Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code:3160507 Date:30-05-2025

Subject Name: Advanced Separation Processes

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.**

Q.1	**(a)**	Define the term "separation factor". Also describe the feasibility of separation based on the different values of separation factor.	**03**
	(b)	Describe the working of membrane bioreactor in brief.	**04**
	(c)	Explain working of gas chromatography with neat a figure in detail.	**07**
Q.2	**(a)**	Differentiate between equilibrium separation processes and rate-governed separation processes with appropriate examples.	**03**
	(b)	Describe the principle of thin-layer chromatography in brief.	**04**
	(c)	List the essential properties of a super critical solvent. Also describe their advantages and disadvantages over conventional liquid solvents.	**07**
		OR	
	(c)	Describe RO process with a schematic diagram and also explain its application in desalination.	**07**
Q.3	**(a)**	Explain the merits of reactive distillation over conventional technology (Reactor followed by distillation column).	**03**
	(b)	List at least four industrial applications of short path distillation.	**04**
	(c)	Explain the manufacturing of ETBE using reactive distillation. Also explain the effect of various parameters on the performance of reactive distillation unit.	**07**
		OR	
Q.3	**(a)**	Discuss about different materials used for membranes synthesis.	**03**
	(b)	List at least four industrial applications of reactive distillation technology.	**04**
	(c)	Explain design and working of shorth path distillation unit. Also explain sepearation of Vitamin-E from crude Vitamin-E acetate with the help of neat process flow diagram using short path distillation.	**07**
Q.4	**(a)**	Explain concept and working of nanofiltration.	**03**
	(b)	Classify different types of membrane process based on the driving force.	**04**
	(c)	With a flow sheet, explain the working of Kraft process for decaffeination of coffee.	**07**
		OR	
Q.4	**(a)**	Compare short-path distillation with molecular distillation.	**03**
	(b)	Explain the different problems associated with membranes and its possible solutions.	**04**
	(c)	Explain ROSE process with a neat flow diagram.	**07**
Q.5	**(a)**	Describe the factors affecting the efficiency of electrophoresis in brief.	**03**
	(b)	Compare ion exchange chromatography with gel filtration chromatography.	**04**
	(c)	Explain working principle of pervaporation and enlist its various industrial applications.	**07**
		OR	
Q.5	**(a)**	Discuss with a neat sketch: BALE and KATMAX packing for reactive and catalytic distillation.	**03**
	(b)	Compare gel electrophoresis with paper electrophoresis	**04**
	(c)	Enlist various membrane modules used for membrane separation processes and describe any two of them in detail.	**07**

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