# 22BT205 INDUSTRIAL BIOTECHNOLOGY

Hours Per Week :

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3	0	2	4

**PREREQUISITE KNOWLEDGE:** Microbiology and Fermentation Technology, Biochemistry and Enzymology.

# COURSE DESCRIPTION & OBJECTIVES:

The course aims to provide fundamental insights to exploit enzymes and microbes for the manufacturing of products which have a huge industrial significance. It uniquely blends the science and engineering with various biochemical processes to obtain products of diverse fields such as chemicals, food and bioenergy.

# **MODULE-1**

# UNIT-1

# MARKETING MANAGEMENT

Fermentations by Bacteria, Fungi and yeast, Modern Biotechnology processes and products, Upstream and Down stream processes, Process Flow Diagram - industrial production of wine.

#### UNIT-2

#### PRODUCTION OF PRIMARY AND SECONDARY METABOLITES

Industrial Production of commercially importantorganic acids, amino acids and solvents, Production of Antibiotics, Vitamins and steroids.

#### PRACTICES:

- Bacterial fermentation for production of Amino acids.
- Preparation of wine.
- Lactic acid production by fermentation.
- Citric acid production by fermentation.

#### **MODULE-2**

#### UNIT-1

#### INDUSTRIAL BIOPRODUCTS

Importance of Industrial Enzymes, Biopesticides, Biofertilizers, Bio-preservatives, Biopolymers, Biodiesel, Single cell Proteins.

#### UNIT-2

#### PRODUCTION OF THERAPEUTIC MOLECULES

Recombinant proteins for therapeutic and diagnostic applications, Production of vaccines and recombinant proteins, Product development based on Plant Cell and Animal Cell culturing technologies. Bioreactors for production of modern biotechnology products, Production of Monoclonal Antibodies.

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Source : https://www. biooekonomie-bw.de/en/ articles/dossiers/industrialbiotechnology-biologicalresources-for-industrialprocesses

### 15L+0T+10P=25 Hours

9L+0T+6P=15 Hours

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9L+0T+6P=15 Hours

#### 15L+0T+10P=25 Hours

### PRACTICES:

- Production of bio-preservatives.
- Shake flask fermentation for production of Spirulina.
- Fermentation for production Amylase.
- PBH production by fermentation.

## COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the principles and methods of fermentation processes for bioproducts production.	Apply	1	1,4,5,6,9,10
2	Select suitable microbial strains for production of primary and secondary metabolites.	Analyze	1	2,4,6,7,9,10
3	Develop the process flows steps for efficient production of products.	Create	2	3,4,6,9,10
4	Design of novel process trains for enhanced yield of bioproducts.	Create	2	3,4,6,9,10

#### **TEXT BOOKS:**

- 1. Lee SY, Nielsen J and Stephanopoulos G, "Industrial biotechnology: microorganisms", 2nd edition, John Wiley & Sons, 2016.
- 2. Liese A, Seelbach K and Wandrey C, "Industrial biotransformations", 1st edition, John Wiley & Sons, 2006.

#### **REFERENCE BOOKS:**

- 1. Glazer AN and Nikaido H, "Microbial biotechnology: fundamentals of applied microbiology", 1st edition, Cambridge University Press, 2007.
- 2. Faye L and Gomord V, "Recombinant Proteins From Plants", 1st edition, Humana Press, 2009.
- 3. Lee SY, Nielsen J and Stephanopoulos G, "Cell culture engineering: recombinant protein production", 3rd edition, 2nd edition, John Wiley & Sons, 2020.
- 4. Okafor N and Okeke BC, "Modern industrial microbiology and biotechnology", CRC Press, 2017.
- 5. Rai BK, "Basic Practical Manual on Industrial Microbiology", 2nd edition, Lulu. Com, 2016.

#### SKILLS:

- ✓ Lab scale culturing of bacteria and yeast for production of bioproducts.
- Developing the process flow sheet for production of products.
- Selecting the suitable mode of fermentation reactions for production of products.