
|-----|------------------------|-----------|
| (c) | Define the terms:      | <b>07</b> |
|     | 1) NPSH requirement    |           |
|     | 2) Pump piping support |           |
|     | 3) Pipe size           |           |
|     | 4) Piping insulation   |           |
|     | 5) Piping fittings     |           |
|     | 6) Pipe joints         |           |
|     | 7) Demineralization    |           |

- Q.3**
- |     |  |           |
|-----|--|-----------|
| (a) | What is difference between chiller and refrigerator?                             | <b>03</b> |
| (b) | Explain various steam generation methods.  | <b>04</b> |
| (c) | Explain Vapor-compression refrigeration along with application of refrigeration. | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | What is the difference between a compressor and a vacuum pump? Can compressor use as a vacuum pump? | <b>03</b> |
| (b) | Short Note: Waste Heat Utilization  | <b>04</b> |
| (c) | What is ejector system? Explain any one type of ejector with neat sketch.                           | <b>07</b> |

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | What are the functions of insulation?                                  | <b>03</b> |
| (b) | Discuss desirable criteria of insulating materials.                    | <b>04</b> |
| (c) | Explain the lubrication requirement in different types of compressors. | <b>07</b> |

**OR**

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain factors for pipe selection.  | <b>03</b> |
| (b) | Discuss types, characteristics and application of steam traps.             | <b>04</b> |
| (c) | Discuss about pressure relief devices used in chemical process industries. | <b>07</b> |

- Q.5**
- |     |   |           |
|-----|---|-----------|
| (a) | Define: Process Heating. Mention process heating applications used in industry. | <b>03</b> |
|-----|---|-----------|

- (b) Explain different types of flow diagrams for process plants. **04**
- (c) List the advantages and disadvantages of centrifugal pump and describe the characteristics curves of a centrifugal pump. **07**

**OR**

- Q.5** (a) Explain how blanketing is done in storage vessel with a diagram. **03**
- (b) Explain causes and prevention techniques for corrosion problem in cooling water treatment. **04**
- (c) List out various types of vacuum pumps and their uses. **07**

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