Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(New) EXAMINATION – SUMMER 2016

Subject Code:2133607 **Date:02/06/2016**

Subject Name:Physical Chemistry

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		**Short Questions**	**14**
	1	Reaction rates can change with (*a*) temperature (*b*) the addition of a catalyst (*c*) reactant concentrations (*d*) all of these	**1**
	2	Define the term Molar heat capacities	**1**
	3	Third law of thermodynamics	**1**
	4	Define the term enzyme catalysis.	**1**
	5	What do you mean by Activation energy?	**1**
	6	A catalyst can be described as a substance that: (*a*) undergoes change to accelerate the rate of the reaction (*b*) increases the kinetic energy of the reactants (*c*) provides a path of lower activation energy for the reaction (*d*) lowers the potential energy of the products with respect to the energy of the reactants	**1**
	7	Define the term order of reaction	**1**
	8	For second-order reactions the rate constant, *k*, has the unit(s) (1) lit/mol (2) 1/time (3) time. Mol/lit (4) none of these	**1**
	9	A reaction in which all reactants are in the same phase is called (*a*) elementary (*b*) bimolecular (*c*) homogeneous (*d*) heterogeneous	**1**
	10	Define the term extensive and intensive properties.	**1**
	11	Define the term EMF	**1**
	12	Define the term critical point	**1**
	13	Define the term degree of freedom.	**1**
	14	Define the term surfactant.	**1**
Q.2	**(a)**	Derive Nernst equation showing effect of electrolyte concentration on the potential of an oxidation-reduction electrode.	**03**
	(b)	The critical temperature of hydrogen gas is 33.2°C and its critical pressure is 12.4 atm. Find out the values of ‘a’ and ‘b’ for the gas	**04**
	(c)	Write a note on acid base catalysis.	**07**
		OR	
	(c)	State and explain the phase rule. Explain various terms involved.	**07**
Q.3	**(a)**	Define the term electrochemistry. Explain reversible cell in detail.	**03**
	(b)	Derive relation between free energy and EMF.	**04**
	(c)	Write a note on van der Waals’ Equation and Critical Constants	**07**
		OR	
Q.3	**(a)**	Write a note on super critical fluid.	**03**

	(b)	Explain adsorption theory of catalysis with examples.	**04**
	(c)	Explain first law of thermodynamics in details.	**07**
Q.4	**(a)**	Define the term positive catalysis and catalytic poison with examples.	**03**
	(b)	Explain 2nd order reaction with examples.	**04**
	(c)	Derive the relation Cp – Cv = R	**07**
		OR	
Q.4	**(a)**	One mole of an ideal gas at 25ºC is allowed to expand reversibly at constant temperature from a volume of 10 litres to 20 litres. Calculate the work done by the gas in joules and calories.	**03**
	(b)	What do you mean by simultaneous reaction? Give examples of it and derive an equation for it.	**04**
	(c)	Explain phase rule for condensed system.	**07**
Q.5	**(a)**	Calculate the amount of heat necessary to raise 213.5 g of water from 25º to 100ºC. Molar heat capacity of water is 18 cal mol^{-1} K^{-1}.	**03**
	(b)	Explain half-cell reaction in details.	**04**
	(c)	Derive mathematical expression for the rate constant of a reaction (A → Products)	**07**
		OR	
Q.5	**(a)**	Four moles of an ideal gas expand isothermally from 1 litre to 10 litres at 300 K. Calculate the change in free energy of the gas. (R = 8.314 JK^{-1} mol^{-1})	**03**
	(b)	Write a note on surface active agents.	**04**
	(c)	Explain phase rule for Sulphur system.	**07**

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