

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MSc
BRANCH: BIOTECHNOLOGY

SEMESTER : Ist
SESSION : MO/2025

SUBJECT: BT402 METABOLISM & BIOENERGETICS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Define the term Enzyme regulation. Discuss any one type of regulation giving an example.	[5] 1	2
Q.1(b)	Diagrammatically explain Integration of metabolism in starvation / Well fed condition.	[5] 1	2
Q.2(a)	Analyze the differences between Glycolysis and Gluconeogenesis. Locate the enzymes availability in the cell compartment required for gluconeogenesis.	[5] 2	4
Q.2(b)	Define the term "Mucopolysaccharides". Explain any sulphated GAGs giving its structure and function.	[5] 2	2
Q.3(a)	Compare Glycerophospholipids with sphingophospholipids. Draw the structure of Digalactosyldiacylglycerol.	[5] 3	4
Q.3(b)	Fatty acid synthesis requires considerable amounts of acetyl-CoA and it's a extra-mitochondrial event. Comment upon its transport with a diagram.	[5] 3	3
Q.4(a)	Diagrammatically discuss Integration of Citric acid cycle with Urea cycle. Compare the activity of CPS1 with CPSII.	[5] 4	3
Q.4(b)	Give an outline summary of events taking place in Purine biosynthesis. List the components required for building up of a Purine nucleus.	[5] 4	2
Q.5(a)	The standard state free energy of hydrolysis of acetyl phosphate is $\Delta G^\circ = -42.3$ kJ/mol. $\text{Acetyl-P} + \text{H}_2\text{O} \rightarrow \text{Acetate} + \text{Pi}$ Calculate the free energy change for the acetyl phosphate hydrolysis in a solution of 2 mM acetate, 2 mM phosphate and 3 nM acetyl phosphate.	[5] 4	3
Q.5(b)	All endergonic reactions are coupled to an exergonic reaction. There is an energy cycle in cells that link anabolic and catabolic reactions. Justify.	[5] 4	5

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