JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

M. Tech.-II Semester (Biotechnology)

COURSE CODE (CREDITS): **20M11BT215 (3)** MAX. MARKS: **35**

COURSE NAME: **Metabolic Engineering**

COURSE INSTRUCTORS: **Dr. Jitendraa Vashistt** MAX. TIME: **2 Hours**

Note: (a) All questions are compulsory. (b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

Q.No	Question	Marks
Q1	"The metabolic pathways of Acetyl COA in terms of catabolic or biosynthetic phases are dependent upon the energy state." Justify this statement with suitable example.	5
Q2	Primary and secondary metabolites are synthesized in several plants. However both metabolites are needed with specific functions. What are the relationship and differences between these above mentioned metabolites?	5
Q3	Define the following in brief. a) Enzyme inhibition and repression for metabolite synthesis regulation b) SILAC and protein expression analysis c) Heave isotopes vs radioactive isotopes in metabolite labeling	3X3=9
Q4	What are the parameters for controlling the metabolic flux in a metabolic network? Explain how, metabolic flux of metabolite has relation with phenotype and genotype of an organism?	5
Q5	An enzyme was assessed for its catalytic activity and it was found that enzyme showed reaction with highest Velocity of 100 micro mol./minute and a Km of 10mM. If these were the catalytic properties of enzyme then you need to calculate the initial velocity of this enzyme in terms of micro mol./minute.	5
Q6	If you want to increase production of an essential amino acid in a bacterial cell using metabolic engineering method, then how will you proceed? Also define the auxotrophy in maintaining the survival of the organism. Justify your answer with suitable example.	6