

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- OCT 2018

B.Tech V Semester

Dr. Saurav Baral

COURSE CODE: 15B11BT511

MAX. MARKS: 25

COURSE NAME: BIOPROCESS ENGINEERING

COURSE CREDITS: 04

MAX. TIME: 1.5 Hr.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. What do you understand by Del factor? How it is varying with increase in culture volume? [2]
[CO I, IV]
2. What is mixing time? How can you reduce the mixing time of a bioprocess? [CO I, IV] [2]
3. How the mixing power determined is different from the actual power required? [CO II, IV] [2]
4. Why the power required for gassed Newtonian fluid is always lesser than that of required for ungassed non-Newtonian fluid? [CO II, IV] [2]
5. Which variable will you consider as a yardstick for comparing the mass transfer efficiency of the fermenter? How can you improve the magnitude of that variable to enhance the mass transfer efficiency of the fermenter? [CO II, IV] [2]
6. Differentiate Between [CO I] [4]
 - a) Axial Flow and Radial Flow Impeller
 - b) Productivity and Yield Coefficient
7. What are the advantages and disadvantages of immobilization of enzymes and cells? [CO III] [2]
8. Whether the following statements are True and False? Give Justification for your answer. [3]
[CO III]
 - a) In a chemostat, at steady state, the cells will get washed off if the dilution rate is greater than specific growth rate (μ).
 - b) Batch culture is a dynamic system.
 - c) Chemostat is most suitable system for the antibiotics production.
9. A cylindrical stirred bioreactor of diameter and height 2 m has a Rushton turbine one third the tank diameter in size. The bioreactor contains Newtonian culture broth with the same density as water and with viscosity 4 cP. Determine the maximum allowable stirrer speed and mixing time if the specific power consumption must not exceed 1.5 kWm^{-3} . The power number for Rushton turbine is 5. [3]
[CO II, IV]

10. An unsterile fermentation broth has been found to contain 10^{11} viable *Bacillus stearothermophilus* cells. The specific death rate of the *B. stearothermophilus* spores at 121° C is 2.54 min^{-1} . This fermentation broth was sterilized during which it was heated from 100° C to 121° C in 30 min and cooled down from 121° C to 100° C in 17 min. Determine the holding period during sterilization while assuming that the cell destructions also occur during heating and cooling of the broth beside the period of holding at 121° C using Richard's Fast Method.

[CO II, IV] [3]

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