Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2021

Subject Code:3170510 Date:15/12/2021

Subject Name:Process Intensification

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)**	What is process intensification? Explain the main benefits of process intensification.	**03**
	(b)	Write a short note on Membrane Distillation.	**04**
	(c)	Write a short note on printed circuit board heat exchangers.	**07**
Q-2	**(a)**	State the various types of compact heat exchangers with applications.	**03**
	(b)	What is area density? Compare the range of area density for various compact heat exchangers.	**04**
	(c)	Draw schematic of toolbox for Process intensification.	**07**
		OR	
	(c)	Explain the working principle of spinning disc reactor. Discuss the Nusselt flow model for this reactor.	**03**
Q-3	**(a)**	Write a short note on Reactive distillation.	**03**
	(b)	What are structure reactors? Give classification of structure reactors with typical example.	**04**
	(c)	Discuss the process intensification in process of Absorption of NOx.	**07**
		OR	
Q-3	**(a)**	Explain the concept in Reactive absorption.	**03**
	(b)	Write a brief note on micro heat exchangers.	**04**
	(c)	Discuss in brief Catalytic Plate Reactor (CPR) with example of various reactions.	**07**
Q-4	**(a)**	Discuss the applications of Monolith reactors with example.	**03**
	(b)	Write a short note on Membrane enclosed catalytic reactor.	**04**
	(c)	Explain the principle and working of foam heat exchangers. Which parameters are intensified?	**07**
		OR	
Q-4	**(a)**	State unique point or application of 1. Mixing on a spinning disc 2. Induction-heated mixer 3. Short path distillation	**03**
	(b)	State the name of various novel reactors used in process industry.	**04**
	(c)	Discuss and explain case study of Methyl Acetate Synthesis as PI.	**07**
Q-5	**(a)**	List out the existing and potential applications of extractive distillation.	**03**
	(b)	What are the barriers and future potential scope for hybrid separation processes?	**04**
	(c)	Discuss in brief process intensification in mixers.	**07**
		OR	
Q-5	**(a)**	Explain the construction and working of ejectors as mixer.	**03**
	(b)	Write a short note on static mixers.	**04**
	(c)	Give a brief overview of structure reactors.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3170510 Date:08/06/2022

Subject Name:Process Intensification

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)**	Discuss the several objectives of Process Intensification.	**03**
	(b)	Write a short note on various techniques of Process Intensification (PI) Applications.	**04**
	(c)	Define Process Intensification and discuss advantages of Process Intensification with respect to safety, Environment and Energy.	**07**
Q.2	**(a)**	Explain the Heat Integrated Distillation Trains.	**03**
	(b)	Discuss the different Principles of Process Intensification	**04**
	(c)	Discuss Rotating Packed bed reactor with neat sketch and applications in detail.	**07**
		OR	
	(c)	Discuss working of Catalytic plate reactor with neat sketch , merits and demerits.	**07**
Q.3	**(a)**	Explain the role of Environmental Catalysis in designing of reactors.	**03**
	(b)	Explain the Gauzes, Structured Packings, Foams in field of reactors.	**04**
	(c)	Discuss Mesh heat exchangers with neat sketch.	**07**
		OR	
Q.3	**(a)**	Define Membrane absorption/stripping with suitable example.	**03**
	(b)	Explain the Fundamentals of process modeling considering example of Methyl Acetate Synthesis.	**04**
	(c)	Discuss Printed circuit heat exchanger in detail.	**07**
Q.4	**(a)**	Write a short note on Ultrasound Atomization	**03**
	(b)	Discuss the selection criteria of heat exchanger technology.	**04**
	(c)	Discuss working of Spinning disc reactor with neat sketch, merits and demerits.	**07**
		OR	
Q.4	**(a)**	Write a short note on Ejectors.	**03**
	(b)	Discuss the advantages and disadvantages of plate heat exchangers.	**04**
	(c)	Discuss Monolithic Catalysts and Reactors in detail.	**07**
Q.5	**(a)**	Discuss the overview of structured reactors.	**03**
	(b)	Explain dividing wall columns of distillation with neat sketch.	**04**
	(c)	Discuss working of Extractive distillation operation with necessary diagram, merits and demerits.	**07**
		OR	
Q.5	**(a)**	Discuss Mass Transfer in Monoliths structures.	**03**
	(b)	Discuss Barriers and future prospects associated with Hybrid Separation.	**04**
	(c)	Discuss working of Supercritical separation operation with necessary diagram, merits and demerits	**07**

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