Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – WINTER 2015

Subject Code:180501 **Date:09/11/2015**

Subject Name: Chemical Reaction Engineering-II

Time: 2:30pm to 5:00pm **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)**	What are Stimulus response (SR) techniques? List various possible SR techniques used to study the flow in vessels.	**07**
	(b)	Discuss in detail deviations from ideal flow pattern with examples.	**07**
Q.2	**(a)**	Discuss and derive dispersion model for non-ideal flow.	**07**
	(b)	A closed vessel has flow for which dispersion number is 0.3, we wish to represent this vessel by tanks in series model. What value of number of tanks should be selected?	**07**
		OR	
	(b)	Explain in detail with diagram different ways of approaching plug flow	**07**
Q.3	**(a)**	For a chemical reaction control fluid particle reaction, derive relation for time required for conversion for unreacted core model for spherical particles of unchanging size. Also find time required for complete conversion.	**07**
	(b)	Calculate the time needed to burn to completion the particles of graphite (diameter of particle=12 mm, ρ_B= 2.2 gm/cm^3, k_s= 25 cm/sec) in an 10% oxygen stream. For the higher gas velocity used assume that film diffusion does not offer any resistance to transfer and reaction. The reaction temperature is 900°C.	**07**
		OR	
Q.3	**(a)**	Discuss in detail different models for fluid particle reactions.	**07**
	(b)	Discuss about determination of rate controlling step for fluid particle reaction	**07**
Q.4	**(a)**	Discuss various kinetic regime of mass transfer and reaction for fluid-fluid reactions	**07**
	(b)	Derive rate equation for instantaneous fluid- fluid reaction	**07**
		OR	
Q.4	**(a)**	Write in brief about towers for slow reaction for reaction of the type A (gas) + bB (liquid) → product	**07**
	(b)	Discuss slurry reaction kinetics	**07**
Q.5	**(a)**	Write briefly about Prediction from active site theory	**07**
	(b)	Write a brief note on “Experimental reactors for solid catalyzed reactions	**07**
		OR	
Q.5	**(a)**	Discuss about Physical adsorption and chemisorption	**07**
	(b)	Write short note on “Catalyst: Promoters, Inhibitors and poisons.”	**07**

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