Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170516 Date:23-05-2025

Subject Name:Process Auxiliaries and utilities

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
Q.1	**(a)**	Under what condition in chemical plant is nitrogen system used as a utility?	**03**
	(b)	List all utilities used in chemical plants.	**04**
	(c)	Justify the importance of pipe insulation and discuss the type of pipe insulation.	**07**
Q.2	**(a)**	Discuss the characteristics of the vacuum pump.	**03**
	(b)	Interpret the importance of steam distribution systems in chemical plants.	**04**
	(c)	Enlist various rotary compressors, and explain the construction and working of any one rotary compressor.	**07**
		OR	
	(c)	Compare various methods of water treatment with each other.	**07**
Q.3	**(a)**	Justify the need of air compressor in the industry.	**03**
	(b)	List the components involved in instrument air system	**04**
	(c)	Differentiate non-steam heating and steam heating process.	**07**
		OR	
Q.3	**(a)**	Why is ejector needed for utility economy?	**03**
	(b)	How is material handling carried out in the industry?	**04**
	(c)	Differentiate steam generation and steam economy.	**07**
Q.4	**(a)**	List all utility energy considerations for industrial application.	**03**
	(b)	Enlist the all materials used for the fabrication of the pipe and explain alloy steel.	**04**
	(c)	Enlist all air compressors. Explain the working with the construction of a multi-stage single-acting reciprocating compressor.	**07**
		OR	
Q.4	**(a)**	Discuss principle and working of thermic fluid heater.	**03**
	(b)	What is blow down and why it is required?	**04**
	(c)	Draw a neat clean figure steam pipe line with its required fittings and ancillaries.	**07**
Q.5	**(a)**	Draw the standard symbols of the following as used in process flow diagram: (i) Control valve (ii) Heat exchanger (iii) packed column	**03**
	(b)	Explain hot and cold insulation with examples and schematics.	**04**
	(c)	Explain the selection criteria of valves.	**07**
		OR	
Q.5	**(a)**	Define COP of a refrigerator.	**03**
	(b)	State four factors for the choice of refrigerant.	**04**
	(c)	Discuss vapor compression refrigeration cycle with a diagram.	**07**

****