Dr Saurabh

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- Sept 2017

B.Tech Vth Semester

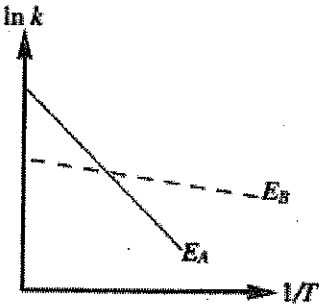
COURSE CODE: 15B11BT511 MAX. MARKS:15

COURSE NAME: Bioprocess Engineering

COURSE CREDITS: 04 MAX. TIME: One Hr

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

1. What will the final volume in a fed-batch fermenter after 10 h if the fermenter, which is initially working with 2 l volume, is fed with 2 l/hr? [1]
2. What are the characteristics of a Batch culture: Dynamic, closed, steady, open system? Justify your answer. [2]
3. Write down the Leudeking Piret equation. Define their significance in terms of product formation kinetics. [2]
4. How will you define the significance of following graph with respect to sterilization and medium nutrient quality? Here, E_A and E_B = Activation energy for spores and Medium respectively. T is the absolute temperature (K) and k is the death rate constant. [2]



5. While running a multistage chemostat, derive an equation for determining the biomass concentration in the second bioreactor through mass balance equation. [4]
6. *Pseudomonas methylotrophus* is used to produce single-cell protein from methanol in a 1000 m^3 pressure-cycle airlift fermenter. The biomass yield from substrate is 0.41 g g^{-1}, K_S is 0.7 mg.l^{-1}, and the maximum specific growth rate is 0.44 h^{-1}. The medium contains 4% (w/v) methanol. A substrate conversion of 98% is desirable. The reactor may be operated either in batch or continuous mode. If operated in batch, an inoculum of 0.01% (w/v) is used and the downtime between batches is 20 h. If operated continuously, a downtime of 25 d is expected per year. Neglecting maintenance requirements, compare the annual biomass production from batch and continuous reactors. [4]

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