BIOCHEMICAL ENGINEERING

(Professional Elective-V)

Course Code: 15CH1142

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Course Outcomes :

At the end of the Course, the Student will be able to:

CO 1 Recognize the structure of any living cells

CO 2 Calculate kinetics of enzyme catalyzed reactions.

CO 3 Explain Immobilized enzyme technology.

CO 4 Assess ideal reactors for kinetic measurement.

CO 5 Explain fermentation technology and downstream processing.

UNIT-I (10 Lectures)

INTRODUCTION TO MICROBIOLOGY:

Biophysics and cell doctrine, the structure of cells, important cell types, RNA and DNA building blocks, proteins from amino acids.

UNIT-II (12 Lectures)

KINETICS OF ENZYME CATALYZED REACTION:

The enzyme substrate complex and enzyme action, simple enzyme kinetics with one and two substrates, other patterns of substrate concentration dependence, modulation and regulation of enzyme activity, other influences on enzyme activity.

UNIT-III (12 Lectures)

IMMOBILIZED ENZYME TECHNOLOGY:

Enzyme immobilization, immobilization of enzyme in industrial processes, utilization and regeneration of cofactors, Metabolic reaction coupling, carbon catabolism, respiration, transport across cell membranes, passive and facilitated diffusion, and active transport and end products of metabolism.

UNIT-IV (9 Lectures)

IDEAL REACTORS FOR KINETIC MEASUREMENT:

The ideal batch reactor, the ideal continuous flow stirred tank reactor, Monod growth kinetics, growth cycle phases for batch cultivation.

DESIGN AND ANALYSIS OF BIOLOGICAL REACTORS:

Batch reactors, enzyme catalyzed reactions in CSTR, CSTR reactors with recycle and cell growth, the ideal plug flow reactors. Sterlization reactors: Batch and continuous sterilization.

UNIT-V (7 Lectures)

FERMENTATION TECHNOLOGY:

Medium formulation, aseptic and aerobic fermentation processes, alternate bio-reactor configurations.

DOWNSTREAM PROCESSING:

Strategies to recover and purify products; separation of insoluble products; separation of soluble products: final steps in purification.

TEXT BOOKS:

1. Bailey. J.E. and Ollis, D.F., "Biochemical Engineering Fundamentals", 2nd Edition, McGraw Hill., New York, 1986.
2. Shuler. M.L. and Kargi, F., "Bioprocess Engineering: Basic Concepts", 2nd Edition, Prentice Hall, USA, 2002.

REFERENCES:

1. Lee. J.M., "Biochemical Engineering", Prentice-Hall, USA, 1992.
2. Doran. P.M., "Bioprocess Engineering Principles", Academic Press, USA, 1995.
3. Blanch. H.W. and Clark, D.S., "Biochemical Engineering", Marcel Dekker, New York, 1997.