JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS-2023
M.Tech-II Semester (Biotechnology)

COURSE CODE(CREDITS): **14M11BT215 (3)** MAX. MARKS: **25**

COURSE NAME: **Metabolic Engineering**

COURSE INSTRUCTORS: **Jitendraa Vashistt** MAX. TIME: **1 Hour 30 Minutes**

Note: All questions are compulsory. Marks are indicated against each question in brackets.

Q1. How do you differentiate between essential and non essential amino acids with reference to humans? Does the same amino acid required by plant system also for their growth, if yes then how these get maintained in plants? **(3 mark)**

Q2. Define the following terms in brief in relation to metabolism. **(3 marks)**

a) Auxotrophy

b) Enzyme suppression and Inhibition

Q3. An enzymatic reaction is proceeding in a steady state in which K_1 constant of Enzyme+ Substrate to form Enzyme: substrate is $1X10^9M^{-1}sec^{-1}$, while K_{-1} constant of reverse reaction is $1X10^6M^{-1}sec^{-1}$. When the reaction proceeds to form product and dissociation of enzyme from substrate occur, the K_2 constant of Enzyme + Product is $1X10^9M^{-1}sec^{-1}$.

a) Calculate the Michaelis-Menten constant (MM) for the above mentioned reaction. **(3 marks)**

b) Calculate the dissociation constant also for the reaction of enzyme substrate. **(3 marks)**

Q4. A commonly utilized herbicide 'glyphosate' has a specific metabolic target in plant and due to inhibition of this metabolic intermediate, several essential pathways get stopped. Name this metabolic intermediate and explain the pathway which is involved in the synthesis of above mentioned essential molecules of plants. **(4 marks)**

Q5 Define a strategy of a metabolic pathway by which you can achieve the maximum production of lysine using a microbe. **(4 mark)**

Q6. What are the consequences on an enzymatic activity of an enzyme if **(5 marks)**
a) Optimum pH is increase by factor of 2.
b) Temperature is decreased by 10^0C
c) Substrate concentration reaches to achieve V_{max} and then addition of 10% more substrate.