Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 711602N

Subject Name: Advanced Kinetics and Reaction Engineering

Date: 01 /02 /2011 **Time: 02.30 pm – 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.**

Q.1	**(a)**	Derive Tanks in series model with usual notations	**07**
	(b)	Discuss different models for fluidized bed reactor	**07**
Q.2	**(a)**	Develop rate equation for s slurry reactor	**07**
	(b)	Discuss kinetic regimes for mass transfer and reaction	**07**
		OR	
	(b)	Derive rate equation for slow fluid-fluid reactions	**07**
Q.3	**(a)**	Discuss in brief about rate laws and mass balances for a bioreactor	**07**
	(b)	A packed bed reactor (L= 8 cm, u=2.2 cm/sec) the conversion is 90% for a 1st order reaction A→R, what would be conversion in a larger fluidized bed reactor (L= 210 cm, u_0=30 cm/sec) in which the estimated bubble size is 10 cm Data: Rate constant k = 1.3 sec^{-1} u_{mf} = 3.8 cm/sec $\varepsilon_{mf} = \varepsilon_m = 0.5$ Diffusivity D = 0.22 cm^2/sec $\alpha = 0.35$	**07**
		OR	
Q.3	**(a)**	Discuss dilution rate and wash out in a bioreactor	**07**
	(b)	With neat diagram explain schemes for avoiding serious by passing in fluidized beds with larger bubbles for fluidized bed reactor	**07**
Q.4	**(a)**	Discuss about flow regimes and liquid hold up for a trickle bed reactor	**07**
	(b)	Write a brief note on Moving bed reactor	**07**
		OR	
Q.4	**(a)**	Explain pressure drop and heat transfer in a trickle bed reactor	**07**
	(b)	Discuss application of differential calculus and linear programming in reactor optimization	**07**
Q.5	**(a)**	Discuss different types of loop reactors used in industry	**07**
	(b)	Derive concentration profile for a single cylindrical pore with reactant A diffusing into pore for solid catalyzed reaction of first order	**07**
		OR	
Q.5	**(a)**	Write a brief note on Bubble column reactors	**07**
	(b)	Discuss in brief recent developments in trickle bed reactor and monolithic reactors	**07**

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