

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI EXAMINATION – WINTER 2025****Subject Code:3160507****Date:25-11-2025****Subject Name:Advanced Separation Processes****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) Mention membrane pore size which is used in RO, MF, UF, and NF individually.	03
(b) Define: the Separation factor, Permeability	04
(c) List out the principal characteristics of novel separation techniques.	07
Q.2 (a) Discuss the drawbacks of conventional separation processes.	03
(b) Explain the working principle and industrial applications of reverse osmosis in membrane separation processes.	04
(c) Explain the concept and working principle of a membrane bioreactor.	07
OR	
(c) Describe the principle and its applications of hybrid distillation-pervaporation systems.	07
Q.3 (a) Enlist major areas of application in advance separation processes.	03
(b) State four advantages of reverse osmosis.	04
(c) Describe in brief a spiral wound membrane module.	07
OR	
Q.3 (a) Explain Equilibrium & rate-governed separation.	03
(b) State four applications of microfiltration.	04
(c) Explain the concept and working of a membrane reactor.	07
Q.4 (a) Discuss the Principle of chromatographic separation.	03
(b) Enlist different factors affecting the electrophoresis process.	04
(c) Describe the manufacturing of ETBE by reactive distillation process and compare it with the conventional process.	07
OR	
Q.4 (a) Write the applications of electrophoresis.	03
(b) Explain Paper Chromatography.	04
(c) With the help of a detailed flow diagram explain the ROSE process for deasphalting.	07
Q.5 (a) List the advantages and disadvantages of reactive catalytic distillation.	03
(b) Discuss Properties of Super Critical Fluid Solvents.	04
(c) Discuss the concept and working of the Short Path Distillation Unit.	07
OR	
Q.5 (a) Discuss the properties of the supercritical fluid solvents and Discuss why CO ₂ is used as the most preferred supercritical fluid solvent.	03
(b) Discuss with neat sketch: BALE and KATMAX packing for reactive and catalytic distillation.	04
(c) Discuss the Hydrothermal oxidation.	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024****Subject Code:3160507****Date:05-12-2024****Subject Name:Advanced Separation Processes****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Figures to the right indicate full marks.
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4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define separation factor and its importance.	03
	(b) Discuss the criteria for selecting an advance separation process over conventional process.	04
	(c) Classify membrane separation processes based on driving force and also list the general characteristics.	07
Q.2	(a) List the commonly used supercritical solvents. Why CO ₂ is preferred?	03
	(b) Enlist the superior properties and solubility behavior of supercritical fluids compared to conventional solvents.	04
	(c) Explain decaffeination of coffee with a neat diagram.	07
OR		
	(c) Explain ROSE process with a neat flow sheet.	07
Q.3	(a) Briefly describe gas separation using membranes.	03
	(b) Write short note on dialysis and electro dialysis.	04
	(c) Describe the different types of packings used in reactive distillation process.	07
OR		
Q.3	(a) Describe the manufacturing process of MTBE by reactive distillation with a neat process flow sheet.	07
	(b) Explain the concept & working of a short path distillation unit with a neat sketch.	07
Q.4	(a) Write a short note on membrane modules.	03
	(b) Elaborate a thin film composite type membrane with a diagram.	04
	(c) Describe reverse osmosis process and its application in desalination of sea water.	07
OR		
Q.4	(a) Depict production of absolute alcohol by pervaporation process.	07
	(b) Describe membrane reactor and its application in gas separation.	07
Q.5	(a) Explain the principle of electrophoresis separation.	03
	(b) What are the different factors which affect electrophoresis separation.	04
	(c) Give a detailed description of the various applications of electrophoresis separation.	07
OR		
Q.5	(a) Discuss principle and operation of ion exchange chromatography.	07
	(b) Describe thin layer and paper chromatography with a neat sketch.	07

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160507

Date:13-12-2023

Subject Name: Advanced Separation Processes

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.

- Q.1** (a) Explain concept and working of ultrafiltration. **03**
(b) Discuss in detail the de-caffination process. **04**
(c) Explain the various aspect of reactive and catalytic distillation over the conventional distillation **07**
- Q.2** (a) Discuss various membrane materials for Reverse Osmosis (RO). **03**
(b) Discuss with neat sketch: BALE and KATMAX packing for reactive and catalytic distillation **04**
(c) Discuss principle of Pressure Swing Adsorption (PSA) with its commercial applications in detail. **07**
- OR**
- (c) Explain the working principle of pervaporation and describe hybrid process for the production of absolute alcohol. **07**
- Q.3** (a) Discuss various applications of Melt Crystallization in brief. **03**
(b) Explain concept and working of membrane reactor. **04**
(c) Discuss about the various types of contacting devices use in Catalytic Distillation. **07**
- OR**
- Q.3** (a) Explain concept and working of nanofiltration. **03**
(b) Write advantages and limitations of membrane separation processes over conventional separation processes. **04**
(c) Explain the concept and working of a membrane reactor. **07**
- Q.4** (a) Describe in brief a spiral wound membrane module. **03**
(b) Discuss the phase equilibrium diagram of melt crystallization. **04**
(c) Discuss various separation techniques used in chemical industry and their advantages with example. **07**
- OR**
- Q.4** (a) Classify the membrane process based on driving force. **03**
(b) Discuss in brief the essential properties of a good supercritical solvent. **04**
(c) Discuss in details various operating parameters for the evaluation of performance of membrane process. **07**
- Q.5** (a) Draw a neat sketch of a cross-flow membrane process. **03**
(b) State industrial application of membrane distillation. **04**
(c) Discuss in detail various engineering problems associated with usage of membranes. **07**
- OR**
- Q.5** (a) Write the advantages and disadvantages of pressure swing distillation over extractive distillation. **03**
(b) Write short note on Membrane cleaning. **04**
(c) With the help of a detailed flowsheet explain the ROSE process for deasphalting by propane using supercritical extraction. Also list the advantages. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI(NEW) EXAMINATION – WINTER 2022****Subject Code:3160507****Date:17-12-2022****Subject Name:Advanced Separation Processes****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) Explain Separation factor	03
	(b) Discuss equilibrium and rate governed separation	04
	(c) Discuss drawbacks of the conventional separation processes	07
Q.2	(a) Write operating parameters of RO and NF membranes	03
	(b) Explain in brief working principle of membrane processes	04
	(c) List out different membrane modules. Discuss anyone in detail	07
OR		
	(c) Discuss working principle of Nanofiltration membrane & write industrial applications for Nanofiltration membrane.	07
Q.3	(a) Enlist different materials used for membranes synthesis	03
	(b) Discuss applications of membrane gas separation	04
	(c) Explain Hybrid distillation-pervaporation system	07
OR		
Q.3	(a) Enlist different properties of supercritical fluids	03
	(b) Enlist Synthesis methods of membrane. Explain anyone in brief	04
	(c) Explain principle of pervaporation & list out different membranes used in pervaporation	07
Q.4	(a) Enlist any three advantages of supercritical extraction	03
	(b) List out various types of membrane used for membrane reactor. Explain anyone	04
	(c) Explain principle of designing of gas separator membrane using complete mixing model	07
OR		
Q.4	(a) Define reactive and catalytic distillation	03
	(b) Discuss advantage and disadvantage of reactive distillation	04
	(c) Explain manufacturing of Methyl Tertiary Butyl Ether (MTBE)	07
Q.5	(a) Discuss in brief Principle of chromatographic separation	03
	(b) List out advantages and disadvantages of chromatographic separation processes	04
	(c) Discuss commercial applications of supercritical extraction.	07
OR		
Q.5	(a) Write principle of electrophoresis process	03
	(b) Enlist different factors affecting electrophoresis process	04
	(c) Discuss chromatographic column Ion exchange chromatography	07
