

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9207

J

Unique Paper Code : 2163012004

Name of the Paper : Industrial and Environmental Microbiology

Name of the Course : **DSE – Botany**

Semester : IV

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt any **four** questions in all.
4. Attempt **all** parts of the question together.
5. Draw diagrams wherever required.

1. (a) Fill in the blanks: **(any five)** (1×5=5)

- (i) _____ processing involves a series of steps to recover, concentrate, and purify a product from fermentation broth.
- (ii) Microorganisms play a vital role in _____ treatment of wastewater by breaking down organic matter.
- (iii) The process of obtaining pure cultures from natural sources is known as _____.
- (iv) In _____ fermentation, the culture is not disturbed until the end of the process.
- (v) _____ is a technique used to separate components based on their size and density by spinning them at high speed.
- (vi) Enzyme immobilization can increase the _____ of the enzyme, making it more resistant to environmental changes like temperature and pH.

(b) Define the following **(any five)** (1×5=5)

- (i) Lyophilization
- (ii) CSTR
- (iii) Serial Dilution
- (iv) GRAS
- (v) Immobilization
- (vi) Coliforms

P.T.O.

- (c) Match the followings : (1×5=5)

Column A**Column B**

- | | |
|------------------------|---|
| A. Protease | 1. Concentrating and purifying proteins by size exclusion |
| B. Agricultural Runoff | 2. Breaking open cells to release intracellular products |
| C. Industrial microbes | 3. Enhances protein breakdown in detergent formulations |
| D. Ultrafiltration | 4. Uses upward gas flow for mixing |
| E. Cell Disruption | 5. Microorganisms utilized for product synthesis and bioprocessing. |
| F. Air-Lift Fermenter | 6. Source of water pollution from fertilizers and pesticides |

2. Differentiate between the following (**any three**) (5×3=15)

- (i) Batch and Continuous Fermentation.
- (ii) BOD and COD
- (iii) Upstream and Downstream processes
- (iv) Stationary and submerged liquid-state fermentations.
- (v) Selective and Differential media.

3. Write short notes on **any three** of the following : (5×3=15)

- (i) Basic components of Bioreactors.
- (ii) Scope and importance of microbes in the environment.
- (iii) Applications of industrially important enzymes.
- (iv) Cell disruption.
- (v) solid-state fermentation and its applications.

4. (a) Describe the scope of microbiology in industry and the environment. Give examples of how microbes are utilized for human benefit. (8)

- (b) Explain in detail the industrial production of Amylase. (7)

5. (a) Write a comprehensive note on the advantages of enzyme immobilization in industrial processes. How does immobilization improve enzyme performance? (8)

- (b) Discuss the stages of wastewater treatment and the role of microbes in each stage. (7)