

Total No. of Questions : 4]

SEAT No. :

**P1480**

[Total No. of Pages : 3

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M.Sc. - II

**PHYSICAL CHEMISTRY**

**CH-414 : Biophysical Chemistry and Related Techniques**

**(Old) (2008 Pattern) (Semester - IV) (Optional)**

*Time : 3 Hours]*

*[Max. Marks :80*

*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	= $23.06 \text{ k cal mol}^{-1}$ = $1.602 \times 10^{-12} \text{ erg}$ = $1.602 \times 10^{-19} \text{ J}$ = $8065.5 \text{ cm}^{-1}$
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	= $4.184 \times 10^7 \text{ erg}$ = $4.184 \text{ J}$
10. 1 amu	= $1.673 \times 10^{-27} \text{ kg}$
11. Bohr magneton	$\beta_e = -9.274 \times 10^{-24} \text{ J T}^{-1}$
12. Nuclear magneton	$\beta_n = 5.051 \times 10^{-27} \text{ J T}^{-1}$
13. Mass of an electron	$m_e = 9.11 \times 10^{-31} \text{ kg}$

**P.T.O.**

### SECTION - I

**Q1)** Attempt any four of the following : **[20]**

- a) Compare animal and plant cells.
- b) Discuss Osmosis and reverse osmosis.
- c) Write a note on Donnan membrane equilibrium.
- d) What are flickering clusters?
- e) What is the role of the phosphoanhydride bond in energy transfer?
- f) Compare chaperones with chaperonins.

**Q2)** Attempt any four of the following : **[20]**

- a) How are nucleic acids important in cell biology?
- b) Deduce  $\bar{R} = l \times \sqrt{\frac{8N}{3\pi}}$ .
- c) Discuss the role of smooth muscles.
- d) Write a note on blood buffering mechanism.
- e) Explain Henderson's equation and its role in buffer preparation.
- f) Enlist the functions of proteins. Give their tests.

### SECTION - II

**Q3)** Answer any four of the following : **[20]**

- a) Explain the structure of a cell membrane on the basis of fluid-mosaic model.
- b) Derive Michaelis-Menton equation for enzyme catalysis.
- c) What is all or none law? Explain.
- d) Enlist the applications of a cell membrane.
- e) State the principle of X-ray diffraction. How is it used to determine the molecular weight of the asymmetric macromolecule?
- f) Write a note on oscillatory reactions.

**Q4)** Answer any four of the following : **[20]**

- a) Briefly discuss any two methods for determination of the size of biopolymers.
- b) Discuss the theory of optical rotary dispersion.
- c) Discuss the application of circular dichroism to study the conformation of biomolecules.
- d) Define the terms :
  - i) Neuron
  - ii) Resting membrane potential
  - iii) Voltage gated channels
  - iv) Action potential and
  - v) Nerve impulse.
- e) Discuss the viscosity method to determine the molecular weight of a biopolymer.
- f) Discuss briefly the factors affecting enzyme activity.

