

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATIONS-2022

B.Tech-V Semester (BT/BI)

COURSE CODE (CREDITS): 18B11BT511(4)

MAX. MARKS: 15

COURSE NAME: Bioprocess Engineering

COURSE INSTRUCTOR: Dr. Saurabh Bansal

MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

CO-I

1. How the growth yield is important for selecting a right Carbon-source? [1]
2. What do you understand by endogenous metabolism and cryptic growth? What are their significance in any bioprocess? [3]
3. Differentiate following: [3]
 - a) Quasi-Steady State and Steady State
 - b) Turbidostat and Chemostat

CO-II, III

4. At the end of a batch culture, the medium is added at a flow rate of 300 ml/h. If the culture volume after 3 h of medium addition is 1500 ml, Calculate the initial culture volume (in ml) in the fermenter. [1]
5. The volume of a fermenter is halved and the cell concentration doubled while other fermentation conditions are the same. [2]
 - a) How will be the volumetric productivity affected?
 - b) How will it affect the specific productivity?
6. Which mode of fermentation give better productivity: Batch or Chemostat? Justify your answer. [2]
7. In a two-stage chemostat system, volume of each reactor is 0.5 m^3 ; the flow rate of feed is 50 l h^{-1} . The first reactor is used for mycelial growth and the second reactor for product synthesis. The substrate concentration in the feed is 10 g l^{-1} . Kinetic and yield parameters for the organism are:

$$Y_{XS} = 0.5 \text{ kg kg}^{-1}, K_S = 1.0 \text{ kg m}^{-3}, \mu_{\max} = 0.12 \text{ h}^{-1}, m_s = 0.025 \text{ kg kg}^{-1} \text{ h}^{-1}, q_p = 0.16 \text{ kg kg}^{-1} \text{ h}^{-1}, Y_{PS} = 0.85 \text{ kg kg}^{-1}$$

Assume that product synthesis in the first reactor and growth in the second reactor are negligible.

- a) Determine the cell and substrate concentrations entering the second reactor. [2]
- b) What is the final product concentration? [1]

T1 Examinations September 2022