

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:162304**Date:14 /12/ 2015****Subject Name: Reaction Engineering & Rheology****Time:2:30pm to 5:00pm****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 homogenous reaction; order of reaction, rate constant, activation energy and chemical kinetics. **07**
- (b) The activation energy of a bimolecular reaction is about 9150 cal/mol. How much faster is this reaction take place at 500 K than at 400 K. **07**
- Q.2** (a) The rate constant of a reaction at 27°C is $1.3 \times 10^{-3} \text{ (s)}^{-1}$. Determine the frequency factor. Take E (energy of activation) = 128170 cal/mol. **07**
- (b) What is Arrhenius law? Discuss its Significance. **07**
- OR**
- (b) Describe Batch & Semi-batch Reactor? What are their advantage, disadvantage, limitations & Uses. **07**
- Q.3** (a) 1. Differentiate between Elementary & Non Elementary reactions. **07**
2. Differentiate between Single & Multiple Reactions.
- (b) Explain the shear stress-shear rate curves for various types of flow behavior? Give suitable example. **07**
- OR**
- Q.3** (a) Explain Creep & Stress relaxation time in polymeric materials with graph in detail. **07**
- (b) Derive Power law & WLF equation. **07**
- Q.4** (a) Write a note on dynamic mechanical models for testing polymeric materials **07**
- (b) Write a brief note on Weissenberg effect. Explain normal stress difference & elongational viscosity. **07**
- OR**
- Q.4** (a) What is the role of branching & stereoregularity of polymers on the rheological properties. **07**
- (b) Describe Cone & Plate Viscometer? What are its scope & limitation in the study of rheology of polymers. **07**
- Q.5** (a) Explain the analysis of polymer melt in Extrusion & Injection molding process. **07**
- (b) Describe Melt flow index? Give the significance of Mooney viscometer. **07**
- OR**
- Q.5** (a) Write down the analysis of Rheological parameters for Calendaring, Rotational molding & Fiber spinning. **07**
- (b) Describe flow analysis for Dip coating, Slush molding & Solid phase forming during process. **07**
