U.S.N.										

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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Biotechnology **Duration: 3 hrs.**

Course Code: 23BT5PEMTE / 22BT5PEMTE **Max Marks: 100**

Course: Metabolic Engineering

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.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Describe the Characteristics of Metabolism with examples.	*CO1*	*PO*	**10**
	b)		Define Central metabolism and discuss its importance in cells.	*CO1*	*PO1*	**6**
	c)		Briefly comment on Anabolic reaction with examples.	*CO1*	*PO1*	**4**
			OR			
2	a)		Explain the methodology for metabolic characterization related to Proteome and metabolome.	*CO1*	*PO1*	**10**
	b)		Write on Anaplerotic reaction and discuss the role of anaplerosis.	*CO1*	*PO1*	**5**
	c)		Interpret the Stoichiometry of cellular reactions with an example.	*CO1*	*PO1*	**5**
			UNIT - II			
3	a)		What are the factors regulating enzyme activity? And discuss in detail with various parameters.	*CO1*	*PO1*	**10**
	b)		Elaborate the ways to regulate the concentration of an enzyme.	*CO1*	*PO1*	**6**
	c)		Define the sensitivity analysis and comment on its applications.	*CO1*	*PO1*	**4**
			OR			
4	a)		Explain the role of Biomolecules in cell processes and regulation.	*CO2*	*PO2*	**10**
	b)		Discuss the regulation of metabolic networks with flow diagram.	*CO2*	*PO3*	**5**
	c)		Define Metabolic flux analysis and write on its applications.	*CO2*	*PO3*	**5**
			UNIT - III			
5	a)		Elaborate the methodology for metabolic flux analysis with flow chart	*CO2*	*PO2*	**8**
	b)		Discuss the importance of metabolite balancing with an example	*CO2*	*PO2*	**8**
	c)		Comment on Applications of metabolic flux analysis.	*CO2*	*PO2*	**4**

			OR			
	6	a)	Illustrate the analysis on metabolic flux by MS and NMR in labelling measurement.	*CO2*	*PO3*	**10**
		b)	Explain the essential cell physiological features of Metabolic flux analysis.	*CO2*	*PO3*	**5**
		c)	Write on the principle of tracer experiments of metabolic flux and interpret on Monitoring with stable isotope tracers.	*CO2*	*PO3*	**5**
			UNIT - IV			
	7	a)	What are the types of Metabolic Control Analysis? Describe the mechanism of action.	*CO3*	*PO5*	**10**
		b)	Interpret the significance in detail for Protein network analysis related to metabolic control analysis.	*CO3*	*PO5*	**6**
		c)	Describe the Applications of Metabolic Control Analysis.	*CO3*	*PO5*	**4**
			OR			
	8	a)	Explain how Flux Control Coefficient involved in the change of biomolecule's reaction concentration.	*CO3*	*PO5*	**10**
		b)	Discuss the relation between MCA linear and Branched pathways and comment on its significance.	*CO3*	*PO5*	**10**
			UNIT - V			
	9	a)	Discuss the principle and importance of metabolic engineering practice.	*CO4*	*PO12*	**4**
		b)	How to create the Isobutanol from Ecoli ? Write the methodology steps for the production.	*CO4*	*PO12*	**8**
		c)	Write on alternative strategy for the production of terpenoids from Engineered E coli.	*C04*	*PO12*	**8**
			OR			
	10	a)	Discuss the Efforts to improve the production of a compound of interest in *Saccharomyces cerevisiae*.	*CO4*	*PO12*	**10**
		b)	Describe the concepts of metabolic engineering and the production of amino acids from corynebacterium.	*CO4*	*PO12*	**10**

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