Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- V EXAMINATION-SUMMER 2023

Subject Code: 3150506 Date: 30/06/2023

Subject Name: Chemical Process Plant Design & Economics

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)**	What is the role of chemical engineer in a chemical process industry?	**03**
	(b)	Discuss types of depreciation in brief.	**04**
	(c)	State and discuss the factors to be considered in selection of the location of a chemical plant.	**07**
Q.2	**(a)**	Define: (1) Salvage value (2) Book value (3) Market Value	**03**
	(b)	Draw a tree-diagram to show the cash flow for an industrial operation.	**04**
	(c)	Compare CPM and PERT techniques of project management.	**07**
		OR	
	(c)	What is BAR chart? Explain planning of a project schedule using it.	**07**
Q.3	**(a)**	A heat Exchanger of Area 10 m^2 costed 50,000 in 2017. What is the estimated cost of 15 m^2 heat exchanger in 2022? Assume that cost index in 2017 was 270 and in 2022 is 320. Equipment cost vs. capacity factor is 0.6.	**03**
	(b)	What is Pilot Plant? State the importance of pilot plant.	**04**
	(c)	Sketch an ideal plant layout. (Provide legend if required)	**07**
		OR	
Q.3	**(a)**	Discuss six-tenth factor rule.	**03**
	(b)	Write a brief note on ‘Unit area concept’.	**04**
	(c)	Explain objectives and contents of techno-economic feasibility survey in detail.	**07**
Q.4	**(a)**	What is standard equipment? State the advantages of standard equipment over special equipment.	**03**
	(b)	Write short note on patents.	**04**
	(c)	The original value of a piece of equipment is $22,000, completely installed and ready for use. Its salvage value is estimated to be $2000 at the end of a service life estimated to be 10 years. Determine the asset (or book) value of the equipment at the end of 5 years using straight line and textbook declining balance method.	**07**
		OR	
Q.4	**(a)**	Define: (i) payback period (ii) net present worth (iii) rate of return on investment.	**03**
	(b)	Discuss replacement studies with example.	**04**
	(c)	Discuss with sketches different pipe fittings. State the selection criteria of valve.	**07**

Q.5	**(a)**	Discuss Types of Flow Diagram.	**03**
	(b)	Enlist various methods of Profitability Analysis. Explain any One.	**04**
	(c)	Discuss the principles of various treatment methods for boiler-feed water in a chemical industry.	**07**

OR

Q.5	**(a)**	Explain Nelson Farrar Refinery construction cost index.	**03**
	(b)	Explain: (1) Battery limit (2) Grass Root Plant.	**04**
	(c)	Write a short note on applied utilities for a chemical process plant.	**07**

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