

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021****Subject Code:3160507****Date:04/12/2021****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.

		MARKS
Q.1	(a) Enlist major areas of application in advance separation processes	03
	(b) Show importance's of chemical engineer in industry	04
	(c) Discuss drawback of conventional separation processes	07
Q.2	(a) Explain different membrane modules	03
	(b) Use industrial application of membrane separation processes	04
	(c) Explain Nano-Filtration Process	07
	OR	
	(c) Explain Reverse Osmosis process	07
Q.3	(a) Describe Gas Separation Membrane	03
	(b) Draw manufacturing of MTBE	04
	(c) Draw neat sketch of SPDU with concept and working	07
	OR	
Q.3	(a) Show membrane bio-reactor	03
	(b) Draw manufacturing of ETBE	04
	(c) Draw and explain with sketch BALE and KATMAX packing	07
Q.4	(a) List common chemicals used as supercritical solvent	03
	(b) Explain gel filtration	04
	(c) Discuss and draw Residium Oil Supercritical Extraction (ROSE) process	07
	OR	
Q.4	(a) List advantages of Supercritical Extraction	03
	(b) Explain Paper Chromatography	04
	(c) Explain Decaffeination of Coffee with sketch	07
Q.5	(a) Give uses of Electrophoresis	03
	(b) Discuss principle of Electrophoresis	04
	(c) Show advantages and disadvantages of Chromatographic Separation	07
	OR	
Q.5	(a) List factors affecting Electrophoresis	03
	(b) Discuss Gel Membrane	04
	(c) Describe Paper Electrophoresis	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2022****Subject Code:3160507****Date:10/06/2022****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) Write two examples of materials used as organic membrane and inorganic membrane. **03**
- (b) What are unique properties and solubility behaviour of supercritical fluids? **04**
- (c) With suitable examples discuss importance of advanced separation processes over conventional separation processes in chemical industry. **07**
- Q.2** (a) List out three names of membrane modules used in membrane separation processes. **03**
- (b) Discuss working principle of nanofiltration and its industrial applications. **04**
- (c) Explain with neat flow sheet Residuum Oil Supercritical Extraction (ROSE) process. **07**
- OR**
- (c) Explain with neat flow sheet MTBE manufacturing by catalytic distillation. **07**
- Q.3** (a) Define: Membrane fouling. If the pressure drop (ΔP) is 1000 units, the flux (J) is 50 units, what is the hydraulic membrane permeability? **03**
- (b) Define: supercritical fluid. Explain important properties of super critical fluid. CO₂ is most widely used super critical fluid for extraction-justify. **04**
- (c) Discuss in detail about different types of membrane reactors. **07**
- OR**
- Q.3** (a) Draw labeled diagram of: (i) dead-end membrane filtration and (ii) cross-flow membrane filtration **03**
- (b) State four advantages of reverse osmosis. **04**
- (c) List out five advantages and five limitations of reactive/catalytic distillation over conventional distillation. **07**
- Q.4** (a) Define: (i) equilibrium governed separation and (ii) rate governed separation. **03**
- (b) State four applications of microfiltration. **04**
- (c) Draw a labeled diagram of short path distillation unit (SPDU). **07**
- OR**
- Q.4** (a) Write three examples of concentration driven membrane process. **03**
- (b) What are the essential properties of a good supercritical solvent? **04**
- (c) Discuss membrane gas separator principal using complete mixing model. **07**
- Q.5** (a) Answer the followings: **03**
- (i) What is the membrane that selectively allows certain species to pass through called?
- (ii) What is the value of standard design temperature of reverse osmosis systems?

- (iii) Calculate the recovery for the following data:
Product Flow: $535 \text{ m}^3/\text{h}$.
Feed flow : $635 \text{ m}^3/\text{h}$.
- (b) What is principal and working of thin layer chromatography? **04**
- (c) Explain in detail about pervaporation separation. **07**

OR

- Q.5** (a) List out three industrial applications of membrane gas separation. **03**
- (b) With neat diagram explain principle of electrophoresis separation. **04**
- (c) Explain principal and working of gel filtration and affinity chromatography. **07**
