Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3170501 Date:01/06/2022

Subject Name:Chemical Reactions Engineering II

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)**	Give name of the type of reactor used for fluid-fluid reactions.	**03**
	(b)	Give examples of fluid particle reactions (Non catalytic).	**04**
	(c)	Explain Progressive Conversion model for fluid particle reaction.	**07**
Q.2	**(a)**	What is the role of catalysts in reaction system? How will it enhance the rate of reaction?	**03**
	(b)	Derive rate equation for fluid-fluid reaction for straight mass transfer	**04**
	(c)	Derive LHHW model with surface reaction as the rate controlling mechanism for the first order reversible reaction.	**07**
		OR	
	(c)	Write in detail about the various methods for preparation of catalysts.	**07**
Q.3	**(a)**	Give significance of Effectiveness factor for solid catalyzed reaction.	**03**
	(b)	Explain poison and promoter for catalyst with example.	**04**
	(c)	Discuss in detail about slurry reactor kinetics.	**07**
		OR	
Q.3	**(a)**	Explain Turn over frequency and Selectivity of catalysts.	**03**
	(b)	Write in brief about the criteria for rate controlling steps in fluid particle reaction.	**04**
	(c)	Discuss advantages and disadvantages of fluidized bed reactor over fixed bed reactor.	**07**
Q.4	**(a)**	Discuss about the Monolithic catalyst.	**03**
	(b)	Define: 1) Catalysts 2) Accelerator 3) Coking 4) Sintering	**04**
	(c)	Derive BET equation for surface area of catalysts.	**07**
		OR	
Q.4	**(a)**	Discuss various physical properties of catalyst.	**03**
	(b)	Discuss the effect of Henry's constant value on the solubility of gas in liquid.	**04**
	(c)	Derive Langmuir adsorption isotherm for molecular adsorption of hydrogen on catalyst surface.	**07**

Q.5	**(a)**	Give examples for various fluid-fluid reactions.	**03**
	(b)	How can Hatta number be used to decide the type of contacting device for fluid –fluid reactions.	**04**
	(c)	State various experimental methods for determining rates in solid catalyzed reaction.	**07**

OR

Q.5	**(a)**	Write in brief on how solubility data cam help to predict the kinetic regime for fluid -fluid reactions.	**03**
	(b)	Discuss Segregation model in brief.	**04**
	(c)	Derive the rate equation for fluid–fluid reaction in the case of instantaneous irreversible reaction with higher concentration of constituent B.	**07**

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