

[34/A-11]

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SEAT No. _____

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30

SARDAR PATEL UNIVERSITY

M. Sc. (Chemistry) SEMESTER-II Examination

Saturday, 23rd March, 2019

10.00 A.M. To 01.00 P.M.

Physical Chemistry – II, Course – **PS02CCHE03** [Total Marks 70]

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

1. **Choose appropriate answer of the following** [08]
- i) Which of the following molecules or ions belongs to the C_{4v} point group?
(a) SF_3Cl (b) $[BH_4]^-$ (c) XeF_4 (d) NH_3
- ii) A reaction involving two different reactants can never be
(a) Second order reaction (b) Unimolecular reaction
(c) First order reaction (d) Bimolecular reaction
- iii) Which if the following species possesses both C_3 and C_2 axes?
(a) SO_3 (b) NH_3 (c) $[H_3O]^+$ (d) PCl_3
- iv) In the hydrolysis of an organic chloride in presence of large excess of water,
 $RCI + H_2O \rightarrow ROH + HCl$
(a) Molecularity and order of reaction both are 2
(b) Molecularity is 2 but order of reaction is 1
(c) Molecularity is 1 and order of reaction is also 1
(d) Molecularity is 1 but order of reaction is 2
- v) Which of the following technique separates charged particles using electric field?
(a) Hydrolysis (b) Electrophoresis
(c) Protein synthesis (d) Protein denaturing
- vi) A colloidal system having a solid substance as a dispersed phase and a liquid as a dispersion medium is classified as _____.
(a) solid sol (b) gel (c) emulsion (d) sol
- vii) The four elements that make up 99% of all elements found in a living system are
(a) C, H, O & P (b) C, H, O & S
(c) C, H, O & N (d) C, N, O & P
- viii) Which of the following is the simplest amino acid?
(a) Alanine (b) Glycine (c) Asparagine (d) Tyrosine

(1)

(P.T.O)

2. **Attempt any SEVEN** [14]
- (i) Explain continuous flow technique.
 - (ii) Explain peptide bond with example.
 - (iii) Give the difference between electrophoresis and electro-osmosis.
 - (iv) Define the term Point group. Explain roto-reflection axis with suitable example.
 - (v) How the molecularity and order of reaction differ from each other?
 - (vi) Explain the point group D_{2h} and C_{4h} with suitable example.
 - (vii) Show the effect of pH on zeta potential.
 - (viii) ATP is energy currency in biological reactions. Explain.
 - (ix) Discuss the primary structure of protein.

3. [A] There are 8 symmetry elements for C_{4v} point group and the character table is shown below. [06]

C_{4v}	E	$2C_4$	C_2	$2\sigma_v$	$2\sigma_d$
Γ_1	1	1	1	1	1
Γ_2	1	1	1	-1	-1
Γ_3	1	-1	1	1	-1
Γ_4	1	-1	1	-1	1
Γ_5	2	a	b	c	d

Deduce the values of unknown **a**, **b**, **c** and **d**

- [B] Construct the transformation matrix for clockwise and anti-clockwise rotation through an angle θ . [06]

OR

- [B] (i) Obtain the transformation matrix for plane of reflection. [03]
(ii) Enlist the conditions for Orthogonality of matrix and prove that $AA^T = E$ meets such condition. [03]

4. [A] For the reaction $A \rightarrow B \rightarrow C$ Obtain the values of A, B & C considering the reaction is of first order. [06]
[B] Discuss the kinetic relations for chain reaction. [06]

OR

- [B] What are un-branched chain reactions? How initiation, propagation and termination steps occurs in such reactions. [06]

(2)

5. [A] Explain in detail about the features of Stern model for an electric double layer. [06]
- [B] (i) Define and explain streaming and sedimentation potentials. [03]
- (ii) What are electrocapillary curves? Why the interfacial tension values for KI aqueous solutions are lower than KCl solution under lower field potential? [03]

OR

- [B] Explain: (i) β -pleated and α -helix forms of protein [06]
- (ii) Mechanism of enzyme
6. [A] Explain the complete mechanism of DNA replication considering the role of different types of enzymes. [06]
- [B] Glucose-6-phosphate was hydrolyzed enzymatically (at pH 7 and 25 °C) to glucose and inorganic phosphate. The concentration of glucose-6-phosphate was 0.1 M at the beginning. At equilibrium, only 0.05% of the original glucose-6-phosphate remained. Calculate (a) K'_{eq} for the hydrolysis of glucose-6-phosphate, (b) $\Delta G'$ for the hydrolysis reaction, (c) K'_{eq} for the reaction by which glucose-6-phosphate is synthesized from inorganic phosphate and glucose and (d) $\Delta G'$ for the synthesis reaction. [06]
- [B] What are lipids? Give the classification of lipids along with their functions. [06]

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5

