

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER 2013****Subject Code: 151301****Date: 27-11-2013****Subject Name: Elements of Chemical Engineering****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) Classify different types of chemical reactions based on different parameters. **07**
 (b) Explain collision theory and transition state theory. **07**

- Q.2** (a) Explain the essential features of a CSTR along with the basic equations with a neat sketch. **07**
 (b) List the advantages and disadvantages of a batch reactor. **07**

OR

- (b) In a catalytic decomposition of hydrogen peroxide the concentration changes with time as follows: **07**

Time, hr	0	10	20	30
Concentration, kmole/kL	25.4	13.4	7.08	3.81

Determine the order of reaction and rate constant.

- Q.3** (a) Define: i) Molecularly, ii) Space velocity, **08**
 iii) mean residence time, iv) Dispersion number.
 (b) Milk is pasteurized if it is heated to 63°C for 30 min, but if it is heated to 74°C it only needs 15 s for the same result. Find the activation energy of this sterilization process. **06**

OR

- Q.3** (a) Write short notes on: i) fluidized bed reactor and ii) fixed bed reactor. **08**
 (b) Explain half life approach for estimating reaction order. **06**

- Q.4** (a) Discuss the various parameters to be considered for reactor design. **07**
 (b) Make a material balance for a steady state tubular reactor. **07**

OR

- Q.4** (a) Give detailed analysis of different parallel irreversible reactions. **07**
 (b) Write a short note on design of mixed flow reactors in steady state. **07**

- Q.5** (a) Discuss the various methods of measurement of RTD. **07**
 (b) Explain RTD in a single CSTR. **07**

OR

- Q.5** (a) Explain the relationship between F and E curves. **07**
 (b) Describe Tank-in-series model to represent non-ideal flow. **07**
