

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code: 151301****Subject Name: Elements of Chemical Engineering****Date: 13 /12 /2010****Time: 03.00 pm - 05.30 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) Discuss factors affecting the Rate of reaction. **07**
 (b) Explain: i) Space time ii) Space velocity **07**

- Q.2** (a) Explain Different definition of rate of reaction. **07**
 (b) Discuss the temperature dependency from thermodynamics with Van't Hoff equation. **07**

OR

- (b) Discuss the types of reactors. **07**

- Q.3** (a) Discuss the temperature dependency from the collision theory. **07**
 (b) List out the Methods of RTD measurement and Give the definition and characteristics of tracer. **07**

OR

- Q.3** (a) RTD in mixed flow reactor. **07**
 (b) Relation between the F and E curves. **07**

- Q.4** (a) Short Note: i) Fixed-bed Reactor. ii) Fluidized-bed Reactor. **07**
 (b) Make a material balance for Ideal batch reactor. **07**

OR

- Q.4** (a) Give classification of reactions with example of each. **07**
 (b) Make a material balance for mixed flow reactor. **07**

- Q.5** (a) At 640 °K the rate of bimolecular reaction is 10 times then the rate at 550 °K. Find the activation energy for the reaction from (a) Thermodynamics (b) Collision Theory. **07**
 (b) Make a Material balance for Plug Flow Reactor. **07**

OR

- Q.5** (a) A reaction $2\text{HI}_{(g)} \longrightarrow \text{H}_2 + \text{I}_2$ is studied over a range of temperature. The results obtained are tabulated below. **07**

Temp. °K	640	670	690	710	756
Rate Constant k , (l/mol.s)	1.8×10^{-5}	1.3×10^{-4}	5.00×10^{-4}	1.50×10^{-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 temp raise from 400 K to 450 K.
- (b) State and explain Thermodynamic Laws with examples and explain the concept of heat transfer in Thermodynamics. **07**
