

(i) Printed Pages : 3

Roll No.

(ii) Questions : 9 Sub. Code :

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Exam. Code :

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M.Sc. Bio-Technology 3rd Semester
(2124)

BIOPROCESS ENGINEERING AND TECHNOLOGY

Paper : MBIO-304

Time Allowed : Three Hours] [Maximum Marks : 80

Note :— FIVE questions to be attempted in all by selecting **ONE** question from each Unit. Question No. 1 is compulsory.

1. (a) Give significance of preservation and maintenance of microorganism.
- (b) Explain del factor and Filtration efficiency.
- (c) Why spargers are used in fermenter ?
- (d) What is significance of fed-batch culture ?
- (e) Define DO and explain why it is critical in fermentation.
- (f) Briefly describe the importance of cell disruption in downstream processing.
- (g) What does COD indicate in the context of effluent treatment ?
- (h) Explain single cell proteins and its applications. 2×8

UNIT—I

2. (a) Derive correlation between time and temperature for batch sterilization and explain.
- (b) Describe the kinetics of microbial growth in a batch culture. 8,8
3. Write short notes on the following :
 - (a) Significance of sterilization in fermentation processes.
 - (b) Scale up of batch sterilization process.
 - (c) Internal feed back culture. 4,4,8

UNIT—II

4. (a) What are key characteristics of Fermenter design ?
- (b) Draw well labelled diagram of fermenter and discuss the role of five major components and their impact on process efficiency. 6,10
5. (a) Explain the role of control systems in fermentation processes. Compare manual and automatic control systems.
- (b) Give working principle and application of photo-bioreactor. 9,7

UNIT—III

6. (a) What is downstream processing ? Give flowchart of steps involved and their significance in bioprocess engineering.
- (b) Discuss any two techniques used for cell disruption and how they aid in product recovery. 10,6

7. Describe the main methods used in the treatment of industrial effluents. Discuss the importance of these methods in terms of environmental safety and compliance. 16

UNIT—IV

8. (a) Explain two methods of whole cell immobilization and its benefits in industrial applications.
- (b) Explain Microbial enhanced oil recovery. 10,6
9. (a) Describe in detail the Koji process for production of citric acid.
- (b) Write short note on Algal single cell protein production. 10,6