K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year: 2025-2026	Semester: VII
Class: FINAL	Program: B.Tech
Branch Code: CHE	Pattern: 2022
Name of Course: Advanced Separation Processes	Course Code: CHE224006A
Max. Marks: 30	Duration:1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome of the Question/sub-question.

		Marks	CO
Question No. 1			
1	Describe the working of extractive distillation and list any two criteria for selecting a suitable entrainer.	(3)	CO2
Question No. 2			
2	Explain the working of pervaporation and the role of sorption–diffusion in separation.	(3)	CO2
Question No. 3			
3.a)	Describe the working cycle of Pressure Swing Adsorption (PSA) with reference to adsorption, depressurization, and regeneration steps.	(4)	CO2
	OR		
3.b)	Explain the adsorption mechanism in zeolites and mention two applications based on their pore structure and ion-exchange capability.	(4)	CO2
3.c)	Describe the design elements of a gas chromatography system (column type, carrier gas, detector) and their influence on separation efficiency.	(4)	CO2
	OR		
3.d)	Compare TSA and PSA in terms of operating conditions, cycle time, energy requirements, and suitable applications.	(4)	CO3
Question No. 4			
4.a)	Explain how reactive separation processes achieve process intensification compared with traditional reactor separator arrangements.	(4)	CO2
	OR		
4.b)	Describe the principle of reactive extraction and apply it to the separation of organic acids using amine extractants.	(4)	CO2
4.c)	Compare membrane distillation with reverse osmosis in terms of driving force, operating conditions, and suitability for high-salinity feeds.	(4)	CO3

OR

4.d)	Analyze the key design considerations (reaction zone, separation zone, catalyst placement) required for designing a reactive distillation column.	(4)	CO3

Question No. 5

5.a)	Explain how centrifugal force enhances phase separation and give two applications in chemical or biotech processing.	(4)	CO2

OR

5.b)	Explain the principle of electrophoresis and describe how charged biomolecules are separated based on mobility.	(4)	CO2
5.c)	Analyze how bubble size, airflow rate, and surface activity influence separation efficiency in foam fractionation.	(4)	CO3

OR

5.d)	Analyze how rotor speed, feed viscosity, and particle size determine separation efficiency in centrifugation.	(4)	CO3

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