

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2025 - 2026)

Subject: Enzyme Technology & Industrial Application

Time: 3 Hours

Max. Marks: 70

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

15

1. Attempt all parts:-

- | | | |
|-------|--|---|
| (1.1) | Name the coenzyme of riboflavin (B2)? (CO1,K1) | 1 |
| | (a) NAD or NADP | |
| | (b) FAD and FMN | |
| | (c) Coenzyme A | |
| | (d) Thiamine pyrophosphate | |
| (1.2) | Which of the following is not an enzyme-catalyzed reaction in metabolism? (CO2,K1) | 1 |
| | (a) Isomerization and elimination | |
| | (b) Internal rearrangement | |
| | (c) Maillard reaction | |
| | (d) Free radical reaction | |
| (1.3) | What is the unit of influent flow rate? (CO3,K1) | 1 |
| | (a) m d | |
| | (b) m/d | |
| | (c) m ² /d | |
| | (d) m ³ /d | |
| (1.4) | Liquid chromatography can be performed in which of the following ways? (CO4,K1) | 1 |
| | (a) Only in columns | |
| | (b) Only on plane surfaces | |
| | (c) Either in columns or on plane surfaces | |
| | (d) Neither in columns nor on plane surfaces | |

- (1.5) Which of the following enzyme hydrolysis casein? (CO5,K1) 1
- (a) Papain
 - (b) Rennet
 - (c) Alkaline protease
 - (d) Trypsin

2. Attempt all parts:-

- (2.1) What are supporting materials for immobilization? (CO1,K1) 2
- (2.2) Explain how Secondary metabolites are released in microbial growth? (CO2,K2) 2
- (2.3) Describe the basic differences between Batch and fed batch bioreactor? (CO3,K2) 2
- (2.4) Explain briefly two phase liquid extraction? (CO4,K2) 2
- (2.5) Name the enzyme and its source that is used in PCR. (CO5,K1) 2

SECTION-B

20

Answer any one of the following:-

- (3.1) Differentiate between competitive and non-competitive inhibition with suitable examples. (CO1,K2) 4
- (3.2) Apply the concept of immobilization to explain how enzymes can be reused in industries.(CO1,K3) 4

Answer any one of the following:-

- (3.3) Explain the importance of metabolism in living organisms.(CO2,K2) 4
- (3.4) Apply the concept of mass balance to explain substrate utilization in a bioreactor. (CO2,K3) 4

Answer any one of the following:-

- (3.5) Draw the diagram of bioreactor with briefly explain each part of it.(CO3,K2) 4
- (3.6) Explain how immobilized cells improve productivity in continuous fermentation systems.(CO3,K3) 4

Answer any one of the following:-

- (3.7) Explain different methods used for biomass removal in downstream processing.(CO4,K2) 4
- (3.8) Apply membrane filtration techniques to separate biomolecules based on size.(CO4,K3) 4

Answer any one of the following:-

- (3.9) How recombinant DNA technology is performed in the lab explain via using diagram? (CO5,K2) 4
- (3.10) Predict the advantage of using immobilized enzymes over soluble enzymes in amino acid production.(CO5,K3) 4

SECTION-C

35

4. Answer any one of the following:-

- (4.1) Discuss different types of enzyme inhibition and compare their effects on enzyme kinetics.(CO1,K2) 7
- (4.2) Explain the nature of the curve due to the effect of pH on enzymatic reaction? 7

(CO1,K2)

5. Answer any one of the following:-

(5.1) Derive expression for competitive and non competitive inhibition kinetics.(CO2,K2) 7

(5.2) Describe different steps of glycolysis. (CO2,K2) 7

6. Answer any one of the following:-

(6.1) What are the assumption one has to consider during the chemostat with immobilized cell?(CO3,K2) 7

(6.2) List and explain any four types of sensors used in bioreactors.(CO3,K2) 7

7. Answer any one of the following:-

(7.1) Discuss different biomass disruption methods and their industrial applications.(CO4,K2) 7

(7.2) Explain chromatography techniques used in bioproduct purification.(CO4,K2) 7

8. Answer any one of the following:-

(8.1) Apply enzyme engineering approaches to improve the efficiency of industrial enzymes.(CO5,K3) 7

(8.2) Analyze the role of recombinant enzymes in improving industrial bioprocesses.(CO5,K3) 7