

# B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

## February 2025 Semester End Main Examinations

Programme: B.E.

Branch: Biotechnology

Course Code: 23BT4PCBAB / 22BT4PCBAB

Course: Biochemistry and Bioenergetics

Semester: IV

Duration: 3 hrs.

Max Marks: 100

**Instructions:** 1. Answer any FIVE full questions, choosing one full question from each unit.  
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			<b>UNIT - I</b>	<b>CO</b>	<b>PO</b>	<b>Marks</b>
	1	a)	What are high energy compounds? Write the examples with any three reaction of the products formed.	CO 2	PO1	10
		b)	Draw the structure of ATP. What factors make it a high energy compound? Explain	CO 2	PO1	10
			<b>OR</b>			
	2	a)	Phosphorylation of glucose in the cell is coupled to the hydrolysis of ATP; Glucose + Pi $\rightarrow$ Glucose-6-phosphate + H <sub>2</sub> O $\Delta G_0' = 13.8 \text{ kJ/mol}$ ATP + H <sub>2</sub> O $\rightarrow$ ADP + Pi $\Delta G_0' = -30.5 \text{ kJ/mol}$ (i) Calculate overall standard free energy change of these two reactions. (ii) What are these type of reactions called? Give examples	CO2	PO1	10
		b)	State the laws of thermodynamics. Give an equation for relationship between $\Delta H$ and $\Delta G$ .	CO1	-	10
			<b>UNIT - II</b>			
	3	a)	Briefly describe the steps involved in Glycolysis pathway. Write a note on its energetics.	CO 1	PO1	8
		b)	Write on the Glyoxylate cycle and comment on the correlation with Kreb's cycle.	CO 1	PO1	6
		c)	Illustrate the mechanism of Oxidative Phosphorylation.	CO2	PO1	6
			<b>OR</b>			
	4	a)	Elaborate the steps for the function of five complexes of ETC chain with diagram.	CO 3	PO2	10
		b)	Elaborate the reaction steps for Kreb's cycle and mention the role of enzymes.	CO1	PO1	10
			<b>UNIT - III</b>			
	5	a)	How does the chloroplast perform photosynthesis? Explain with a neat diagram.	CO3	PO2	4
		b)	Discuss the difference between C4 and CAM pathway in Photosynthesis.	CO 3	PO2	6

	c)	Briefly explain the Light dependent reaction of Photosynthesis.	CO 3	PO2	10
		<b>OR</b>			
6	a)	“Photorespiration is an expense to the cell “. Justify this statement.	CO 3	PO2	10
	b)	Discuss in detail sequential steps in Calvin cycle.	CO1	PO1	10
		<b>UNIT - IV</b>			
7	a)	What are the four stages of elongation cycle of fatty acid synthesis? Explain with their reactions.	CO4	PO2	10
	b)	Describe the biosynthesis of Phospholipids Phosphatidyl ethanolamine and phosphatidyl serine.	CO 4	PO2	6
	c)	Justify the statement on “Ketone Bodies Are a Major Fuel in Some Tissues”.	CO4	PO2	4
		<b>OR</b>			
8	a)	Elaborate reaction steps of cholesterol Biosynthesis with enzymatic action.	CO 4	PO2	10
	b)	Describe $\beta$ -oxidation pathways of fatty acids with an example.	CO 4	PO2	10
		<b>UNIT - V</b>			
9	a)	Enumerate the De novo synthesis of pyrimidine nucleotides UTP and CTP from orotidylate.	CO 5	PO2	10
	b)	Describe the steps for Amino group catabolism to urea formation. Give the bioenergetics of the urea cycle	CO5	PO2	10
		<b>OR</b>			
10	a)	Explain the Transamination reactions in Amino Acid metabolism	CO5	PO2	8
	b)	Explain the biosynthesis of purine nucleotides			12

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