SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR
M.Sc. SECOND SEMESTER, Examination November – 2019
Thursday, 21st November 2019
Course – PS02CCHE03, Physical Chemistry – II, Selected Topics

Time: 10:00 AM to 1:00 PM

Total Marks: 70

N.B. Figures to the right of each of the questions indicate marks

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Que.1 **Write the correct answer**   08

1 The molecule that has an S_6 symmetry element is

A) SF_6 B) B_2H_6 C) PH_3 D) CH_4

2 In the Lindemann mechanism of unimolecular reactions, the observed order at low concentration is

A) 0.5   B) 1   C) 1.5   D) 2

3 In the mechanism of reaction, $H_2 + Br_2 \rightarrow 2HBr$, the first step is

A) Dissociation of H_2 into $H^\bullet$ radicals

B) Dissociation of Br_2 into $Br^\bullet$ radicals

C) Reaction of $H^\bullet$ radical with Br_2

D) Reaction of $Br^\bullet$ radical with H_2

4 The result of the product $C_2(X) \times C_2(Y)$ is

A) E   B) σ_{xy} C) $C_2(Z)$ D) i

5 Sharp fall of electric potential occurs in an electric double layer based on

A) Helmholz-Perrin model   B) Guoy Chapman layer

C) Stern model   D) Both b and c

6 Which of the following do not show Electrokinetic effects?

A) Electrophoresis   B) Electroosmosis

C) Streaming potential   D) Brownian motion

7 β-pleated sheet form of a protein represents:

A) Tertiary structure   B) Secondary structure

C) Primary structure   D) Quaternary structure

8 How many amino acids are present in each turn of α-helix structure?

A) 2.0   B) 3.6   C) 2.6   D) 1

Que.2   Attempt any **SEVEN:**   **14**

1   The rate constant for a first order reaction is 1.54×10^{-3} S^{-1}. Calculate its half life time.

2   Prove that $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

3   Depict the principal axis and number of planes in NH_3

4   What is zeta potential? What are their importances?

5   Show difference between parallel and consecutive reactions. Give one example of each.

6   Define and explain the term electrophoresis.

7   What are liposomes?

8   Explain the peptide bond?

9   What is membrane potential? What are their importances?

Que.3   **A**   Construct a character table for a point group having the symmetry   **06** elements E, $2C_3$ and $3\sigma v$.

B

(i)   Show that under orthogonal transformation the length of the vector   **03** remains constant.

(ii)   Give difference between reducible and irreducible representation.   **03**

<div align="center">OR</div>

B   Demonstrate that C_3^+ and C_3^- symmetry operations as well as C_4^+ and C_4^- **06** are not identity operations.

Que.4   **A**   Derive the following equation for primary equation of primary kinetics   **06** sait effect.

$$\text{Log } K = \text{Log } K^0 + 2\, Z_A\, Z_B\, A\, I^{1/2}$$

B   Discuss the kinetics of opposing reactions.   **06**

<div align="center">OR</div>

B   What is relaxation time? Derive an expression of relaxation for first order   **06** reaction.

<div align="center">(2)</div>

[62]   **Seat No :**_____

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(1)   (PTO)

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(2)

Que.5 **A** Explain quantitative treatment of electrical double layer? 06

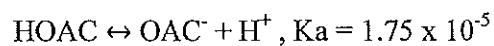**B** Discuss the stern model for the electrical double layer. 06

OR

B Write a note on ATP cycle. 06

Que.6 **A** What are lipids and lipid vesicles? How does an active and passive 06 transport across a biomembrane differ from each other?

B The concentration of chloride in a blood stream is about 0.1 M and in 06 urine is about 0.16 mol.dm^{-3} respectively. Calculate the energy spent by the kidneys in transporting chloride from plasma to urine and how many moles of chloride ions can be transported per mole of ATP hydrolyzed?

OR

B Calculate the standard state ΔG values at (A) pH 0 (B) pH 5 for the 06 dissociation of acetic acid

$$HOAC \leftrightarrow OAC^- + H^+, Ka = 1.75 \times 10^{-5}$$

(C) Calculate ΔG_{ion} at pH 5.0

—X—

③