Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2133506 **Date: 09/06/2017**

Subject Name: Physico-chemical Processes

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.**

MARKS

Q.1 Short Questions **14**

1 How many phases are present in mixture of N_2, O_2 and H_2?

2 In true solution, the diameter of the dispersed particle is in the range from____.

3 Define the term: Normality.

4 Define the term: Activation energy.

5 NaCN on hydrolysis produces a solution which has
(a) pH > 7 (b) pH = 7 (c) pH < 7 (d) pH = 0

6 For first order reaction the rate constant K, has the unit_____.

7 Define the term promoter with example.

8 How many components are present in the following systems?
(*a*) Water and Water vapour (*b*) KCl + Water and KCl hydrate

9 Which one of the following statements is not true?
(a) enzymes require optimum temperature (b) enzymes required optimum pH
(c) enzymes increase activation energy (d) enzymes are highly specific in nature

10 In a galvanic cell the following reaction takes place:
$2H_2O \leftrightarrow O_{2(g)} + 4H^+ + 4e^-$
It occurs at the (a) cathode (b) anode (c) cathode and anode (d) none of the

11 Define the term eutectic point in phase diagram.

12 In lyophobic sols, the dispersed phase has no ____for the medium or solvent.

13 In series of reaction which is the rate determining step?

14 Which salt out of the following will be hydrolysed to give basic solution?
NaCN, NaCl, $NaNO_3$, NH_4Cl
(*a*) NaCN (*b*) NaCl(*c*) $NaNO_3$ (*d*) NH_4Cl

Q.2 (a) The pH of a solution of HCl is 2. Find out the amount of acid present in a litre of the solution. **03**

(b) Give examples of acid base catalysis and explain their mechanism **04**

(c) Explain the rate law, rate equation and order of reaction with suitable examples **07**

OR

(c) Discuss the salient features of phase diagram of water system. **07**

Q.3 (a) Explain homogeneous catalysis with examples **03**

(b) A litre of solution containing 0.5 mole of CH_3COOH and 0.5 mole of CH_3COONa provides a buffer of pH 4.76. Calculate the pH of solution after the addition of 0.1 mole HCl. Ka = 1.75×10^{-5}. **04**

	(c)	Explain zero order and pseudo order reaction with examples	**07**

OR

Q.3	**(a)**	For a certain first order reaction $t_{0.5}$ is 100 sec. how long will it take for the reaction to be completed 75%?	**03**
	(b)	Define the term colloids. Give the classification of collides.	**04**
	(c)	Define the term buffer solution. Derive Henderson equation to find out pH of buffer solution.	**07**
Q.4	**(a)**	What is the cell potential half-cell consisting of zinc electrode in 0.01M ZnSO4 solution at 25°C, E° =0.763V	**03**
	(b)	Explain Ostwald's theory of indicator?	**04**
	(c)	Define the term adsorption and explain adsorption theory of catalysis with suitable examples	**07**

OR

Q.4	**(a)**	Explain Nernst equation in detail.	**03**
	(b)	Explain Quinonoid theory of indicator?	**04**
	(c)	Define the term acid base catalysis. Give examples of acid base catalysis and explain their mechanism	**07**
Q.5	**(a)**	Find the pH of a buffer solution containing 0.20 mole per litre CH3COONa and 0.15 mole per litre CH3COOH. Ka for acetic acid is 1.8×10^{-5}.	**03**
	(b)	Explain relation between hydrolysis constant and degree of hydrolysis.	**04**
	(c)	Write a note on purification techniques of colloids	**07**

OR

Q.5	**(a)**	Write a note on molecularity of reaction	**03**
	(b)	Write a note on stability of colloids.	**04**
	(c)	What do you mean by electromotive force? Derive the relation between free energy and EMF	**07**

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