

Total No. of Questions :6]

SEAT No. :

P2890**[5023]-404**

[Total No. of Pages :3]

M.Sc.**PHYSICAL CHEMISTRY****CHP - 413: Biophysical Chemistry****(New) (2013 Pattern) (Semester - IV)****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 | | = | $23.06 \text{ k cal mol}^{-1}$ |
| | | = | $1.602 \times 10^{-12} \text{ erg}$ |
| | | = | $1.602 \times 10^{-19} \text{ J}$ |
| | | = | 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) Give the colour tests for proteins.
- b) State the Bragg equation.
- c) What is the role of mitochondria in a biological cell?
- d) Differentiate between secondary and tertiary proteins.
- e) Write the significance of ferritin in metabolism.

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

- a) Explain denaturation of proteins.
- b) Discuss the classification of proteins.
- c) Explain the gel electrophoresis technique.
- d) Discuss the types of electrophoresis.

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

- a) Calculate the standard free energy of the reaction Dihydroxy acetone phosphate $\xrightleftharpoons{\text{catalyst}}$ Glyceraldehyde 3 phosphate. At equilibrium, the ratio of glyceraldehyde 3 phosphate to dihydroxy acetone phosphate is 0.0475 at 25°C and 7pH.
- b) Discuss the reactions related to hydrolysis of ATP.

SECTION -II

Q4) Answer precisely the following: [10]

- a) What is a nerve? State its types with examples.
- b) Define depolarization and repolarization in generation of an impulse.

- c) Enlist the factors affecting enzyme activity.
- d) Explain the term 'flow birefringence'.
- e) What is reversible enzyme inhibition?

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

- a) Explain how ions are transported through a cell membrane.
- b) Give the classification of biopolymer particles based on shapes. What are fibrous and globular proteins?
- c) Explain irreversible enzyme inhibition with examples.
- d) Discuss the theory of optical rotatory dispersion.

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

- a) A polymer sample contains equal number of molecules with molecular weight 10,000 and 20,000. Calculate \bar{M}_n and \bar{M}_w .
- b) 1.0 g of a polyester in 100 cm³ methyl ethyl ketone required 13.5 cm³ of 5×10^{-3} m alcoholic KOH for neutralization. Calculate the molecular weight of the polymer.

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