1/21

2703N1138

Candidate's Seat No :_____

B.Sc. Sem.-5 Examination

CC-302

Biotechnology

March-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Q.1. What is a bioreactor? Describe in detail Batch, fed-batch, and continuous reactors with proper illustration. (14)

OR

Q.1.A. Write a short note on Scale-up process. (7)

Q.1.B. Describe Air-lift and Hollow fiber reactor with diagram. (7)

Q.2. Describe various types of physical and chemical parameters in process control. (14)

OR

Q.2.A. Write a short note PID Controls in a bioreactor. (7)

Q-2.B. What are biosensors? Write the various applications of biosensors in process control. (7)

Q.3. Discuss heat transfer by Conduction, Convection and Radiation. Explain the design of heat Exchangers used in fermentation technology. (14)

OR

Q.3.A. Describe the Factors affecting Kl_a. (7)

Q.3.B. Write important Rheological properties of the fluid. (7)

Q.4. What is downstream processing? Describe various ways of cell removal in downstream processing. (14)

OR

Q.4.A. Write an account of product recovery by chromatography and ultrafiltration. (7)

Q.4.B. Differentiate between product concentration by Liquid-liquid extraction and Solid-phase extraction (7)

Q.5. Short Questions (Any 7) (14)

1) What is the use of On/Off Control in a bioreactor?
2) What are shell and tube heat exchangers?
3) What is a perfusion reactor?
4) Give two examples of Non-Newtonian fluid.
5) Write the application of Flow Microfluorometry.
6) What is Cascaded Feedback Control?
7) Name few enzymatic methods of cell disruption.
8) Write the names of a few materials used for the construction of bioreactors.
9) Define containment in terms bioreactor design.
10) What is the use of anti-foaming agents?
11) Draw the diagram of a stirred tank bioreactor.
12) Write one significance of Rheological properties of fluid for fermentation process.