

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI • EXAMINATION – SUMMER 2015

Subject code: 162304**Date: 14/05/2015****Subject Name: Reaction Engg. and Rheology****Time: 10.30am-01.00pm****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) Answer the following- **07**
(a) Activation energy
(b) On doubling the concentration of reactants, the rate of reaction triples. Find the reaction order.
- (b) Write about Non-Newtonian fluids.. **07**
- Q.2** (a) Explain order of reaction and give difference between molecularity and order of reaction. **07**
Write about Newtonian fluids.
- (b) Explain kinetics of free radical chain polymerisation. **07**
- OR**
- (b) Answer the following questions: **07**
(a) Shear thickening
(b) Shear thinning
(c) Time dependent Fluids.
- Q.3** (a) At 500 K the rate of a bimolecular reaction is ten times the rate at 400 K. **07**
Find the activation energy for this reaction (a) from Arrhenius Law (b) from Collision theory.
- (b) What is tank reactor? Explain continuous stirred tank reactor (CSTR). **07**
- OR**
- Q.3** (a) 1. 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 °C? **07**
2. Discuss WLF equation
- (b) Discuss free volume concept. **07**
- Q.4** (a) Explain Melt flow index with neat sketch **07**
(b) Explain deformation characteristics of an elastic body. **07**
- OR**
- Q.4** (a) 1. Differentiate between Elementary and Non Elementary reactions. **07**
2. Differentiate between single and multiple reactions.
- Q.4** (b) 1. Write a note on: The Power law. **07**
2. 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.
- Q.5** (a) Explain Mooney viscometer with applications. **07**

- (b) What is chemical kinetics? Give detail classification of chemical reactions with suitable examples **07**

OR

- Q.5** (a) Describe batch and semi-batch reactor along with advantages, disadvantages and applications. **07**
- (b) Explain die swell and melt fracture effect in polymer melt flow. **07**
