

B.Sc. BIOTECHNOLOGY
Third Semester
BIOPHYSICAL CHEMISTRY
(BBT - 14)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any five of the following questions:

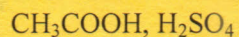
1. Explain the folding of Protein? What are the roles of different chaperones in protein folding? What is a native protein? (3+5+2=10)
2. What is the difference between A and B form of DNA? Explain the structure of a DNA molecule. (5+5=10)
3. (a) What is redox reaction? Give example of it. (2+3+5=10)
(b) Write the Nernst equation.
(c) What is electrochemical series? Write application of it.
4. (a) Write Schrödinger wave equation. (2+3+5=10)
(b) Write Pauli's exclusion principle and Hund's rule.
(c) Write short notes on quantum numbers.
5. (a) Write Raoult's law. (2+3+5=10)
(b) Calculate the normality and molarity of 4 g NaOH in 500 ml water.
(c) What is osmotic pressure? How osmotic pressure can be measured?
6. (a) Write about glass membrane of ion selective electrode. (2+3+5=10)
(b) Write three differences between natural and artificial radioactivity.

(c) Derive the following equation:

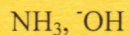
$$\lambda = 2.303/t \log (N_0/N)$$

7. (a) Illustrate the concept of acids and bases according to Bronsted and Lowry's concept.

(b) Write down conjugate bases for following acids: (5+5=10)



Write down conjugate acids for following bases:



(c) (i) What do you mean by pK_a of an acid?

(ii) Find the P^{H} of following:

(a) 0.25 N HCl

(b) 0.01 N NaOH

8. (a) On the basis of VSEPR theory explain shapes of following molecule and draw their structure $\text{NH}_3, \text{ClF}_3$ (5+3+2=10)

(b) (i) Ethyl alcohol is miscible with water however ether is not. Explain why?

(ii) Explain why H_2S is gas while H_2O is liquid?

(c) Explain in brief about the formation of H_2 -molecule from H-atom using Valence Bond Theory.

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Duration: 20 minutes

Marks – 20

(PART A- Objective Type)

I. Choose the correct answer:

1×20= 20

- Which of the following is a basic amino acid?
a. Alanine b. Glycine c. Lysine d. Methionine
- Imino group is present in which amino acid?
a. Asparagine b. Histidine c. Proline d. Serine
- Which is an aromatic amino acid?
a. Phenylalanine b. Cysteine c. Leucine d. Isoleucine
- Out of the following which is a protein secondary structure?
a. Amino acids b. Peptides c. Domains d. Alpha helix
- The nitrogen base, sugar and phosphate group forms the
a. Nucleoside b. TRNA c. DNA d. Nucleotide
- The oxidation means
a. loss of electron c. both a & b
b. gain of electron d. none of the above
- Which of the following metal will react with dil. H_2SO_4 ?
a. Zn b. Cu c. Ag d. All of the above
- Isotonic solution means
a. solution having same osmotic pressure c. both a & b
b. solution having different osmotic pressure d. none of the above
- Half life period depends upon
a. disintegration constant λ c. conc. of product
b. initial conc. of reactant d. none of the above
- The value of m_l for $l=1$
a. -1, 0,+1 b. 0 c. 1 d. None of the above
- The s-orbital have
a. spherical shape c. square pyramidal shape
b. dump-bell shape d. all of the above

12. An acid is
a. proton acceptor
b. proton donor
c. electron donor
d. none of the above
13. p^{H} of a solution is 2, its concentration of $[\text{H}^+]$ in moles/lit is
a. 10^{-1}
b. 10^{-2}
c. 10^2
d. 10^{12}
14. p^{H} of 0.1 (N) NaOH will be
a. 13
b. 14
c. 12
d. 11
15. Which of the following molecule will have zero dipole moment?
a. NH_3
b. H_2O
c. BeCl_2
d. CH_3Cl
16. O-nitrophenol is more volatile than p-nitrophenol because of
a. intermolecular H-bonding between o-nitrophenol.
b. intramolecular H-bonding between o-nitrophenol.
c. vander-waals force of attraction between o-nitrophenol.
d. all of the above.
17. The type of hybridization involved in following molecule:
 SO_4^{-2} , BF_3 , XeOF_4 , BeCl_2 are respectively
a. sp^3 , sp^3d , sp and sp^2
b. sp , sp^3d , sp^3 and sp^2
c. sp^2 , sp^3 , sp^3d , sp
d. sp^3 , sp^2 , sp^3d^2 , sp
18. The value of half life period is
a. $0.693/\lambda$
b. $\lambda/0.693$
c. .693
d. None of the above
19. Weak electrolyte
a. completely ionised
b. feebly ionised
c. not ionized
d. all of the above
20. The flow of solvent through a semi permeable membrane towards the solution side is the phenomenon of
a. adsorption
b. diffusion
c. osmosis
d. transfusion
