

Total No. of Questions : 6]

SEAT No. :

P1402

[5123]-404

[Total No. of Pages : 3

M.Sc.

PHYSICAL CHEMISTRY

**CHP - 413 : Biophysical Chemistry
(2013 Pattern) (Semester - IV) (New)**

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answers to the TWO sections should be written in separate answer books.*
- 2) *All questions are compulsory.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic table/calculator is allowed.*
- 5) *Neat diagrams must be drawn wherever necessary.*

Physico - Chemical Constants

1) Avogadro Number	N	= $6.022 \times 10^{23} \text{ mol}^{-1}$
2) Boltzmann Constant	k	= $1.38 \times 10^{-16} \text{ erg K}^{-1} \text{ molecule}^{-1}$ = $1.38 \times 10^{-23} \text{ J K}^{-1} \text{ molecule}^{-1}$
3) Planck Constant	h	= $6.626 \times 10^{-27} \text{ erg s}$ = $6.626 \times 10^{-34} \text{ J s}$
4) Electronic Charge	e	= $4.803 \times 10^{-10} \text{ esu}$ = $1.602 \times 10^{-19} \text{ C}$
5) 1 eV		= $23.06 \text{ kcal mol}^{-1}$ = $1.602 \times 10^{-12} \text{ erg}$ = $1.602 \times 10^{-19} \text{ J}$ = 8065.5 cm^{-1}
6) Gas Constant	R	= $8.314 \times 10^7 \text{ erg K}^{-1} \text{ mol}^{-1}$ = $8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ = $1.987 \text{ cal K}^{-1} \text{ mol}^{-1}$
7) Faraday Constant	F	= $96487 \text{ C equiv}^{-1}$
8) Speed of light	c	= $2.997 \times 10^{10} \text{ cm s}^{-1}$ = $2.997 \times 10^8 \text{ m s}^{-1}$
9) 1 cal		= $4.184 \times 10^7 \text{ erg}$ = 4.184 J
10) 1 amu		= $1.673 \times 10^{-27} \text{ kg}$
11) Bohr magneton	β_e	= $-9.274 \times 10^{-24} \text{ J T}^{-1}$
12) Nuclear magneton	β_n	= $5.051 \times 10^{-27} \text{ J T}^{-1}$
13) Mass of an electron	m_e	= $9.11 \times 10^{-31} \text{ kg}$

P.T.O.

SECTION - I

Q1) Attempt the following: [10]

- a) Define proteins and classify them.
- b) How do biological energy processes obey first and second laws of thermodynamics?
- c) Write and explain Bragg's equation.
- d) Enlist types of biological reactions.
- e) What is gel electrophoresis?

Q2) Attempt any two of the following: [10]

- a) Explain the structure and functions of proteins.
- b) Discuss the classification of RNA.
- c) What is electrophoresis? Explain its types.
- d) State the principle of XRD. How is applied to study the molecular weight of an asymmetric macromolecule.

Q3) Attempt any one of the following: [5]

- a) Discuss the reactions involved in ATP hydrolysis.
- b) Calculate the standard free energy of the reaction Dihydroxy acetone phosphate catalyst glyceraldehyde 3 phosphate. At equilibrium, the ratio of the product to reactant is 0.0475 at 7pH and 25°C.

SECTION - II

Q4) Answer precisely the following: [10]

- a) Mention three layers of a cell membrane with dimensions.
- b) Define the terms - Axolemma and endocytosis.
- c) How is the size of biopolymer particles, determined by Brownian motion method?
- d) What is uncompetitive enzyme inhibition?
- e) Define - Circular dichroism (CD).

Q5) Attempt any two of the following:

[10]

- Discuss the mechanism of muscle contraction.
- Describe the end-group determination method to determine the molecular weight of a biopolymer.
- Derive the Michaeli's - menton equation for enzyme catalysis.
- Discuss the application of circular dichroism to study the conformation of biomolecules.

Q6) Attempt any one of the following:

[5]

- Fractions of a biopolymer, when dissolved in an organic solvent, gave the following intrinsic viscosities at 25°C.

M (g mol ⁻¹)	34,000	61,000	1,30,000
[η]	1.02	1.6	2.75

Determine K and α in Mark-Hounrink equation.

- A biopolymer sample has the following distribution of molecular weight.

Fraction	0.15	0.20	0.40	0.15	0.10
Mol wt	1×10^4	1.5×10^4	2×10^4	3×10^4	4×10^4

Calcualte \bar{M}_n and \bar{M}_w .

