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**M.Sc. (Semester-I) Examination,
Dec.-Jan. (2025-26)**

MICROBIOLOGY

(Microbial Biochemistry)

Time Allowed : Three Hours

Maximum Marks : 70

Note : This question paper is divided into four sections. Attempt questions of all four sections as per given direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt any ten questions. Each question carries 1 mark. [10x1=10]

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(1)

[P.T.O.]

1. (i) Which mathematical expression correctly defines the ionic product of water?

(a) $K_w = [H_3O^+][OH^-]$

(b) $K_w = \frac{[H_3O^+][OH^-]}{[H_2O]}$

(c) $K_w = [H^+][OH^-] \times [H_2O]$

(d) $K_w = [H_3O^+] + [OH^-]$

(ii) The change in the energy between a chemical reaction and its surrounding at constant temperature is called :

(a) Enthalpy change

(b) Enthalpy

(c) Enthalpy dynamics

(d) Enthalpy profile

(iii) Which of the following is represented to the primary structure of proteins?

(a) Alfa helix

(b) Beta-sheets

(c) Loops

(d) None of the above

(iv) The Furanose structure of Fructose is obtained by the interaction of groups at which carbon atoms?

(a) C_1 and C_5

(b) C_1 and C_6

(c) C_2 and C_5

(d) C_2 and C_6

(v) What quantities are taken into consideration to plot the Ramachandran plot?

(a) Phi and Omega

(b) Omega and psi

(c) Phi and psi

(d) Omega and epsilon

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(2)

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(3)

[P.T.O.]

- (vi) Which of the following is considered the structural parent of all sphingolipids?
- (a) Sphingosine
 - (b) Ceramide
 - (c) Lecithin
 - (d) Sphingomyelin
- (vii) The water purification mechanism that uses pressure to force water through a semipermeable membrane, removing contaminants like bacteria and dissolved solid is called _____.
- (viii) Molecules are similar with the same formula but differ in the 3D arrangement (configuration) at any one specific chiral carbon atom, while all other stereocenters remain identical are called _____.
- (ix) Essential organic nutrients of our body needs in small amounts for normal cell function, growth, metabolism and overall health are called _____.

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(4)

- (x) A compact, spherical proteins that are generally water soluble, playing crucial roles in biological processes like enzyme catalyst transport and cell signaling are called _____.
- (xi) One of the same molecular forms of the same enzyme that catalyze the identical biochemical reaction but differ in their amino acid sequence structure and physical properties are called _____.
- (xiii) A ribonucleic acid molecule that act as a biological catalyst, performing functions similar to protein enzyme, such as cutting other RNA molecules like amino acid or facilitating RNA splicing is called _____.

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 02 marks. (Word limit : 25-30 words) [5×2=10]

2. (i) Define pH.
(ii) What is K_w of water?

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(5)

[P.T.O.]



- (iii) Define primary structure of proteins.
- (iv) Define Peptidoglycans.
- (v) Define Hormones.
- (vi) Define Ribozyme.
- (vii) Define Gibbs Free energy.

SECTION-C

(Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 4 marks. (Word limit : 250 words) [5×4=20]

- 3. (i) Explain properties of water.
- (ii) Explain Buffer and Buffering capacity.
- (iii) Explain Lipoprotein.
- (iv) Explain Ramachandran plots.
- (v) Explain Furanose and Pyranose.
- (vi) Explain Sphingolipids.
- (vii) Explain tertiary structure of proteins.

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(6)

SECTION-D

(Long Answer Type Questions)

Note : Attempt any three questions. Each question carries 10 marks. (More than 500 words) [3×10=30]

- 4. (i) Describe classification, structure and properties of Monosaccharides.
- (ii) Describe classification structure and properties of Amino acids.
- (iii) Describe classification, mechanism of action and kinetics of Enzyme.
- (iv) Describe classification, structure and Biological function of Lipid.

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(7)

