Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII(NEW) • EXAMINATION - WINTER 2016

Subject Code:2173612

Date:29/11/2016

Subject Name: Fundamentals of Reaction	Engineering
Time: 10.30 AM to 1.00 PM	

Total Marks: 70

Instructions:

(b)

- 1. Attempt all questions.
- Make suitable assumptions wherever necessary. 2.
- 3. Figures to the right indicate full marks.
- 4.
- Write a short note on the classification of Chemical Reactions with suitable **Q.1 (a)** 07 examples.
 - **(b)** At 1100 K nonane thermally cracks 20 times as rapidly as at 1000 K. Estimate 07 the activation energy for this decomposition.

Q.2 What are the different ways to represent the rate of a Chemical Reaction? 07 **(a)**

- On doubling the concentration of reactants the rate of reaction increases i. 03 four times. Find the order of reaction.
 - ii. Discuss the various kinds of intermediates involved with case of non -04 elementary reactions.

OR

- Write a short note on temperature dependency of reaction rate constant from 07 **(b)** Arrhenius law. Compare the same with transition state and collision theories.
- Q.3 Write a short note on the different methods for the analysis of kinetic data 07 **(a)**
 - In case of a first order reaction show that time required for 75% conversion is **(b)** 07 double the time required for 50% conversion

OR

Q.3	(a)	Write a short note on the variable volume batch reactor.	07
	(b)	Derive the integrated form of rate expression for irreversible bimolecular type	07
		second order reactions.	

- 0.4 Discuss the analysis of total pressure data obtained in a constant volume system 07 **(a)** and also establish the relation used to calculate the partial pressure of gaseous component in reaction mixture.
 - Write short note on following terms associated with reactor operation **(b)** 07 i) Space time ii) Holding time iii) Space velocity

OR

- **Q.4** Describe various reactors systems used in Industries with their specific 07 **(a)** characteristics.
 - **(b)** Starting from the basic principles obtain the design equation of Plug flow 07 reactor.
- Q.5 Estimate the equilibrium constant at 600 K for the reaction 07 **(a)** C_2H_4 (g) + H_2O (g) $\rightarrow C_2H_5OH$ (g). At 298 K $\Delta G^\circ = -2030$ cal/mol, ΔH°_f for $H_2O(g) = -57798$ cal/mol, ΔH_f^o for $C_2H_5OH(g) = -56240$ cal/mol, ΔH_f^o for C_2H_4 (g) = 12496 cal/mol 07
 - Write the steps involved in a catalytic reaction? **(b)**

OR

- Write a short note on optimum temperature progression? Mention the optimum Q.5 **(a)** 07 temperature progression that has to be followed for different type of reactions?
 - What is catalyst deactivation? Explaining its importance mention the various **(b)** 07 ways adopted for catalyst deactivation?