Seat No.: _____ Enrolment No._____

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**

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Seat No.: _____ Enrolment No._____

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. CO_2 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 m^3/h. Feed flow : 635 m^3/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**

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