

Roll No.

34098

**B. Sc. Bio-Technology 1st Semester
Examination – December, 2024**

BASICS OF BIOMOLECULES

Paper : 24CBTS401DS01

Time : Three hours]

[Maximum Marks : 70

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All question carry equal marks.

1. Write short notes on the following :

- (i) What is the general formula of carbohydrates, explain ? 2
- (ii) Define a monosaccharide and give examples. 2
- (iii) What type of bond is formed during the formation of a disaccharide, explain ? 2
- (iv) What are the main components of a triglyceride ? 2
- (v) Differentiate between saturated and unsaturated fatty acids. 2

(vi) Define an amino acid and mention its general structure. 2

(vii) What type of bond links amino acids in a protein? 2

UNIT - I

2. Define carbohydrates and discuss their classification and nomenclature with suitable examples? 14

3. Explain the following :

(i) Structure and properties of monosaccharaides 7

(ii) Glycoproteins 7

UNIT - II

4. Describe the classification, nomenclature, and properties of fatty acids, highlighting their significance in lipid biology? 14

5. Explain the following :

(i) Concept of acid value 7

(ii) Steroids 7

UNIT - III

6. Explain the structure, classification, and properties of amino acids and discuss how they contribute to the structure and function of proteins? 14

7. Discuss in detail the following :
- (i) Explain essential amino acids and their function 7
 - (ii) Different levels of Protein Structure 7

UNIT - IV

8. Explain the following in detail :
- (i) Watson Crick model (B-DNA) 7
 - (ii) A- and Z- DNA 7
9. Explain chemical structure and basic composition of nucleic acids. 14
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Roll No.

34099

**B.Sc. (Bio-Technology) 1st Semester
Examination – December, 2024**

CELL BIOLOGY

Paper :24CBTS401DS02

Time : Three hours |

| Maximum Marks : 70

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. Question No. 1 is *compulsory*. All questions carry equal marks

1. Write short note on the followings : 2 × 7 = 14
- (a) Discovery of Cell
 - (b) Mitochondria
 - (c) Centrioles
 - (d) Chromosomes
 - (e) Fimbriae
 - (f) Endospores
 - (g) Membrane Lipids

UNIT – I

2. Give a detailed account of structure and function of Cell wall. 14

3. Explain the followings:

- (a) Structural organization of Plasma Membrane 7
- (b) Chloroplast 7

UNIT – II

- 4. Describe briefly Protein synthesis and folding in the cytoplasm. 14
- 5. Describe the biogenesis of Golgi complex. 14

UNIT – III

- 6. Explain the water and ion transport. 14
- 7. Write short notes on the followings :
 - (a) Outer membrane of gram negative bacteria 7
 - (b) Cytoskeleton Filament 7

UNIT – IV

- 8. Give a detailed account of Programmed cell Death (Apoptosis). 14
- 9. Explain the Facilitated diffusion and Active transport. 14

Roll No.

91049

**B. Sc. Biotechnology 1st Semester
w.e.f. 2012-13**

Examination – December, 2024

BIOCHEMISTRY & METABOLISM

Paper : BT-104

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. **1** is *compulsory*. All questions carry equal marks.

1. Write note on (any *four*) :

$2 \times 4 = 8$

- (a) Prosthetic groups
- (b) β -oxidation of fatty acids
- (c) Amino acids
- (d) Heteropoly Saccharides
- (e) Holoenzymes

UNIT - I

2. Write note on :

4 × 2 = 8

(a) Monosaccharides

(b) Bacterial cell wall polysaccharides

3. Write in detail the classification of proteins and different biological role of proteins. 8

UNIT - II

4. What are nucleic acids ? Briefly explain structure, properties of purines and pyrimidines. 8

5. (a) Differentiate b/w saturated and unsaturated fatty acids. 4

(b) Lipids, its structure and function. 4

UNIT - III

6. Write note on :

4 × 2 = 8

(a) Holoenzymes

(b) Cofactors

7. Write note on :

4 × 2 = 8

(a) Activation energy of enzymes

(b) Specificity of enzymes

UNIT – IV

8. Write note on :

4 × 2 = 8

(a) Glycolysis

(b) Aerobic and Anaerobic pathway

9. Briefly explain TCA cycle.

8

Roll No.

91050

**B. Sc. (Bio-Technology) 1st Semester
w.e.f. 2012-13**

Examination – December, 2024

PHYSICAL CHEMISTRY

Paper : BT-105

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. Attempt *all* questions : $8 \times 1 = 8$
- (a) Write expression for most probable velocity and average velocity.
- (b) Define collision frequency
- (c) Which type of crystalline solids have highest melting point and why ?

- (d) Why amorphous solids are isotropic but crystalline solids are anisotropic ?
- (e) Explain Snell's law ?
- (f) What is critical temperature ?
- (g) Describe Vander Waal's forces.
- (h) State the law of corresponding states.

SECTION – A

2. (a) Write the expression for the following : $3 \times 1 = 3$

(i) Average velocity

(ii) Root mean square velocity

(iii) Most Probable velocity

(b) The average velocity of a gas is 200 ms^{-1} . Calculate its root mean square velocity at the same temperature ? 3

(c) What is the SI unit of : $2 \times 1 = 2$

(i) Vander Waal's constant 'a'

(ii) Vander Waal's constant 'b'

3. (a) Explain the effects of pressure and temperature on mean free path. 3

- (b) Calculate the Boyle temperature, T_b for O_2 gas provided Vander Waal's constant values $a = 1.36 \text{ dm}^6 \text{ atm mol}^{-1}$ $b = 0.0318 \text{ dm}^6 \text{ atm mol}^{-1}$ and $R = 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$. 3
- (c) Describe compression factor. 2

SECTION - B

4. (a) Write expressions for the critical in terms of Vander Waal's constants. 4
- (b) Calculate the volume of 10 moles of ethane at 10 atm pressure and 273 K. At this temperature and pressure, compressibility factor ' z ' = 0.873. 4
5. (a) Derive $P_c V_c = 3/8 RT_c$. 4
- (b) Discuss the essential conditions for the liquification of gases in terms of critical phenomenon. 4

SECTION - C

6. (a) What is meant by coefficient of viscosity of a liquid ? Describe Ostwald's method for determining the viscosity of liquid. 4
- (b) Explain the application of dipole moment in elucidating molecular structure. 4
7. (a) Express the relationship between boiling point and heat of vapourization. 3

- (b) The parachors of ethane and propane are 125.1 and 180.5 respectively. What values of parachor value do you expect for butane ? 3
- (c) Describe a method for measurement of surface tension. 2

SECTION - D

8. (a) What are liquid crystals ? Discuss about different types of liquid crystals. 4
- (b) Derive Bragg's equation for the diffraction of X-ray by crystals. 4
9. (a) The intercepts made by the unit plane on the crystallographic axes X, Y, Z are a, b and c respectively. A particular face of a crystal makes intercepts 2a, 2b and 3c on the same axes. What are the Miller indices of this face ? 4
- (b) Identify the crystal system to which each of the following belongs : 4
- (i) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
- (ii) $a = b = c$ and $\alpha \neq \beta \neq \gamma = 90^\circ$
- (iii) $a = b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
- (iv) $a = b \neq c$ and $\alpha = \gamma = 90^\circ, \beta = 120^\circ$
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91051

**B. Sc. Biotechnology 1st Semester
w.e.f. 2012-13**

Examination – December, 2024

INORGANIC CHEMISTRY

Paper : BT-106

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) How many orientations are possible for f-orbitals ?
 $1 \times 8 = 8$
- (b) What is $(n + l)$ value for 4p orbital ?
- (c) Which has smaller size H^- or He and why ?
- (d) Why electron affinity of Noble gases is zero ?
- (e) Why bond angle in H_2O is less than the bond angle in CH_4 ?

- (f) Define bond energy.
- (g) Why LiF is ionic?
- (h) Why size of K^+ is less than that of Cl^- ion.

UNIT – I

2. (a) Derive de Broglie equation. What is its significance? 4
- (b) Draw p and d orbitals. How many nodes are there in $2s$ & $3s$ orbitals? 4
3. (a) Draw and explain radial probability distribution curve for $2p$ and $3d$ orbitals. 4
- (b) Find the values n , l , m & s for an electron in $4f$ orbital of an atom. 4

UNIT – II

4. (a) Discuss Aufbau principle. What are its limitations? 4
- (b) Write electronic configuration of Fe^{3+} and Cu^{2+} . 2
- (c) Calculate z_{eff} for $4p$ electron in Fe ($Z = 26$). 2
5. (a) Distinguish between electron affinity and electronegativity. 3
- (b) Explain the factors affecting Ionization energy. 3
- (c) What has smaller size & why between Na and Cl ? 2

UNIT – III

6. (a) What is hybridization ? Explain the structure of SF_6 . 4
- (b) Explain VSEPR theory by taking examples of ClF_3 and H_2O . 4
7. (a) Draw molecular orbital diagram of CO calculate its bond order. 4
- (b) Calculate percentage ionic character of HF molecule. [Bond distance = 0.92 Å and Dipole moment = 1.91 D]. 4

UNIT – IV

8. (a) Explain how Born-Haber cycle is used for calculating lattice energy of $NaCl$. 4
- (b) Discuss the structure of solid calcium fluoride. 4
9. (a) Define lattice energy. What are the factors affecting lattice energy ? 4
- (b) Explain Fajan's rule. 2
- (c) Why LiCe have covalent character ? 2

Roll No.

91052

**B. Sc. Biotechnology 1st Semester
w.e.f. 2012-13**

Examination – December, 2024

ORGANIC CHEMISTRY

Paper : BT-107

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) What is localized covalent bond ? $1 \times 8 = 8$
- (b) Define racemization.
- (c) What is steric strain ?
- (d) What are *two* important conformations of cyclohexane ?
- (e) Define Enantiomers.

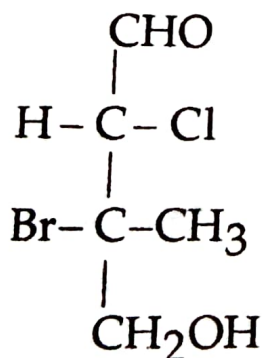
- (f) What is full form of symbol 'R' and 'S' to designate configuration about chiral carbon.
- (g) Why $C \equiv C$ bond length is shorter than $C = O$ bond length ?
- (h) Why branched chain alkanes have lower b.pt. than straight chain isomers ?

UNIT - I

2. (a) What is meant by hyperconjugation ? Why is it also termed as no bond resonance ? Explain with example. 4
- (b) Write all the differences between inductive effect and electromeric effect. 4
3. (a) What is optical activity ? Explain why Chirality is essential condition for optical activity. 4
- (b) Explain various types of isomerism. 4

UNIT - II

4. (a) Assign R and S configuration to the following :



4

- (b) Discuss the stability of different conformations of n-butane. 4

5. (a) Draw Fischer, Newman and Saw-horse formulae of 3-bromo-2-butanol. 4
- (b) What are the necessary conditions for a compound to show geometrical isomerism? 4

UNIT - III

6. (a) Differentiate between singlet and triplet carbene. 3
- (b) Explain : 2
- (i) Homolytic
- (ii) Heterolytic bond breaking
- (c) Pick up from following, the electrophiles and nucleophiles. 3
- NO_2^+ , NH_3 , KOH , BF_3 , CN^- , SO_3
7. (a) Discuss relative stabilities of 1° , 2° and 3° carbocations. 4
- (b) Explain Transition state theory of reaction rates. 4

UNIT - IV

8. (a) Explain structural isomerism in alkanes. 4
- (b) How butane is prepared by : 4
- (i) Corey-house reaction
- (ii) Wurtz reaction

9. (a) How will you prepare :

(i) Cyclohexane

(ii) Cyclopentane

(b) Write note on Baeyer strain theory. What are its limitations ?

4

4
