

16BT304 INDUSTRIAL BIOTECHNOLOGY

Hours Per Week :

L	T	P	C
3	1	-	4

Course Description and Objectives:

This course introduces industrial production of primary and secondary metabolites; enzymes and other commercially important products. The objective of the course is to explore the potential of life systems in providing biological services such as metabolites, vaccines, biopolymers and fermented foods by industrial methods.

Course Outcomes:

Upon completion of the course, the student will be able to

- CO1: Understand the overview of industrial fermentation process for production bio-products.
- CO2: Apply the knowledge of fermentation principles for production of primary metabolites.
- CO3: Produce the secondary metabolites using different methods of fermentation process.
- CO4: Design the process flow sheet for enhanced production of enzymes and biopolymers.
- CO5: Identify the suitable methods for production of therapeutic recombinant proteins.

SKILLS:

- ✓ *Optimize parameters for fermentation.*
- ✓ *Handle and maintain fermenter.*
- ✓ *Produce and purify antibodies from cell lines.*

UNIT - 1

L-9, T-3

INTRODUCTION TO INDUSTRIAL BIOPROCESS: A historical overview of industrial fermentation process - traditional and modern biotechnology; A brief survey of organisms, processes, products relating to traditional (production of beer, production of cheese) and modern biotechnology (recombinant proteins) in the form of process flow sheeting.

UNIT - 2

L-9, T-3

PRODUCTION OF PRIMARY METABOLITES: Outline of processes for the production of some commercially important organic acids such as citric acid, lactic acid and acetic acid; Amino acids such as glutamic acid, phenylalanine and aspartic acid and alcohols such as ethanol and butanol.

UNIT - 3

L-9, T-3

PRODUCTION OF SECONDARY METABOLITES: Antibiotics- beta-lactams (penicillin), aminoglycosides (streptomycin) macrolides (erythromycin); Vitamins and steroids.

UNIT - 4

L-9, T-3

PRODUCTION OF INDUSTRIAL ENZYMES AND OTHER BIOPRODUCTS: Production of industrial enzymes such as proteases, amylases, lipases and cellulases; Production of biopesticides; Production of biofertilisers; Production of biopreservatives (nisin); Production of cheese; Production of biopolymers (xanthan gum, PHB); Single cell protein production and its uses.

UNIT - 5

L-9, T-3

PRODUCTION OF MODERN BIOTECHNOLOGY PRODUCTS: Production of recombinant proteins having therapeutic and diagnostic applications; Production of vaccines; Production of monoclonal antibodies; Products of plants and animals obtained by modern biotechnology approaches.

TEXT BOOKS:

1. L.E. Casida Jr., "Industrial Microbiology", 1st edition, New Age International (P.) Ltd, 2007.
2. S.C. Prescott and C.G. Dunn, "Industrial Microbiology", 1st edition, Agrobios (India), CBS Publication, 2004.

REFERENCE BOOKS:

1. A.N. Glazer and H. Nikaido, "Microbial Biotechnology", W.H. Freeman and Company, New York, 1995.

ACTIVITIES:

- Ferment barley and grapes for production of beverages.
- Plenary session on historical perspective of evolution of antibiotics and multidrug resistance.
- Produce biofertilizers and biopreservatives.
- Discuss current scenario on bioethanol and butanol production.