

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) EXAMINATION – WINTER 2018****Subject Code: 170501****Date: 03/12/2018****Subject Name: Chemical Reaction Engineering - I****Time: 10:30 AM TO 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) Give classification of chemical reactions with examples. **07**
 (b) Differentiate Differential and Integral method of analysis for finding rate of reaction. **07**
- Q.2** (a) Discuss and compare various theories for dependency of activation energy on temperature. **07**
 (b) Derive rate equation for second order irreversible reaction using integral method of analysis. Reaction is $2A \rightarrow R$ **07**
- OR**
- (b) Discuss the relationship between C, E and F curve. **07**
- Q.3** (a) Derive performance equation for ideal batch reactor. **07**
 (b) Derive equation for the RTD for ideal single CSTR. **07**
- OR**
- Q.3** (a) A homogeneous gas reaction $A \rightarrow 3R$ has a reported rate at 215°C **07**
 $-r_A = 10^{-2}C_A^{1/2}$, [mol/liter sec]
 Find the space-time needed for 80% conversion of a 50% A-50% inert feed to a plug flow reactor operating at 215°C and 5 atm ($C_{A0} = 0.0625$ mol/liter).
 (b) Derive equation for space time for recycle reactor. **07**
- Q.4** (a) Write a short note on equilibrium constants from thermodynamics clearly indicating the equations. **07**
 (b) With neat sketches discuss about correct recycle ratio and compare it with too high and too low recycle ratios for autocatalytic reaction. **07**
- OR**
- Q.4** (a) Discuss fractional yield, Overall yield and selectivity for parallel reaction. **07**
 (b) Discuss qualitative product distribution for reaction in series **07**
 $A \rightarrow R \rightarrow S$
- Q.5** (a) Write short note on 'Adiabatic Operation in reactor'. **07**
 (b) Derive the performance equation for equal sized CSTRs in series. **07**
- OR**
- Q.5** (a) Give comparison between ideal plug flow and mixed flow reactor. **07**
 (b) Write short note on 'Searching for reaction mechanism'. **07**
