GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 162304   **Date: 25/10/2016**

Subject Name: Reaction Engineering & Rheology

Time: 10:30 AM to 01:00 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[any seven] : Chemical Kinetics, Elementary Reaction, Molecularity of Reaction, Reaction rate, Arrhenius law, Homogenous Reaction, Order of Reaction, Shear Strain,Shear Strain, Die Swell	**07**
	(b)	1. Differentiate between Elementary and Non Elementary reactions. 2. Differentiate between single and multiple reactions	**07**
Q.2	**(a)**	Explain temperature dependency from Arrhenius' law.	**07**
	(b)	Explain kinetics of free radical chain polymerisation.	**07**
		OR	
	(b)	Discuss Voigt Kelvin model.	**07**
Q.3	**(a)**	What is chemical kinetics? Give detail classification of chemical reactions with suitable examples.	**07**
	(b)	Explain order of reaction and give difference between molecularity and order of reaction	**07**
		OR	
Q.3	**(a)**	Answer the following questions: (a) Shear thickening (b) Shear thinning (c) Time dependent Fluids.	**07**
	(b)	Explain Boltzman superposition principle.	**07**
Q.4	**(a)**	At 500 K the rate of a bimolecular reaction is ten times the rate at 400 K. Find the activation energy of this reaction: (a) From Arrhenius Law. (b) From collision theory What is the percentage difference in the rate of reaction at 600 K predicted by these two methods ?	**07**
	(b)	The pyrolsis of ethane proceeds with an activation energy of about 300 KJ/mol. How much faster is the decomposition at 650 deg.C than at 500 deg.C?	**07**
		OR	

Q.4 **(a)** A reaction 2HI(g) --→ H (g) + I (g) is studied over a range of temperatures . The **07** results obtained are tabulated below

Temp., K	633	666	697	715	781
Rate constant K, l/(mol.s)	1.7 x 10	1.07 x 10	5.01 x 10	1.05 x 10	1.51x 10

     (i)   find out the value of activation energy graphically using the given data

     (ii)   Determine by what factor the rate increases when temperature rises from 300 K to 310 K

(b) Discuss kinetics of Anionic polymerization **07**

Q.5 **(a)** Discuss Weissenberg effect and extrudate swell **07**

(b) In an isothermal batch reactor 70% of a reactant A is converted in 13 minutes. Find the space time and space velocity needed to effect this conversion in a plug flow reactor and a mixed flow reactor. **07**

OR

Q.5 **(a)** Discuss Maxwell model. **07**

(b) Discuss Capillary rheometer **07**

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