

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII • EXAMINATION – WINTER • 2014****Subject Code: 180501****Date: 04-12-2014****Subject Name: Chemical Reaction Engineering-II****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)** Define E, F, & C curves and derive relation between them. **07**
(b) Explain linear and non- linear process with examples **07**

- Q.2 (a)** What are Stimulus response (SR) techniques? List various possible SR techniques used to study the flow in vessels. **07**
(b) A closed vessel has flow for which dispersion number is 0.2, 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)** Discuss in detail different models for fluid particle reactions. **07**
(b) Calculate the time needed to burn to completion the particles of graphite (diameter of particle=12 mm, $\rho_B = 2.2 \text{ gm/cm}^3$, $k_s = 25 \text{ cm/sec}$) in a 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)** Describe with diagram various contacting patterns for two phase reacting system **07**
(b) In a uniform environment 4 mm solid particles are 87.5% converted to product in 5 min. The solids are unchanged in size during reaction and ash diffusion step is known to be rate controlling. What mean conversion is obtainable in a fluidized bed reactor operating with same environment but using feed consisting of equal mass of 2 mm and 1 mm particles? The mean residence time of solids in this reactor is 30 minutes. **07**

- Q.4 (a)** With a neat diagram write about double mixed reactor used for studying kinetics of fluid –fluid reactions. **07**
(b) Discuss various kinetic regime of mass transfer and reaction for fluid-fluid reactions **07**

OR

- Q.4 (a)** Write about following: **07**
i) Film conversion parameter
ii) Clues to kinetic regimes from solubility data
(b) Derive rate expression for fast fluid-fluid reactions. **07**

- Q.5 (a)** Discuss briefly about different types of adsorption processes. **07**
(b) Discuss about “Determination of Surface area for catalysts” **07**

OR

- Q.5 (a)** Discuss about nature and mechanism of catalytic reactions **07**
(b) Write a brief note on “Experimental reactors for solid catalyzed reactions” **07**
