GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VIII EXAMINATION – WINTER 2015

Su	bject	t Code:183502 Date:04/12/2	015								
Su Tii Ins	bject me: 2 tructio 1. 2. 3.	t Name: Chemical Kinetics & Reaction Engineering 2:30pm to 5:00pm Total Marks ons: . Attempt all questions. . Make suitable assumptions wherever necessary. . Figures to the right indicate full marks.	s: 70								
Q.1	(a)	Explain following terms. Molecularity of reaction, Order of reaction, Elementary & Non-elementary reaction	07								
	 (b) Milk is pasteurized if it is heated to 63° C for 30 min., but if it is heated to C it only needs 15 sec for the same results. Find the activation energy for sterilization process. 										
Q.2	(a)	Explain differential method of analyzing rate data to find order of reaction and 07 specific reaction rate									
	(b) For irreversible Unimolecular Type first order reaction of type $A \longrightarrow$ Products Show that $-\ln (1-X_A) = k t$										
	(b)	OR(b) Discuss the Method of initial rate for finding the order of reaction and specific reaction rate.									
Q.3	(a)	Reactant A decomposes in a batch reactor as $A \longrightarrow$ Products .Concentration of A, (C _A) in the reactor at different time are reported as below.Time (Sec)0204060120180300Concn.(Mol/lit)10865321	14]]								
		method.	L								
Q.3	(a) (b)	Assuming that volume of reaction mixture varies linearly with extent of 07 reaction, Derive design equation for 'variable volume' batch reactor. Give classification of ideal reactors. 07									
Q.4	(a)	For the irreversible reactions in series of type A $\longrightarrow R \longrightarrow S$, with rate 0 constants k_1 and k_2 for first and second reaction respectively, derive the equation for time required to maximize yield of 'R'									
	(b)	Discuss Autocatalytic reaction. 07									
Q.4	(a)	For following reactions in parallel with given rate equations ,Discuss the dependence of product distribution(desired product / Undesired product) on concentration of A,C _A . A \longrightarrow R (desired) , $-r_R = k_1 C_A^{a1}$ A \longrightarrow S (undesired) , $-r_r = k_2 C_A^{a2}$									
	(b)	Prove that for N reactor of equal volume in series , for first order reaction $C_0/C_N = (1 + k \tau_i)^n$	07								

1

- Q.5 (a) With the help of diagram explain various steps involved in the reaction of 07 Aerobic fermentation.
 - (b) For heterogeneous reaction system comprising of A (l) and B(s), with first order 07 reaction, derive the expression for overall rate.

OR

Q.5 (a) Kinetic data for the Bio-Reactor of effluent treatment plant are given below.

С _{А0} ,	2	5	6	6	11	14	16	24
mmol/m ³								
Ca,	0.5	3	1	2	6	10	8	4
mmol/m ³								
$\tau \min$	30	1	50	8	4	20	20	4
1/-r _A	20	0.5	10	2	0.8	5	2.5	0.2
$=\tau/(C_{A0}-C_A)$								

It is proposed that two tank reactors are to be chosen for the purpose, suggest the suitable size for two reactors.

14