JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATIONS-2022

M.Sc.-II Semester (MB)

COURSE CODE (CREDITS): 21MS1MB211 (3)

MAX. MARKS: 35

COURSE NAME: Enzymes & Bioprocess Technology

COURSE INSTRUCTORS: Dr. Saurabh Bansal

MAX. TIME: 2 Hours

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

PART-A (Marks: 1*14 = 14)

Each question of this section carries 1 mark.

1. a) What are the two major assumptions made for Michaelis-Menten equation?

   b) Define turnover number and its unit.

   c) Give an example of suicide inhibitor and its enzyme.

   d) What is the significance of Michaelis-Menten constant (K_M)?

   e) What kind of inhibitor can only bind to the ES complex?

2. a) In which mode of fermentation a Quasi steady state occurs?

   b) If a toxic compound is synthesized during fermentation, which mode of fermentation is best suited for such a condition? Justify your answer.

   c) Why the name of β-Lactum antibiotics is so?

   d) Why citric acid production should be carried out at low pH?

   e) Why a batch culture is known to be a dynamic culture?

3. a) What are major limitations of bottom entry impellers?

   b) In what cases, a large headspace volume need to be kept in the fermenter and why?

   c) What is the function of load cells?

   d) Define the significance of Del factor.

PART-B (Marks: 21)

[4]

4. Differentiate between following:

   a) Solid-state fermentation and Submerged fermentation

   b) Airlift bioreactor and Bubble Bioreactor

5. a) Why salt-induced precipitation is preferred over the organic acid method? [1]

b) Why the reduction in number of passed in a homogenizer is preferred during cell disruption? [1]

c) What are the major steps involved in a liquid-liquid extraction? [2]

d) To increase the centrifugal effect, it is of greater advantage to use a centrifuge of the same size at a higher speed rather than using a larger centrifuge at the same speed of rotation. Justify the statement. [2]

e) Why removal of nucleic acid from the cell lysate is essential for its further proceeding? How it can be removed? [2]

6. Suppose you have a protein mixture which contains five different proteins with the following properties: [3]

Protein	Molecular weight	pI	Affinity
A	150 kDa	5.0	--
B	400 kDa	5.0	Ni^{2+}
C	200 kDa	7.0	-
D	150 kDa	7.0	-
E	600 kDa	5.0	-

How will you purify each protein in minimal number of steps? Design a suitable experiment and show in a flow chart form with proper justification.

7. a) How clavulanic acid, an antibiotic, helps in killing pathogens? [1]

b) Draw a flow chart representing the downstream processing of penicillin. [2]

8. Why the properties of *Zymomonas mobilis* seem to be more promising over the *Saccharomyces sp.* for the ethanol production? [3]