Printed Page:- 03 **Subject Code:- ABT0401**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2023 - 2024)

Subject: Fermentation Engineering

Time: 3 Hours **Max. Marks: 100**

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 20

1. Attempt all parts:-

1-a. While constructing the fermenter, which of the following is not required? (CO1) 1

(a) High-speed Agitation and Aeration system

(b) Temperature control system

(c) pH control system

(d) Sample facilities

1-b. Which of the following process proceeds with having a rich fermentation broth and high oxygen concentration? (CO1) 1

(a) Submerged fermentation

(b) Surface fermentation

(c) Solid state fermentation

(d) Batch fermentation

1-c. Which of the following does not have the property of production of secondary metabolites? (CO2) 1

(a) Filamentous fungi

(b) Filamentous bacteria

(c) Sporing bacteria

(d) Enterobacteria

1-d. Which of the following is not a product of fermentation? (CO2) 1

(a) Oxygen

(b) Carbon dioxide
(c) Ethanol
(d) Lactate

1-e. In case of transcription which is the rate limiting step? (CO3) 1

(a) Binding of RNA polymerase
(b) Unwinding of DNA duplex
(c) Promoter escape
(d) Formation of the open complex

1-f. What do you mean by “Nutrient repression”? (CO3) 1

(a) Inhibition of unwanted enzyme production
(b) Production of unwanted enzymes
(c) Inhibition of cell nutrients
(d) Production of waste

1-g. The puffed up appearance of dough of idli and dosa is due to (CO4) 1

(a) Fermentation
(b) Carbon Dioxide
(c) Both A and B
(d) High Temperature

1-h. The varieties of cheese are not known by their (CO4) 1

(a) Characteristic texture, flavor, taste
(b) Characteristic texture, flavor
(c) Specificity coming from microbes used
(d) Characteristic shape texture

1-i. In Penicillium chrysogenum, the maximum antibiotic production occurs during the _____. (CO5) 1

(a) The second phase
(b) The third phase
(c) First phase
(d) In all three phases

1-j. Antibiotics are used to treat infections by (CO5) 1

(a) Virus
(b) Bacteria
(c) All of the microorganisms
(d) None of the above

2. Attempt all parts:-

2.a. Discuss the role of microbiology in fermentation engineering. (CO1) 2

2.b. What should be the basic points of consideration while designing a fermenter? (CO2) 2

2.c.	What do you understand by carbon catabolite repression. (CO3)	2
2.d.	Comment on the applications of cell culture (CO4)	2
2.e.	Write two properties of penicilin. (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain any three physical methods of sterilization process used in controlling microbial growth. (CO1)	6
3-b.	Discuss the interaction between biochemical engineering, microbiology and biochemistry in fermentation process. (CO1)	6
3-c.	Diagramatically explain fed batch fermention process and also give its disadvantages. (CO2)	6
3-d.	How continuous fermentation process is different from fed batch process. (CO2)	6
3.e.	Discuss the significance of crabtree effect. (CO3)	6
3.f.	What are fermented foods and write its beneficial aspects. (CO4)	6
3.g.	Briefly describe the lysine production by fermentation process. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain upstream, midstream and downstream process in fermentation. (CO1)	10
4-b.	Write the principle of fermentation and differentiate between solid state and submerged state fermentation. (CO1)	10

5. Answer any one of the following:-

5-a.	Differentiate between chemostat and turbidostat with suitable diagrams. (CO2)	10
5-b.	Explain continous fermentation process with its disadvantages and advantages. (CO2)	10

6. Answer any one of the following:-

6-a.	Describe case of enzyme induction involving the enzymes of lactose degradation in *E. coli*. (CO3)	10
6-b.	Write short notes on following: (a) catabolism (b) Anabolism (CO3)	10

7. Answer any one of the following:-

7-a.	Differentiate between Carbon catabolite repression and Crabtree effect. (CO4)	10
7-b.	Write short notes on following: (a) Mushroom cultivation (b) Soya sauce fermentation (CO4)	10

8. Answer any one of the following:-

8-a.	Explain the industrial production of beta lactum antibiotics. (CO5)	10
8-b.	Describe the industrial production of acetone and give its two uses. (CO5)	10