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Printed Page:-3 **Subject Code:- AMTBT0102**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
M.Tech
SEM: I - THEORY EXAMINATION (2025 - 2026)
Subject: Bioprocess Engineering & Technology

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-a. What is the basic function of fermenter (CO1,K1) 1

(a) To recover the product
(b) To provide optimum growth conditions to microbes
(c) To purify the product
(d) To sterlize the medium

1-b. Mixing per unit volume is observed to be poorest in (CO2, K2) 1

(a) Continuous packed bed reactor
(b) continuous fluidized bed bioreactor
(c) continuous airlift bioreacto
(d) None of the above

1-c. The solubility of oxygen in aqueous solutions is about?(CO3,K3) 1

(a) 20 ppm
(b) 10 ppm
(c) 5 ppm
(d) 15 ppm

1-d. Which organism is used for the overproduction of amino acids (CO4,K4) 1

(a) Fungi
(b) Bacteria
(c) Alagae
(d) Virus

1-e. Which of the following is not a use of aqueous-two phase system?(CO5,K4) 1

(a) Enzyme kinetics
(b) Separation of different types of cell membranes
(c) Purification of enzymes
(d) Extractive bioconversions

2. Attempt all parts:-

2.a.	What is media optimization?(CO1,K1)	2
2.b.	Del factor is dependent on what?(CO2,K2)	2
2.c.	Name the chemical used in sulphite oxidation method?(CO3,K2)	2
2.d.	Name different type of interferon?(CO4,K2)	2
2.e.	What is scaling up in bioprocess engineering? (CO5,K3)	2

SECTION-B 20

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Describe any three method for pre-treatment of raw material in bioprocess engineering? (CO1,K1)	4
3.a.(ii)	What are the general requirement for fermentation process?(CO1,K1)	4

3.b. Answer any one of the following:-

3.b.(i)	Explain thermodynamics behind microbial growth in batch reactor? (CO2, K2)	4
3.b.(ii)	How is degree of reduction is estimated? Explain with the help of example? (CO2, K2)	4

3.c. Answer any one of the following:-

3.c.(i)	Describe chemical method for KLa determination? (CO3,K3)	4
3.c.(ii)	How eddies help in mixing?(CO3,K3)	4

3.d. Answer any one of the following:-

3.d.(i)	Draw crab tree effect?(CO4,K1)	4
3.d.(ii)	What is the difference between sequential and co-operative control? (CO4,K2)	4

3.e. Answer any one of the following:-

3.e.(i)	Describe the phenomena behind adsorption?(CO5,K3)	4
3.e.(ii)	How two phase extraction is performed?(CO5,K3)	4

SECTION-C 35

4. Answer any one of the following:-

4-a.	Describe the chronological historic developments in bioprocess technology? (CO1, K1)	7
4-b.	Draw the diagram of bioreactor with briefly explain each part of it. (CO1,K1)	7

5. Answer any one of the following:-

5-a.	Please do elemental balance for the given biochemical process: Reactant: CHmOn + aO2 + bNH3 and Product: cCHαOβNμ+ dH2O + eCO2 (CO2,K`2)	7
5-b.	What is available electron balance and yield in biochemical reaction? (CO2,K2)	7

6. Answer any one of the following:-

6-a.	How bubble size affect the oxygen transfer and the role of oxygen transfer in	7

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	aerobic fermentations? (CO3, K2)	
6-b.	Why is oxygen transfer very much needed in bioprocess engineering? (CO3,K2)	7
7. Answer any <u>one</u> of the following:-		
7-a.	Draw conversion of glucose to pyruvate?(CO4,K2)	7
7-b.	Explain simplex method for media optimization? (CO4,K2)	7
8. Answer any <u>one</u> of the following:-		
8-a.	Describe the filtration process along with filter aids?(CO5,K3)	7
8-b.	Describe the filtration process with filtration equipment? (CO5,K3)	7