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

B.Tech

SEM: IV - THEORY EXAMINATION (2025 - 2026)

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:-

- | | | |
|-------|---|---|
| (1.1) | Culture selection depends on: (CO1, K1) | 1 |
| (a) | Temperature only | |
| (b) | Product specificity | |
| (c) | Color | |
| (d) | Shape | |
| (1.2) | GRAS organisms refer to: (CO1, K1) | 1 |
| (a) | Genetically resistant strains | |
| (b) | Generally Recognized As Safe | |
| (c) | Growth rate adjusted strains | |
| (d) | Genetically replicated strains | |
| (1.3) | Sterile medium means: (CO2, K1) | 1 |
| (a) | No microbes | |
| (b) | High microbes | |
| (c) | Only fungi | |
| (d) | Only bacteria | |
| (1.4) | Aseptic transfer is done near: (CO2, K1) | 1 |
| (a) | Window | |
| (b) | Flame | |
| (c) | Door | |
| (d) | Floor | |
| (1.5) | Fermenter sterilization is done by: (CO3, K1) | 1 |

- (a) Cooling
 - (b) Mixing
 - (c) Steam
 - (d) Air
- (1.6) HEPA filters remove: (CO3, K1) 1
- (a) Water
 - (b) Heat
 - (c) Gas
 - (d) Microbes
- (1.7) Kombucha is made from: (CO4, K1) 1
- (a) Fermented tea
 - (b) Fermented rice
 - (c) Fermented wheat
 - (d) Fermented milk
- (1.8) Food safety regulations ensure: (CO4, K1) 1
- (a) More contamination
 - (b) Consumer safety
 - (c) Lower quality
 - (d) Higher toxicity
- (1.9) Immobilized enzymes are used for: (CO5, K1) 1
- (a) Single use only
 - (b) Repeated use in processes
 - (c) Destroying substrates
 - (d) Heating reactions
- (1.10) Fermentation temperature affects: (CO5, K1) 1
- (a) Only color
 - (b) Microbial activity and product formation
 - (c) Only pressure
 - (d) Only pH

2. Attempt all parts:-

- (2.1) Why is temperature control critical during fermentation processes? (CO1, K1) 2
- (2.2) Define continuous culture and mention its advantage. (CO2, K1) 2
- (2.3) Define feedback inhibition. (CO3, K1) 2
- (2.4) What is the role of moisture in mushroom cultivation? (CO4, K1) 2
- (2.5) What is the role of fermentation in antibiotic production? (CO5, K1) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Why is continuous strain improvement necessary in industry? (CO1, K2) 6
- (3.2) Describe the structure and working of a fermenter. (CO1, K2) 6

Answer any one of the following:-

(3.3)	Discuss the methods used to measure microbial growth in laboratory and industry. (CO2, K2)	6
(3.4)	Explain the concept of batch culture with its characteristics and applications. (CO2, K2)	6
Answer any one of the following:-		
(3.5)	Explain feedback inhibition with suitable examples. (CO3, K2)	6
(3.6)	Describe allosteric enzymes and explain their mechanism of regulation. (CO3, K2)	6
Answer any one of the following:-		
(3.7)	Explain environmental factors affecting mushroom growth. (CO4, K2)	6
(3.8)	Describe the steps involved in oyster mushroom cultivation. (CO4, K2)	6
Answer any one of the following:-		
(3.9)	Discuss the role of fermentation in food preservation and shelf-life enhancement. (CO5, K2)	6
(3.10)	Explain the steps involved in beer production. (CO5, K2)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
(4.1)	Describe the steps involved in a typical fermentation process from start to finish. (CO1, K2)	10
(4.2)	Differentiate between solid-state fermentation and submerged fermentation with advantages and applications. (CO1, K2)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Discuss the factors affecting microbial growth kinetics such as nutrients, temperature, pH, and oxygen. (CO2, K2)	10
(5.2)	Explain the importance of oxygen transfer and pH control in fermentation and their effect on microbial growth. (CO2, K2)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	Compare Pasteur effect and Crabtree effect in detail, including their biochemical basis and industrial significance. (CO3, K2)	10
(6.2)	Discuss the interaction between media composition and metabolic regulation in controlling product formation. (CO3, K2)	10
7. Answer any <u>one</u> of the following:-		
(7.1)	Discuss the nutritional and health benefits of fermented foods like dosa, idli, and kombucha. (CO4, K3)	10
(7.2)	Explain the importance of fermentation in food preservation, flavor development, and industrial applications. (CO4, K3)	10
8. Answer any <u>one</u> of the following:-		
(8.1)	Explain beer and wine production processes with flow diagrams and comparison. (CO5, K2)	10
(8.2)	Discuss how fermentation technology integrates food biotechnology and industrial biotechnology for sustainable development. (CO5, K2)	10