U.S.N.										

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

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT7DE5MTE **Max Marks: 100**
Course: Metabolic Engineering **Date: 20.02.2023**

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

UNIT - I

1	a)	Focussing on carbon metabolism, connect concepts on fuelling reactions and biomass precursors.	**10**
	b)	Formulate general stoichiometry for cellular reactions.	**10**

UNIT - II

2	a)	With a suitable example explain regulatory effect on metabolic pathway.	**10**
	b)	With suitable example illustrate enzyme regulation by phosphorylation.	**10**

OR

3	a)	Focussing on constraint based approach, discuss the role of metabolic flux analysis in metabolic engineering.	**10**
	b)	How is intracellular flux measured for undermined systems?	**10**

UNIT - III

4	a)	Discuss in detail different approaches of fractional label enrichment for direct flux determination.	**10**
	b)	Using a suitable example, state the role of NMR in metabolic flux analysis.	**10**

UNIT - IV

5	a)	Summarize different methods for determination of flux control coefficients.	**10**
	b)	How is metabolic control analysis applied for linear pathways?	**10**

OR

6	a)	Define control coefficients and summation theorem for metabolic control analysis.	**10**
	b)	Compare & contrast the randomized strain development with targeted strain development. Which would you consider better & why?	**10**

UNIT - V

7	a)	Design a process for metabolic engineering of *E. coli* to increase NADH availability.	**10**
	b)	Design a process for metabolic engineering of *E. coli* for the production of functionalized terpenoids using plant p450s.	**10**

******