

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014

Subject Code: 162304**Date: 28-05-2014****Subject Name: Reaction Engineering and Rheology****Time: 10:30 am - 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) Describe batch and semi-batch reactor along with advantages and disadvantages. **07**
 (b) What are elementary and non-elementary reactions? Give difference between them. **07**
- Q.2** (a) What are Non-Newtonian fluids? Explain types of Non-Newtonian fluids with suitable examples. **07**
 (b) What is chemical kinetics? Give detail classification of chemical reactions with suitable examples. **07**
- OR**
- (b) Explain kinetics of free radical chain polymerization. **07**
- Q.3** (a) Answers the following-
 (i) Explain creep and relaxation of typical plastics. **04**
 (ii) The rate constants of a certain reaction are 1.6×10^{-3} and $1.625 \times 10^{-2} (\text{s})^{-1}$ at 10°C and 30°C . Calculate the activation energy. **03**
- (b) What is tank reactor? Explain continuous stirred tank reactor (CSTR). **07**
- OR**
- Q.3** (a) Explain Melt flow index with neat sketch. **07**
 (b) Answers the following-
 (i) At 1100 K n-nonane thermally cracks 20 times as rapidly as at 1000 K . Estimate the activation energy for the decomposition. **03**
 (ii) Explain Maxwell model for viscoelasticity. **04**
- Q.4** (a) Explain kinetics of cationic polymerization. **07**
 (b) Answer the following:
 (i) 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 . **03**
 (ii) Write a note on Fluidized-Bed reactor. **04**
- OR**
- Q.4** (a) Explain Boltzman superposition principle. **07**
 (b) Explain Mooney viscometer with applications. **07**
- Q.5** (a) Explain die swell and melt fracture effect in polymer melt flow. **07**
 (b) Write a note on: The Power law. **07**
- OR**
- Q.5** (a) Discuss Weissenberg Effects. **07**
 (b) Explain Optical Birefringence method. **07**
