Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech.(Bio. Tech.)   (Sem.–1)
BIOPROCESS ENGINEERING & TECHNOLOGY
Subject Code : MTBT-105
M.Code : 23005

Time : 3 Hrs.   **Max. Marks : 100**

INSTRUCTIONS TO CANDIDATES :
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Discuss the fixed-volume fed-batch culture system with relevant mass-balance expressions. (10)

   b) Why a fed batch reactor is preferred over CSTR for the commercial production of biochemical products. (10)

2. a) What is log penetration theory? State its relevance in terms of designing a filter for air sterilization. (10)

   b) Discuss the significance of Del factor in media sterilization. (10)

3. a) Define the term 'volumetric transfer coefficient' in an aerated bioreactor? State its importance. (10)

   b) Discuss the effect of "power consumption" on $K_L a$ value of a bioreactor. (10)

4. a) Discuss various controllers that can be used in a bioprocess control system. (10)

   b) Explain the working principle of a thermocouple with a neat and well labelled diagram. (10)

5. a) Discuss the various stages involved while recovering a biochemical product from the fermentation broth. (10)

   b) What are the important criteria for designing a bioseparation processes? Explain with suitable examples. (10)

6. a) Derive the equation for terminal settling velocity for a spherical solid moving under acceleration due to gravity. (6)

    b) How would settling velocity of the same particle change if the rpm of the centrifuges is increased by 25%?? (4)

    c) Explain the working of a tubular bowl centrifuge. (10)

7. a) What is the role of 'precipitation' in downstream processing? (10)

    b) Discuss 'salting-in' and 'salting-out' phenomena for protein purification. (10)

8. Write short notes on following :

    a) Aqueous two phase extraction (10)

    b) Types of control system in bioprocessing (10)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.