

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER 2013****Subject Code: 162304****Date: 03-06-2013****Subject Name: Reaction Engineering & 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) What is Chemical Kinetics? Discuss Classification of Chemical reactions. **07**
 (b) What is Arrhenius Law? The activation energy of a bimolecular reaction is about 9150cal/mol. How much faster does this reaction take place at 500K than at 400K? **07**
- Q.2** (a) Define [any seven] : Molecularity ; Morphology; Apparent viscosity ; **07**
 Dilatent fluid; activation energy ; Bingham plastic; pseudoplastic;
 Viscoelasticity ; stress; strain
 (b) Discuss in detail , Non Newtonian fluids. **07**
- OR**
- (b) What is Maxwell Model? Discuss in detail. **07**
- Q.3** (a) What is Free Volume or Molecular Hole concept? Discuss **07**
 (b) Discuss Capillary Rheometer and its importance in Rheological studies **07**
- OR**
- 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. (c) What is the percentage difference in rate of
 reaction at 600K predicted by these two methods?
 (b) 1. Difference between Elementary and Non Elementary **07**
 Reactions.
 2. Difference between Molecularity and Order of Reaction.
- Q.4** (a) Discuss about The Power Law in detail. **07**
 (b) Discuss Weissenberg Effects. **07**
- OR**
- Q.4** (a) What is Boltzmann's Superposition Principle? Discuss **07**
Q.4 (b) Discuss Batch Reactor in detail. **07**
- Q.5** (a) 1. The pyrolysis of ethane proceeds with an activation energy of about 75,000 **07**
 cal. How much faster is the decomposition at 650 C than at 500 C.
 2. Discuss Rate Constant.
 (b) 1. A common rule of thumb is that the rate of a reaction doubles for **07**
 each 10 dec. C. rise in temperature. What activation energy would this
 suggest at a temperature of 25 deg.C ?
 2. What is Continuous Stirred tank reactor?
- OR**
- Q.5** (a) Discuss Kinetics of Free Radical Polymerization. **07**
 (b) Discuss Melt Flow Index as an important Rheological property **07**
