

2056

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) What are the characteristics of model organisms? Give example
 - b) What is downtime in a batch bioreaction?
 - c) What is the use of a thermocouple in a bioreactor?
 - d) What is Peclet number?
 - e) How to deal with foam problem in large scale industrial fermentation?
 - f) What are the materials used in membrane bioreactor?
 - g) How can you relate dilution rate with Monod equation?
 - h) Why fed batch culture is best choice for baker's yeast production?
 - i) How can we deal with product inhibition in a bioreactor? Give example.
 - j) Explain with relevant equation how reactor depth plays important role for light absorption in a photobioreactor. (10x1)

UNIT - I

2.
 - a) Nutritional requirement for growth and product formation may differ. Justify the statement with examples.
 - b) Derive equation of batch bioreaction time for enzymatic reaction when enzyme deactivation is significant. (5,5)
3.
 - a) What are various photobioreactor design types? Describe briefly along with diagram.
 - b) How does fluidized bed reactor differ from packed bed column reactor with respect to design, operation and application? (5,5)
4.
 - a) Microbial characteristics have great influence on bioreactor selection. Justify the statement with detail discussion.
 - b) What is the importance of membrane bioreactors? What are the challenges of this type of bioreactor? (5, 5)

P.T.O.

(2)

UNIT - II

5. What are the technologies available for measuring physical and chemical process variables in a bioreactor? Briefly explain along with diagram. (10)
6. a) What are the working principles of biosensors? Discuss their applications in healthcare and environment field with specific example.
b) Design continuous sterilization flow model and graphically represent temperature variation with time. (5, 5)
7. Explain various types of automatic control system in a bioreactor with relevant diagram and equation. (10)

x-x-x