M. Tech. –II (Chemical Engineering) (CBCS – 2015 Course) :
SUMMER - 2019
SUBJECT: CHEMICAL REACTOR ANALYSIS & DESIGN

Day: Thursday
Date: 06/06/2019
S-2019-3423
Time: 11.00 AM TO 02.00 PM
Max Marks: 60

N.B.:

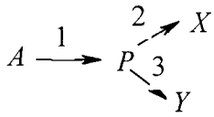
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the sections should be written in **SAME** Answer book.

SECTION – I

Q.1 Elaborate on optimal temperature policies. **[10]**

OR

A desired product 'P' is made according to the following reaction scheme



$k_i = A_i e^{-EIRT}$

Discuss qualitatively optimum temperature profile for the two cases:
i) $E_2 > E_3 > E_1$ **ii)** $E_2 > E_1 > E_3$

Q.2 a) The batch saponification of ethyl acetate **[05]**
$CH_3COOC_2H_5 + NaOH \rightleftharpoons CH_3COONa + C_2H_5OH$ was carried out in a 200 ml reactor at 26^0C. The initial concentration of batch reactants was 0.051N. From the following time vs concentration data , determine the specific rate and tabulate as a function of composition of reacting mixtures.

Time (s)	30	90	150	210	270	390	630	1110
NaOH (mol/*l*)	0.0429	0.0340	0.0282	0.042	0.0209	0.0169	0.0118	0.0067

b) Determine a suitable reaction rate model for this system. **[05]**

OR

Differentiate between fluidized bed and trickle bed reactor with design parameters. **[10]**

Q.3 Discuss steady state non-isothermal reactor design. **[10]**

OR

Elaborate about tubular reactor with heat exchange.

SECTION – II

Q.4 Illustrate adiabatic operation of batch reactor. **[10]**

OR

Discuss unsteady state operation of CSTR.

Q.5 Give detail design of fixed bed catalytic reactor at isothermal condition. **[10]**

OR

Give detail design of fixed bed catalytic reactor at adiabatic condition.

Q.6 Discuss design aspects of reactors with non ideal flow. **[10]**

OR

Discuss micro and meso mixing in reactors.

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