Your Roll No ……

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M.Sc. BOTANY
I SEMESTER EXAMINATION JANUARY 2025

Paper Name: **Plant Biochemistry and Metabolism** Paper Code: **MBO-CC103**
Time: **2 ½ hours** Maximum Marks: **60**
Note: This paper has 3 sections A, B, and C.
Section A: Answer **all the questions**.
Section B: Attempt any **04 out of 05**
Section C: Attempt any **02 out of 03**

Abbreviations used:
CLO-Course Learning Outcomes
CO1: explain the principles of bioenergetics and principles, kinetics and regulation of enzymes (understand);
CO2: interpret the composition, structure and function of carbohydrates, proteins, vitamins, lipids and nucleic acids (evaluate);
CO3: examine the conformation and stability of proteins and nucleic acids (analyze); and
CO4: recognize the metabolism of carbohydrate, lipids and nucleic acids (remember).
BTL-Bloom's Taxonomy Levels
1- Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, 6-Creating

SECTION A

Very Short Type Question (15 questions) 15 x 1 = 15 marks

Q.No.	Question	Marks	CLO	BTL
1	Mention the role of thiamin in carbohydrate metabolism.	1	2	2
2	What are anaplerotic reactions?	1	2	2
3	Glutamic acid is an ……...	1	3	1
4	What is meant by specific activity of an enzyme?	1	1	1
5	What is glyoxylate cycle?	1	2	2
6	Mention the difference between oxidation of saturated and unsaturated fatty acids.	1	4	2
7	What is Ramachandran plot?	1	3	2
8	Explain wobble hypothesis.	1	4	1
9	Name the metabolite that acts as the immediate precursor of pyruvate.	1	2	1
10	When is TCA cycle inhibited	1	4	2
11	Name any catalytic enzyme.	1	1	1
12	What is the chemical nature of ubiquinone?	1	4	1
13	Mention the criteria of spontaneity of a biochemical reaction.	1	1	2
14	How is hairpin structure of nucleic acid formed?	1	2	2
15	Write the chemical structure of the most abundant biopolymer.	1	2	1

SECTION B

Short Type Question. (Attempt any **Four**) 5 x 4 = 20 marks

Q.No.	Question	Marks	CLO	BTL
1	Mention the roles of carnitine acetyltransferase I and carnitine acetyltransferase II in fatty acid oxidation. What are chylomicrons?	5	4	4
2	Elucidate the stepwise mechanism of reactions of the enzyme phosphoglycerate mutase in glycolysis.	5	4	1
3	Why is the peptide bond regarded to be planar? Mention the characteristics of peptide bond.	5	2	4,1
4	Explains the kinetic behavior of allosteric enzymes. Give an example of non-competitive enzyme inhibition.	5	1	4
5	a) Explain thermodynamic concepts and its importance.	2	1	1
	b) How can you show mathematically that heat transfer from an object of higher temperature to one of lower temperature, but not the reverse process, obeys second law of thermodynamics?	2	1	4
	c) Write the thermodynamic equation that connects enthalpy and entropy.	1	1	1

SECTION C

Long type Question (Attempt any **TWO**) 2 x 12.5 = 25 marks

Q.No.	Question	Marks	CLO	BTL
1	a) How does the respiratory chain in mitochondria generate a proton motive force across the membrane? Why membrane are critical for oxidative phosphorylation?	10	4	4
	b) Explain coupled reactions with any example.	2.5	1	2
2	a) Discuss the structural conformation and formation of furanose and pyranose rings with diagrams.	6.25	2	2
	b) How can you show experimentally that the three-dimensional structure of a protein is regulated by its amino acid sequence?	6.25	2	4
3	a) "Pyruvate dehydrogenase complex is a multimeric assembly of three kinds of enzymes" – Justify the statement, highlighting the four biochemical steps involved in the conversion of pyruvate to acetyl CoA.	6	4	4
	b) With the help of suitable illustration explain steps of ß-oxidation of fatty acid.	4	4	1

******END OF QUESTION PAPER******