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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2162304 **Date:13/05/2016**

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	Define : Chemical Kinetics ; Elementary reactions	
	2	Explain shear stress strain rate curves for Bingham plastic	
	3	Short note on power law index	
	4	Give difference between elementary and non-elementary reaction	
	5	State the difference between configuration and conformations with example.	
	6	Explain zero shear viscosity in brief.	
	7	What is cold drawing?	
	8	Draw the general stress vs elongation curve for hard and strong plastics material.	
	9	Explain Wissenberg effect.	
	10	Discuss classification of chemical reaction	
	11	What is tank reactor?. Explain continues stirred tank reactor	
	12	Explain Maxwell model with proper diagram.	
	13	Explain shear stress strain rate curves for Pseudoplastics	
	14	Kelvin Vigot model for viscoelastic material	
Q.2	**(a)**	Explain the shear stress/shear rate curve for various types of flow behaviour? Give the suitable examples	**03**
	(b)	Derive Arrhenius equation .Give its proper significance.	**04**
	(c)	Explain Boltzmann superposition principle.	**07**
		OR	
	(c)	The pyrolysis of ethane proceeds with an activation energy of about 300 kJ/m. How much faster is the decomposition at 650 °C than at 500°C? And discuss rate constant	**07**
Q.3	**(a)**	Explain cone and plate viscometer	**03**
	(b)	Write a short note on time dependent non Newtonian fluids	**04**
	(c)	Define degree of crystallinity and factors affecting degree of crystallinity.	**07**
		OR	
Q.3	**(a)**	Discuss stress relaxation.	**03**

	(b)	What is Power law model. Explain in detail	**04**
	(c)	What is glass transition temperature? State the factors affecting Tg .	**07**
Q.4	**(a)**	Explain the following: Shear thickning, shear thinning, time dependent fluid	**03**
	(b)	Define: intrinsic viscosity, die swell, homogeneous reaction, rate constant.	**04**
	(c)	Explain order of reaction and give difference between molecularity and order of reaction. Write about Newtonian fluid	**07**

OR

Q.4	**(a)**	What is Young's modulus and Shear modulus?	**03**
	(b)	Explain Melt flow index with neat diagram	**04**
	(c)	Explain kinetics of free radical polymerization	**07**
Q.5	**(a)**	What are stereo regular polymers?	**03**
	(b)	Describe WLF equation with Time Temp Superposition principle	**04**
	(c)	Derive Flory Huggins theory	**07**

OR

Q.5	**(a)**	Explain chain orientation. Sate the effect of orientation on properties of polymer material.	**03**
	(b)	Explain the correlation between free volume,Tg and crystallinity	**04**
	(c)	What is Viscoelasticity? Write down the equation for voigt Kelvin model with stress strain curve.	**07**

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