

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2295025

Roll No.

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B.TECH

Regular Theory Examination (Odd Sem - VII), 2016-17

BIOPROCESS ENGINEERING PRINCIPLES

Time : 3 Hours

Max. Marks : 100

Section - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)
 - a) Define viscosity and kinematic viscosity.
 - b) Describe absolute and relative error.
 - c) What is volumetric oxygen transfer coefficient?
 - d) What do you understand by growth of micro organism?
 - e) Define normality and molarity.
 - f) What do you mean by bioreactor?
 - g) Define sterilization.
 - h) What is an autoclave?
 - i) What do you mean by pure culture?
 - j) What is fermentation broth?

Section - B

2. Attempt any five questions from this section.

(5×10=50)

- a) Discuss the factors affecting $k_L a$ in fermentation vessel. Develop the following expression.

$$k_L a = C_c \cdot Q_{oxy} / (C^* - C_L)$$
- b) Discuss the oxygen supply and demand in aerobic fermentation.
- c) What are the different resistances encountered in the transfer of O_2 and what is the limiting step?
- d) Using a Monod chemostat model for a single stage continuous culture, find the conditions for maximum cell productivity.
- e) The feed to a continuous fractionating column contains 28% by weight of benzene and 72% toluene. The distillate contains 52% benzene by weight and the residue contains 5% benzene by weight. calculate the weight or amount of distillate and residue per 1000kg of feed per hour. Also calculate the percentage recovery of benzene.
- f) Describe relationship between Power consumption and other operating variables of a bioreactor.
- g) Define and explain the chromatographic separation process and its various types. Also write its uses.
- h) Derive Michaelis-Menten equation.

Section - C

Note: Attempt any two questions from this section.

(2×15=30)

3. What is the criterion in selection of various sensors in environmental control of Bio reactor? Describe the monitoring and control of P^H during operation of Bioreactor.
4. Explain in detail the principle for measurement and control of DO in a bioreactor.
5. Compare Stirred tank reactor (STR) and plug flow reactor (PFR) for growing microbial cultures giving specific features of each of them. What type of culture would you select for cultures showing
 - a) Substrate
 - b) Product inhibition?

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