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**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER- III (New) EXAMINATION – WINTER 2019**

**Subject Code: 3133607**

**Date: 28/11/2019**

**Subject Name: Physical Chemistry**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
<b>Q.1</b>	(a) Write a short note on emulsions.	<b>03</b>
	(b) Give the characteristics of catalytic reactions.	<b>04</b>
	(c) Draw TP phase diagram and explain phase, number of component and degree of freedom for the compound having same chemical formula in every phase.	<b>07</b>
<b>Q.2</b>	(a) Define the terms: Eutectic point & Eutectic mixture	<b>03</b>
	(b) Enlist heterogeneous and homogeneous catalysis with suitable examples.	<b>04</b>
	(c) What do you mean by parallel reaction? Give examples of it and derive an equation for it.	<b>07</b>
	<b>OR</b>	
	(c) Derive mathematical expression for the rate constant of a second order reaction.	<b>07</b>
<b>Q.3</b>	(a) Write a note on acid base catalysis.	<b>03</b>
	(b) Explain working of Daniell cell with neat diagram.	<b>04</b>
	(c) How will you differentiate between diffusion and effusion? If a gas X diffuses at a rate of one half as fast as oxygen, find the molecular mass of the gas.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Write a note on enzyme catalysis.	<b>03</b>
	(b) Explain the role of salt bridge in electrochemical cell.	<b>04</b>
	(c) Derive Young Laplace equation with importance of it.	<b>07</b>
<b>Q.4</b>	(a) Write a note on molecularity.	<b>03</b>
	(b) Draw phase diagram of sulphur system and explain only degree of freedom on each phase.	<b>04</b>
	(c) Explain measurement of Emf of an unknown cell with diagram.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) What do you mean by half-life of a reaction. The half-life of a substance in a first order reaction is 15 minutes. Calculate the rate constant.	<b>03</b>
	(b) Draw phase diagram of Ag-Pb system and explain only degree of freedom on each phase.	<b>04</b>
	(c) Derive an expression for $\Delta G$ , $\Delta H$ in terms of emf of the cell and temperature coefficient of emf.	<b>07</b>

- Q.5 (a) The following data obtained for the decomposition of  $N_2O_5$  in  $CCl_4$  solution at  $48^\circ C$  establish that this is a first order reaction: 03

t (mins)	10	15	20	$\infty$
Vol of $O_2$ evolved	6.30	8.95	11.40	34.75

- (b) Derive an equation for Isothermal reversible expansion work of an ideal gas. 04
- (c) Derive Gibb's Helmholtz equation in terms of internal energy and work function at constant volume. 07

**OR**

- Q.5 (a) Define surface tension, capillary action. How it plays an important role in bubble formation? 03
- (b) Show thermodynamically that for an ideal gas  $C_p - C_v = R$ . 04
- (c) Derive Gibb's Helmholtz equation in terms of free energy and enthalpy change at constant volume. 07

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