## **GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER- V • EXAMINATION - WINTER 2016**

Subject Code: 151301									Date: 30/11/2016		
Subject Name: Elements of Chemical Engineering Time: 10:30AM – 01:00PM Instructions:									Total Marks: 70		
	2.	Attempt all questions Make suitable assum Figures to the right in	ptions w			essa	ry.				
Q.1	(a)	1									0'
	(b)	Arrhenius Equation. Describe a method to find the rate constant and order of reaction from t power law type rate equations.									0′
Q.2	(a) (b)	Differentiate between elementary and non-elementary reactions. Define: (i) Homogeneous Reaction, (ii) Heterogeneous Reaction. <b>OR</b>									0 0
	<b>(b)</b>	Give the classification of types of reactions.									0
Q.3	(a) (b)	Differentiate between plug flow reactor and mix flow reactor. Write performance equation of Batch, CSTR and Plug flow reactor, explain the each variable used in the equations.									
Q.3	(a) (b)	<b>OR</b> Discuss the types of ideal reactors. The reaction $A \rightarrow B$ is carried in a batch reactor. The initial concentration is $CA_0 = 2.0$ mol/litre. The conversion is 90%. Find the time required if the reaction is, (i) First order reaction, $k = 0.01$ s <sup>-1</sup> , (ii) Second order reaction, $k = 0.01$ L mol <sup>-1</sup> s <sup>-1</sup> .									
Q.4	(a)	In a catalytic decomposition of hydrogen peroxide the concentration changes (with time following first order kinetics as follows:									
		Time, hr		0		10		20		30	
		Concentration, mol/	litre	25.	4	13	.4	7.08		3.81	
	<i>(</i> <b>-</b> )	Determine the rate constant with correct unit.									
	<b>(b)</b>	State the difference between step input and pulse input for RTD measurement.									
Q.4	(a) (b)										
		$T(^{0}C)$	319		330	1	354		78.5	383	
		$k (cm^3/gmol - sec)$	522		755		1700	4(	)20	5030	
	Calculate the activation energy.										
Q.5	(a) (b)	Explain transition state theory. Draw a neat sketch of plug flow reactors in parallel with proper explanation. <b>OR</b>									
Q.5	<ul> <li>(a) Explain: i) Space time, ii) Space velocity</li> <li>(b) Write a short note on temperature dependency from thermodynami</li> </ul>										0 0
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