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M.Sc. (Biochemistry), Semester-II Examination, 2023
Paper Title: Metabolism-I: Bioenergetics, Carbohydrate and Intermediary Metabolism
Paper Code: MBC 203

Time: 3 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 one; Section C: Answer all the questions, each question in this section has an internal choice

Abbreviations Used:

CO- Course Outcome, PO- Program 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. 1	Questions (Do as directed/Complete the sentence)	BTL	CLO	PLO
i.	NADH and ribose 5-phosphate are the two primary products of the pentose phosphate pathway. (True/False)	2	2	3
ii.	Milk sugar, lactose is a disaccharide made with and	2	2	3
iii.	Protein associated with biological thermogenesis (UCP1/ATP synthase/ATP translocase)	4	5	2
iv.	Transketolase and transaldolase reactions link the pentose phosphate pathway to glycolysis. (True/False)	4	4	3
v.	On average transfer of 4 protons from inter-membrane space to matrix would result in rotation on ATP synthase (360°/240°/120°)	3	3	2
vi.	During photosynthesis, oxygen is released as a by-product of water photolysis. (True/False)	3	4	3
vii.	For chain growth, glycogen synthase requires primers such as glycogenin containing eight glucosyl units. (True/False)	4	4	3
viii.	Portion of F1 subunit of ATP synthase which can rotate..... (β/C ring/γ)	4	4	3
ix.	Cell voltage under equilibrium will be (Positive/Zero/Negative)	2	2	3
x.	If the free energy of reactants is greater than that of products then the reaction will be (Spontaneous/ Non-spontaneous)	2	2	3

Section B: Long type Questions (Attempt any TWO out of FOUR)
(2x12.5=25 Marks)

Q. No. 2	Questions	BTL	CLO	PLO
a)	Write the Tricarboxylic acid cycle, label the reaction type at each stage, and discuss its regulation.	3	2	3
b)	Write about Glyoxylate pathway, as well as a description of how fatty acids are converted to sugars in plants.	5	3	2
c)	What is the significance of Gibbs free energy? Explain why negative Gibbs free energy is associated with spontaneous reactions	2	2	3
d)	Discuss the functioning of ATP synthase and discuss the mechanism of ATP synthesis	1	1	2

Section C: Short-type Questions (Attempt all questions, each question has an internal choice)
(5x5=25 Marks)

Q. No. 3	Questions	BTL	CLO	PLO
a)	Explain the role of fructose 2,6-bisphosphate in the regulation of glycolysis, and describe how cells protect themselves from acidosis through lactate formation. OR Describe the adaptations of C4 and CAM plants. Give examples of each type of plant.	4	5	3
b)	Compare and contrast the glyoxylate cycle with the TCA cycle. Identify the key enzymes and reactions involved. OR Discuss about glycogen storage diseases.	3	2	3
c)	What are the feeder reactions of glycolysis and how can fructose enter the glycolytic pathway through two distinct pathways? OR Explain the need and significance of second law of thermodynamics	4	3	2
d)	Briefly explain Le Châtelier's principle. OR Briefly explain the process of non-shivering thermogenesis in infants	2	2	3
e)	List out the inhibitors of electron transport chain. Explain briefly the effect of these inhibitors on functioning of electron transport chain. OR What is Q cycle? Discuss its significance	4	2	3

END OF THE QUESTION PAPER