

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATIONS-2022

M.Tech.-II Semester (BT)

COURSE CODE (CREDITS): 14M11BT215 (3)

MAX. MARKS: 35

COURSE NAME: Metabolic Engineering

COURSE INSTRUCTORS: Dr. Jitendraa Vashistt

MAX. TIME: 2 Hours

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

1. A drug commonly known as “round up” is commonly utilized as non-selective herbicide which inhibits a metabolic pathway in plants.
  - a) Identify the herbicide molecule and also explain the molecular target/metabolite and metabolic pathway inhibited by this herbicide. [3]
  - b) “The molecules produced in above enquired pathway have an essentiality in humans”. If the above statement is true then identify the specific molecules and explain why these are essential for humans? [4]
2. If a metabolite is reaching to the maximum production in a cell, then an antagonistic mechanism initiated through enzymatic controls. How cell utilizes these different enzymatic controls for maintaining the optimum concentration of a metabolite in metabolic pathways? [4]
3. In a metabolic labeling experiment, usually carbon -13 is being utilized. However, one may utilize carbon-14 also for labeling a metabolite for subsequent trace. If both the isotopes can be utilized, then why C13 is preferred over C14? How these two isotopic confirmations are different from usual Carbon-12 atom? [4]
4. How will you design an experimental method using SILAC proteomic approach, if you need to check the relative protein expression in two set of cell populations? [5]
5. Diabetes mellitus is a lifestyle disorder with altered regulation of blood glucose levels. How this disorder and its rectification measures can be interpreted in-terms of metabolic flux balance analysis? What will be different steps involved during the metabolic flux analysis for the above mentioned disorder? [5]
6. a) Electron Impact is usual method for mass spectrometry, however it is not been utilized for biomolecules. If it is the case then, how mass spectrometry of biomolecules done? [3]  
b) How do you design a methodology for identification of a specific protein using the peptide mass fingerprinting approach? [3]
7. Does tricarboxylic acid pathway always shows circular, unidirectional behaviour? Justify your answer with suitable example. [4]