

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 9

Sub. Code : 

2	5	9	4	9
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Exam. Code : 

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M.Sc. Bio-Technology 3<sup>rd</sup> Semester  
(2125)

**BIOPROCESS ENGINEERING AND TECHNOLOGY**

**Paper : MBIO-304**

**Time Allowed : Three Hours]**

**[Maximum Marks : 80**

**Note :—** Attempt **five** questions in total. Question no. **1** is compulsory.  
Attempt **one** question from each unit. All questions carry equal marks.

1. (a) Differentiate between batch and continuous sterilization.
- (b) Define yield coefficient and its importance in growth kinetics.
- (c) What are the main functions of impellers and baffles in a bioreactor?
- (d) Explain significance of photo bioreactor.
- (e) Differentiate between BOD and COD.
- (f) What is role of chromatographic techniques in downstream processing?
- (g) Mention two advantages of whole cell immobilization.
- (h) Enlist microbes involved in mineral beneficiation. 2×8

## UNIT—I

2. (a) Explain the microbial growth kinetics in batch system in terms of biomass and product formation.
- (b) Describe methods used for preservation and maintenance of industrially useful microorganisms. 8,8
3. Write short note on the following :
- (a) Air sterilization techniques used in industrial fermentation.
- (b) External feedback system and its significance. 8,8

## UNIT—II

4. (a) Draw a labelled diagram of a typical bioreactor. What are the basic requirements for designing of a fermenter?
- (b) Explain the working principles of pH probes used in fermentation monitoring. 8,8
5. (a) Why are control systems required in fermentation? Explain two positions control system.
- (b) Discuss the principle and applications of airlift bioreactors. 8,8

## UNIT—III

6. (a) Give a flow chart of downstream processing of a microbial product.
- (b) Enlist various methods of cell disruption used in downstream processing. Explain any two methods in detail. 6,10

7. (a) Explain two-phase aqueous extraction system and its significance.
- (b) Explain activated sludge process and trickling filter process for disposal of industrial effluents. 6,10

#### UNIT—IV

8. (a) Discuss two methods of whole-cell immobilization with suitable examples.
- (b) How do microbes play a role in oil recovery? 8,8
9. (a) Describe the industrial production of ethanol.
- (b) Explain in detail the production of algal single cell protein. 8,8