Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2162304 **Date: 05/05/2017**

Subject Name: Polymer reaction engineering and 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is Rheology?	
	2	What is shear thickening?	
	3	What is Newtonian Fluid?	
	4	What is Apparent Viscosity?	
	5	What is a time dependent fluid?	
	6	Define Die Swell	
	7	What is viscoelasticity?	
	8	What is a homogenous reaction?	
	9	What is melt fracture effect in polymer melt flow.	
	10	What is Activation Energy?	
	11	What is tank reactor?	
	12	Define Pseudoplastics	
	13	What is Youngs modulus and Shear Modulus?	
	14	What is glass transition temperature?	
Q.2	**(a)**	Differentiate between Elementary and Non Elementary reactions.	**03**
	(b)	The pyrolysis of Ethane proceeds with an activation energy of about 75000 Cal. How much faster is the decomposition at 700 deg.C than at 550 deg.C?	**04**
	(c)	Discuss in detail about Non Newtonian fluids. Give suitable examples.	**07**
		OR	
	(c)	What is power law model? Explain in detail.	**07**
Q.3	**(a)**	Discuss free volume concept.	**03**
	(b)	Explain Willians-Landel-Ferry (WLF) equation.	**04**
	(c)	Discuss Capillary rheometer.	**07**
		OR	
Q.3	**(a)**	Explain kinetics of free radical polymerisation	**03**
	(b)	Discuss Maxwell Model	**04**
	(c)	At 500 k the rate of bimolecular reaction is ten times then the rate at 400 k. Find the activation energy for this reaction. (a) From Arrhenius equation. (b) From collision theory.	**07**
Q.4	**(a)**	What is Weissenberg effect? Discuss	**03**
	(b)	Discuss Kelvin Voigt model	**04**
	(c)	What is chemical kinetics? Give detail classification of Chemical reaction with suitable example.	**07**

OR

Q.4	**(a)**	What is Rate Constant? Discuss	**03**
	(b)	The activation energy of a chemical reaction is 17982 cal/mol in the absence of a catalyst and 11980 cal/mol with a catalyst. By how many times will the rate of the reaction will grow in the presence of a catalyst, if a reaction proceeds at 25 deg.C?	**04**
	(c)	Describe batch and semi-batch reactor along with Advantages and disadvantages and application.	**07**
Q.5	**(a)**	What is Molecularity and order of reaction?	**03**
	(b)	On doubling the concentration of reactant, the rate of reaction triples. Find out the reaction order.	**04**
	(c)	Explain Boltzmann's superposition principle	**07**

OR

Q.5	**(a)**	Explain Shear thinning	**03**
	(b)	Explain continuous stirred tank reactor (CSTR).	**04**
	(c)	Derive Arrhenius equation. Give its proper significance.	**07**

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