

Paper: Advances in Fermentation and Enzyme Technology MM: 80

The total eight questions will be set selecting two questions from each unit.

The students will have to attempt total four questions selecting one question from each Unit.

Unit I

Fermentation: Submerged and solid state fermentations, Types of fermenters, Design and operation of Fermenters, Concepts for selection of a reactor. Growth and product formation kinetics: Monod growth kinetics, Kinetics of colony formation and pellet growth. Concepts for calculation of yield coefficient, specific growth rate, specific productivity, maintenance coefficient. Biomass and substrate balance calculations for chemostat, chemostat with recycles, multistage chemostat systems and fed-batch systems.

Unit II

Stoichiometry of cell growth: Elemental balance, Electron balance, Theoretical calculation of oxygen demand, Upper limit of yield and energy changes occurring due to growth and product formation. Sterilization: Kinetics of cell death and nutrient degradation during heat killing ; Batch and continuous sterilization; Scale up of sterilization. Brief account of Downstream processing: Downstream process economics, Cost cutting strategies in downstream processing industry.

Unit III

Enzymes: commercial applications; Production of industrially important enzymes such as Amylases, Proteases, Lipases, Enzymes used for analytical purpose: Glucose oxidase, cholesterol oxidase; Medicinal enzymes: L-Asparaginase.

Unit IV

Techniques of enzyme immobilization; Kinetic Parameters for soluble and Immobilized Enzyme Systems, Reactors for Enzyme Catalyzed Reactions. Idealized Enzyme Reactor Performance, Mass transfer limitations in immobilized enzyme reactors.