Roll No: _____

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M.Sc. Biochemistry Semester II Examination, May 2024

Paper Title: Metabolism-I
Paper Code: MBC 203

Time: $2^{1/2}$ Hours **Max Marks: 60**

Note: This paper has 3 Sections, A, B, and C. Attempt all three sections. Section A: Answer all the questions; Section B: Answer any two; Section C: Answer all the questions, each question in this section has an internal choice.

Abbreviations Used: *CLO- Course Learning Outcome, PLO- Program Learning Outcome, BTL- Bloom Taxonomy Level: BT level 1- Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create.*

SECTION A: Attempt all questions. (1x10=10 Marks)

Q. No. 01	Questions	BTL	CLO	PLO
i.	Q cycle is associated with ..... **(Cytochrome c reductase/ NADH oxidoreductase/ Cytochrome c oxidoreductase/Cytochrome c oxidase)**	2	2	3
ii.	Catalytic subunit of ATP synthase is..... **(a/α/β/γ)**	2	2	3
iii.	For spontaneous process TΔS should be..... ΔH of the system **(< / >/ =)**	4	5	2
iv.	The reduction potential of Galvanic cell is always..... **(Positive/Negative/Can't be predicted)**	4	4	3
v.	..... is the source of electrons for Electron Transport Chain **(Acetyl Phosphate/ Phosphoenolpyruvate/ FMN/ Ascorbate)**	3	3	2
vi.	_____ is the breakdown of carbohydrates into smaller units such as glucose.	3	4	3
vii.	Gluconeogenesis is the process of synthesizing glucose from non-carbohydrate precursors. **(True/False)**	4	4	3
viii.	The pentose phosphate pathway generates _____ and _____ important end products.	4	4	3
ix.	The _____ pathway is involved in the conversion of fatty acids to carbohydrates in plants.	2	2	3
x.	The C3, C4, and CAM pathways are useful to plants for _____.	2	2	3

Section B: LONG ANSWER QUESTIONS.
Attempt any TWO out of four questions (2x12.5=25 Marks)

Q. No. 02	Questions	BTL	CLO	PLO
a)	What are high energy compounds. Discuss the factors responsible for the high energy character.	3	2	3
b)	Explain the glyoxylate pathway and its significance in lipid utilization during seed germination.	5	3	2
c)	Compare and contrast the C3, C4, and CAM pathways of carbon fixation in plants, highlighting their anatomical, physiological, and ecological differences.	2	2	3
d)	Discuss the need and brief mechanism of transport of equivalents of NADH produced in the cytoplasm to mitochondria.	1	1	2

Section C: SHORT ANSWER QUESTIONS.
Attempt ALL questions, each question has an internal choice (5x5=25 Marks)

Q. No. 03	Questions	BTL	CLO	PLO
a)	Discuss the general characteristics of Metabolic Pathways **OR** At 900 K the following reaction has Kp= 0.345: $2SO_2(g) + O_2(g) = 2SO_3(g)$ In an equilibrium mixture the partial pressures of SO_2 and O_2 are 0.215 atm and 0.679 atm, respectively. What is the equilibrium partial pressure of SO_3 in the mixture.	4	5	3
b)	Discuss Briefly the Binding change mechanism of ATP synthesis. **OR** Discuss the relevance and mechanism of uncoupling of electron transport chain	3	2	3
c)	Compare and contrast gluconeogenesis and glycolysis, highlighting their regulation and key enzymes involved. **OR** Describe the pentose phosphate pathway and its significance.	4	3	2
d)	Discuss the importance of the citric acid cycle in cellular respiration, outlining its key reactions and products and the nature of each reaction. **OR** Describe the role of photorespiration in plants, explaining its possible biological significance.	2	2	3
e)	What is Gibbs Free Energy. Discuss its significance. **OR** Discuss the role and importance of the antenna complex and Photosynthetic Reaction Center.	4	2	3

END OF THE QUESTION PAPER