

Q.6

Attempt any two:

- i. Describe the electron transport chain and its role in oxidative phosphorylation. How do the components of the electron transport chain contribute to ATP production? **5** 3 2 5 1
- ii. Compare and contrast substrate-level phosphorylation and oxidative phosphorylation. In what contexts do these processes occur, and what are their relative contributions to ATP production? **5** 4 2 5 1
- iii. Discuss glycogenolysis and glycogen synthesis. Describe the enzymes involved in the process. **5** 3 2 5 1

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Total No. of Questions: 6

Total No. of Printed Pages: 4

Enrollment No.....



Faculty of Science

End Sem Examination Dec 2024

BT3CO03 Biochemistry &amp; Metabolism

Programme: B.Sc.

Branch/Specialisation: Biotechnology

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Marks	BL	PO	CO	PSO
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- Q.1 i. What is the bond type that links monosaccharides to form disaccharides? **1** 1 1 2 1
- (a) Ionic bond
  - (b) Hydrogen bond
  - (c) Glycosidic bond
  - (d) Peptide bond
- ii. Which of the following is a major component of bacterial cell walls? **1** 1 1 1 1
- (a) Cellulose
  - (b) Peptidoglycan
  - (c) Starch
  - (d) Glycogen
- iii. Which of the following fatty acids is classified as essential? **1** 1 1 1 1
- (a) Palmitic acid
  - (b) Stearic acid
  - (c) Linoleic acid
  - (d) Myristic acid
- iv. Which form of DNA is characterized by a right-handed helix? **1** 1 1 1 1
- (a) A-DNA
  - (b) B-DNA
  - (c) Z-DNA
  - (d) Circular DNA
- v. What happens during protein denaturation? **1** 2 1 3 1
- (a) Peptide bonds are broken
  - (b) The protein loses its functional shape
  - (c) The amino acid sequence is altered
  - (d) New disulfide bonds form

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- vi. Which of the following amino acids contains a sulphur atom and can form disulfide bonds?

(a) Cysteine                   (b) Methionine  
(c) Serine                   (d) Threonine

- vii. What is the primary role of coenzymes such as NAD<sup>+</sup> and NADP<sup>+</sup> in enzymatic reactions?

(a) Provide structural support  
(b) Facilitate the transfer of phosphate groups  
(c) Act as electron carriers  
(d) Stabilize enzyme-substrate complexes

- viii. What is the effect of increasing substrate concentration on enzyme activity, assuming the enzyme is saturated?

(a) Activity decreases  
(b) Activity increases linearly  
(c) Activity reaches a maximum (V<sub>max</sub>)  
(d) Activity becomes zero

- ix. Oxidative phosphorylation is most directly coupled to:

(a) Substrate-level phosphorylation  
(b) The electrochemical gradient created by proton pumps  
(c) The TCA cycle  
(d) The pentose phosphate pathway

- x. Which molecule is produced during the TCA cycle and serves as a substrate for the electron transport chain?

(a) Citrate                   (b) Fumarate  
(c) NADH                   (d) Succinate

**1      2      1      3      1**

- Q.2** i. Explain the unique properties of water that make it essential for life.

**2      1      1      1      1**

- ii. Compare and contrast the structures and functions of monosaccharides and disaccharides, providing specific examples for each.

**3      2      1      2      1**

- iii. Explain the composition and function of bacterial cell wall polysaccharides. Discuss their role in

**5      3      2      2      1**

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maintaining bacterial integrity and how they are targeted by antibiotics.

- OR iv. Describe structure, function and properties of polysaccharides. **5      4      2      4      1**

- Q.3 i. Describe the structure and function of phospholipids in cellular membranes. **2      2      1      2      1**

- ii. Discuss the differences between purines and pyrimidines, including their examples and significance. **8      2      1      3      1**

- OR iii. Describe the classification of fatty acids into saturated and unsaturated types, including nomenclature. **8      2      1      2      1**

- Q.4 i. Define denaturation and renaturation of proteins. What factors can lead to denaturation, and how can proteins be renatured? **3      2      1      3      1**

- ii. Explain the different level of structural organization of proteins. **7      2      2      3      1**

- OR iii. Discuss the structure and properties of amino acids. Include their classification, the significance of their side chains, and how these properties relate to protein structure and function. **7      3      2      3      1**

- Q.5 i. Explain the difference between prosthetic groups and metallic ions as cofactors in enzymes. Give an example of each. **4      2      2      4      1**

- ii. Explain the concepts of activation energy and transition state in the context of enzyme-catalyzed reactions. How do enzymes lower activation energy and stabilize the transition state? **6      2      2      4      1**

- OR iii. Discuss the roles of key coenzymes such as NAD<sup>+</sup>, NADP<sup>+</sup>, FMN/FAD, and coenzyme A in cellular metabolism. How do these coenzymes function in redox reactions and metabolic pathways? Provide specific examples of their involvement in enzymatic reactions. **6      3      2      5      1**

**Marking Scheme**  
**BT3CO03 Biochemistry & Metabolism**

Q.1	i) (c) Glycosidic bond	1	ii. Discuss the differences between purines and pyrimidines, including their examples and significance.	8
	ii) (b) Peptidoglycan		OR     iii. Describe the classification of fatty acids into saturated and unsaturated types, including nomenclature.	8
	iii) (c) Linoleic acid			
	iv) (b) B-DNA			
	v) (b) The protein loses its functional shape			
	vi) (a) Cysteine			
	vii) (c) Act as electron carriers			
	viii) (c) Activity reaches a maximum ( $V_{max}$ )			
	ix) (b) The electrochemical gradient created by proton pumps			
	x) (c) NADH			
Q.2	i. Explain the unique properties of water that make it essential for life.	2		
	ii. Compare and contrast the structures and functions of monosaccharides and disaccharides, providing specific examples for each.	3		
	iii. Explain the composition and function of bacterial cell wall polysaccharides. Discuss their role in maintaining bacterial integrity and how they are targeted by antibiotics.	5		
	iv. Describe structure 3 marks function and properties 2 marks	5		
OR			Q.4     i. Define denaturation and renaturation of proteins. What factors can lead to denaturation, and how can proteins be renatured?	3
			ii. Explain the different level of structural organization of proteins.	7
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