Printed Page:- 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 (2021 - 2022)

Subject: Fermentation Engineering

Time: 3 Hours Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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. What is the basic function of the fermenter? (CO1) 1

(a) To sterilize the medium

(b) To recover the product

(c) To provide optimum growth conditions to organisms and obtain the desired product

(d) To purify the product

1-b. 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 Which of the following is an upstream process? (CO2) 1

(a) Product recovery

(b) Product purification

(c) Media formulation

(d) Cell lysis

1 Alcoholic fermentation is carried by yeast known as _____ (CO2) 1

(a) Lactobacillus

(b) Bacillus

(c) Saccharomyces cerevisiae

(d) Escherichia coli

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. Glucose, as the carbon source, is the first choice by bacteria even if other sugars are available. The mechanism behind this selectivity is _____ (CO3) 1

(a) Operon repression

(b) Glucose utilization

(c) Enzyme repression

(d) Catabolite repression

1-g. The dough of bread is fermented by (CO4) 1

(a) Saccharomyces cerevisiae
(b) Saccharomyces sharmani
(c) Propionibacterium sharmanii
(d) Baker's Bacteria

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. The yield of the antibiotic depends upon _____ (CO5) 1

(a) Age of the inoculum
(b) Only the pH of the medium
(c) Composition of the medium
(d) All of the above

1-j. Which of the following fermentation processes is used in the production of penicillin? (CO5) 1

(a) Aerobic fermentation followed by anaerobic fermentation
(b) Anaerobic fermentation
(c) Aerobic fermentation
(d) Anaerobic fermentation followed by aerobic fermentation

2. Attempt all parts:-

2.a. What do you mean by solid state fermentation? (CO1) 2

2.b. Define fed batch fermentation system. (CO2) 2

2.c. What is meant by crabtree effect? (CO3) 2

2.d. Name any four major types of bioreactor. (CO4) 2

2.e. Write two properties of penicilin. (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. Explain batch sterilization process and write its advantages. (CO1) 6

3-b. Write short notes on strain improvement in fermentation technology. (CO1) 6

3-c. Elaborate the significance of aeration and agitation in fermentation process. (CO2) 6

3-d. How continuous fermentation process is different from fed batch process. (CO2) 6

3.e. Briefly discuss the classification of metabolism in microorganism. (CO3) 6

3.f. Explain the Idli fermentation process with suitable diagram. (CO4) 6

3.g. Describe the citric acid production process. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. Briefly write a historical overview of industrial fermentation process. (CO1) 10

4-b. Explain upstream, midstream and downstream process in fermentation. (CO1) 10

5. Answer any one of the following:-

5-a. Enumerate the role of precursors and inducers in secondary metabolite production. (CO2) 10

5-b. Elaborate submerged and solid state fermentation process with suitable examples. (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.	Explain the growth kinetics of any microorganism. (CO3)	10
7. Answer any one of the following:-		
7-a.	Define catabolite repression and explain why the regulation is significant in microorganisms? (CO4)	10
7-b.	Define inhibition? Discuss feedback inhibition in detail with suitable examples. (CO4)	10
8. Answer any one of the following:-		
8	Explain the industrial production of beta lactum antibiotics. (CO5)	10
8	Explain the industrial production of ethanol and give its two uses. (CO5)	10