GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:2160503   **Date:05-12-2023**
Subject Name:Process Equipment Design -I
Time:02:30 PM TO 05:30 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)	Define Schedule number.	03
	(b)	Write a brief note on NPSH for centrifugal pumps	04
	(c)	Explain the function of the following parts for the shell and tube heat exchanger. (i) Baffles (ii) Tie rods (iii) Spacers (iv) Expansion joint (v) Tube side pass partition (vi) Tube sheet s	07
Q.2	(a)	Determine the designation of the shell & tube heat exchanger based on following TEMA notations 1. BEM 2. BFL 3. AKT	03
	(b)	How baffle cut and baffle spacing affect shell side heat transfer coefficient	04
	(c)	Explain Tinker's flow model with a neat diagram.	07
		OR	
	(c)	Discuss criteria of selection between Kettle-type Reboiler and Thermosyphon reboiler	07
Q.3	(a)	Define: Weeping, Entrainment, Coning in distillation column?	03
	(b)	Discuss in brief the factors affecting selection of tray type.	04
	(c)	Discuss the concept of optimum reflux ratio	07
		OR	
Q.3		Consider a case where condensation is done with subcooling by cooling water entering at 32ºC. Heat duty of condensation is 1327 KW and heat duty for subcooling is 166 KW. Temperature difference of cooling medium is 8ºC.Specific heat of cooling water 1 Kcal/Kg ºC.Calculate the mass flow rates of cooling water required separately of condensation as well as subcooling and calculate intermediate temperature of cooling water utilized for subcooling assuming that entire flow rate of cooling water is utilized for subcooling first	14
Q.4	(a)	Mention the application of hegstebeck and geddes equation? Discuss the equation.	03
	(b)	State the advantages of vacuum distillation.	04
	(c)	With suitable examples explain the concept of selection of operating pressure for distillation column.	07
		OR	
Q.4	(a)	State the function of liquid distributors, packing support and hold down plate in packed tower type absorber?	03
	(b)	With neat sketch discuss any two types of random packing material used for packed tower type absorber.	04

	(c)	Write down selection criteria for packed tower and spray tower	07
Q.5	(a)	How distribution coefficient affects liquid liquid extraction	03
	(b)	Classify industrially important extractors	04
	(c)	Discuss the industrial applications of Liquid Liquid Extraction	07

OR

Q.5	(a)	Define selectivity for extraction	03
	(b)	Discuss about various liquid distributors in detail	04
	(c)	Discuss in brief the design steps for the process design of horizontal settler	07

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