

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 162304****Date: 05-12-2014****Subject Name: Reaction Engineering and Rheology****Time: 02:30 pm - 05:00 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) Define : homogenous reaction; order of reaction, rate constant; activation energy; : chemical kinetics; die swell; non elementary reaction **07**
- (b) 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.

- Q.2** (a) What is Arrhenius Law ? Discuss its Significance **07**
- (b) Discuss kinetics of Free Radical Polymerisation **07**

OR

- (b) The pyrolysis of Ethane proceeds with an activation energy of about 75000 Cal. **07**
How much faster is the decomposition at 700 deg.C than at 550 deg.C?

- Q.3** (a) 1. Differentiate between Elementary and Non Elementary Reactions. **07**
2. Differentiate between Single and Multiple Reactions
- (b) Discuss in detail about Non Newtonian fluids. Give suitable examples. **07**

OR

- Q.3** (a) Discuss about Batch Reactor **07**
- (b) What is Die Swell? Discuss in detail. **07**

- Q.4** (a) Discuss Maxwell Model in detail **07**
- (b) 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 Relaxation and Retardation.

OR

- Q.4** (a) What is Molecularity and Order of Reaction? Differentiate. On doubling the concentration of reactant, the rate of reaction triples. Find out the reaction order. **07**
- (b) Write a short note on Rate of Chemical reaction. **07**

- Q.5** (a) What are the different methods used for determining molecular weights of polymers? Explain in detail the sedimentation method indicating its limitations. **07**
- (b) What is Weissenberg effect? Discuss **07**

OR

- Q.5** (a) What is a rate constant ? The rate constants of a certain reaction are 1.6×10^{-3} and $1.625 \times 10^{-2} \text{ (s)}^{-1}$ at 10 deg.C and 30 deg.C. Calculate the activation Energy. **07**
- (b) A reaction $2\text{HI(g)} \rightarrow \text{H}_2\text{(g)} + \text{I}_2\text{(g)}$ is studied over a range of temperatures. **07**
The results obtained are as tabulated below:

Temp.degK	633	666	697	715	781
Rate const K, l/(mol.s)	1.7×10^{-5}	1.07×10^{-4}	5.01×10^{-4}	1.05×10^{-3}	1.51×10^{-3}

- (i) Find out the value of activation energy graphically using the given data.

- (ii) Determine by what factor the rate increases when temperature rises from 300K to 310K.
