

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 |

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....

Faculty of Science

End Sem Examination Dec 2024

BT3CO03 Biochemistry & 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
Q.1	i. What is the bond type that links monosaccharides to form disaccharides? (a) Ionic bond (b) Hydrogen bond (c) Glycosidic bond (d) Peptide bond	1	1	1	2	1
	ii. Which of the following is a major component of bacterial cell walls? (a) Cellulose (b) Peptidoglycan (c) Starch (d) Glycogen	1	1	1	1	1
	iii. Which of the following fatty acids is classified as essential? (a) Palmitic acid (b) Stearic acid (c) Linoleic acid (d) Myristic acid	1	1	1	1	1
	iv. Which form of DNA is characterized by a right-handed helix? (a) A-DNA (b) B-DNA (c) Z-DNA (d) Circular DNA	1	1	1	1	1
	v. What happens during protein denaturation? (a) Peptide bonds are broken (b) The protein loses its functional shape (c) The amino acid sequence is altered (d) New disulfide bonds form	1	2	1	3	1

vi.	Which of the following amino acids contains a sulphur atom and can form disulfide bonds?	1	2	1	3	1
	(a) Cysteine (b) Methionine					
	(c) Serine (d) Threonine					
vii.	What is the primary role of coenzymes such as NAD ⁺ and NADP ⁺ in enzymatic reactions?	1	3	2	4	1
	(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?	1	3	2	4	1
	(a) Activity decreases					
	(b) Activity increases linearly					
	(c) Activity reaches a maximum (V _{max})					
	(d) Activity becomes zero					
ix.	Oxidative phosphorylation is most directly coupled to:	1	2	2	5	1
	(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?	1	2	1	5	1
	(a) Citrate (b) Fumarate					
	(c) NADH (d) Succinate					

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

		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 ⁺ , NADP ⁺ , 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	OR	ii.	Discuss the differences between purines and pyrimidines, including their examples and significance.	8
	ii)	(b) Peptidoglycan	1		iii.	Describe the classification of fatty acids into saturated and unsaturated types, including nomenclature.	8
	iii)	(c) Linoleic acid	1	Q.4	i.	Define denaturation and renaturation of proteins. What factors can lead to denaturation, and how can proteins be renatured?	3
	iv)	(b) B-DNA	1		ii.	Explain the different level of structural organization of proteins.	7
	v)	(b) The protein loses its functional shape	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
	vi)	(a) Cysteine	1				
	vii)	(c) Act as electron carriers	1	Q.5	i.	Explain the difference between prosthetic groups and metallic ions as cofactors in enzymes. Give an example of each.	4
	viii)	(c) Activity reaches a maximum (V _{max})	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
	ix)	(b) The electrochemical gradient created by proton pumps	1	OR	iii.	Discuss the roles of key coenzymes such as NAD ⁺ , NADP ⁺ , 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
	x)	(c) NADH	1				
Q.2	i.	Explain the unique properties of water that make it essential for life.	2	Q.6	Attempt any two:		
	ii.	Compare and contrast the structures and functions of monosaccharides and disaccharides, providing specific examples for each.	3		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
	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		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
	OR iv.	Describe structure 3 marks function and properties 2 marks	5		iii.	Discuss glycogenolysis and glycogen synthesis. Describe the enzymes involved in the process.	5
Q.3	i.	Describe the structure and function of phospholipids in cellular membranes.	2	*****			

