

Exam.Code:0910

Sub. Code: 6317 ✓

2054

B.E. (Biotechnology) Sixth Semester
BIO-613: Bioreactor Design and Operation ✓

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

1. Write briefly:

- a) Name few model organisms that are used in bioreactor research.
- b) What are damkohler number and peclet number in sterilization process?
- c) What is the use of baffles in a stirred tank reactor?
- d) What do you mean by aspect ratio?
- e) Give example of chemical anti foaming agent.
- f) Define 'quasi steady state' for a batch cultivation of microbial cells?
- g) Why does fed batch culture is used for bakers' yeast production?
- h) What is a bourdon tube and why is it used in a bioreactor?
- i) What is gas hold up?
- j) What is photosynthetic efficiency of a photobioreactor? (10x1)

UNIT - I

2. a) What are the main constrains for scaling up from laboratory scale to commercial scale?
b) How do you differentiate primary and secondary screening?
c) Citric acid production in a fermenter is following first-order reaction. The value of K_1 is given as 0.12 h^{-1} . Initially the product concentration was 4.5 g / l . What will be the concentration of product after 24 h and 48 h? (5, 2.5, 2.5)
3. a) What are the applications and limitations of membrane bioreactors?
b) Differentiate between mechanically agitated and pneumatically agitated reactors. (5,5)
4. a) For a continuous plug flow tubular reactor, how we can calculate residence time.
b) What is residence time distribution function? Explain the importance of pulse and step injection. (5,5)

P.T.O.

(2)

UNIT - II

5. a) What is PID control system? Discuss the structural details along with proper diagram.
b) What are the methods of measuring various physical and chemical process parameters? (5,5)
6. a) How do you differentiate batch and continuous heat sterilization with respect to mode of action and uses?
b) How can we mathematically determine extent of cell death in a sterilization process? (5,5)
7. a) What will be the mass balance equation of limiting substrate when product formation is not directly coupled with energy metabolism?
b) Explain mass balance equation of chemostat with immobilized cells. (5,5)

x-x-x