Total No. of Questions : 6]

SEAT No. :

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P2014

[4923]-404

M.Sc.

PHYSICAL CHEMISTRY

CHP - 413 : Biophysical Chemistry

(2013 Pattern) (Semester - IV) (New)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

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

P.T.O.

SECTION - I

Q1) Attempt the following: [10]

a) Give the colour tests for proteins.

b) Define biological cell. Mention its constituents.

c) State the principle of XRD technique.

d) Distinguish between Exogenic and Endorgonic reactions.

e) Discuss types of electrolysis.

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

a) Discuss the role of ATP in biological systems.

b) Compare RNA and DNA.

c) Explain denaturation of proteins.

d) How is Bragg's equation used to analyze the crystal structure?

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

a) Glucose l-phosphatase $\xrightarrow{\text{catalyst}}$ glucose 6-phosphate. Starting with 100% 20mM reactant the equilibrium mixture contains 1mM reactant and 19mM product. Find the standard free energy change for the reaction.

b) Discuss the components of a plant cell and compare with those of an animal cell.

SECTION - II

Q4) Answer precisely the following: [10]

a) What is Donnan membrane equilibrium?

b) Define the terms - Nerve impulse and action potential.

c) How is the size of biopolymer particles determined by Tyndall effect?

d) Explain the effect of temperature on enzyme activity.

e) Draw a neat labelled diagram of the apparatus for circular dichroism.

Q5) Answer any two of the following: **[10]**

    a)   With a neat labelled diagram, describe the fluid mosaic model for cell membrane.

    b)   Explain the role of Na^+/k^+ pump during the development of an impulse.

    c)   What is enzyme inhibition? Explain briefly the reversible inhibition.

    d)   Discuss the theory of optical rotatory dispersion.

Q6) Attempt any one of the following: **[5]**

    a)   A biopolymer sample contains equal weights of molecules with molecular weight 10,000 and 20,000. Calculate $\overline{M}n$ and $\overline{M}w$.

    b)   The following relative viscosities were measured for a polymer in a given solvent at 25°C.

C(g/100cc)	0.152	0.271	0.541
η_r	1.226	1.425	1.983

    Find the intrinsic viscosity of the polymer.

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