



Semester-6

BRANCH	Subject Title	Subject Code
B.Sc. (Microbiology -MAJOR)	Industrial Microbiology	MBM1-161

Course Learning Outcomes

On successful completion of this course in Microbiology, the student will be able to:

1. Work on fermenter, medium formulation, sterilization.
2. Formulate strategies of strain improvement of microorganisms for increasing production.
3. Explore avenues of industrial microbiology.
4. Appreciation of how microbiology is applied in manufacturing of day-to-day industrial products like alcohols, organic acids, solvents, antibiotics, paper and Textiles

Unit 1

- 1.1 Role of Microbes in Industry: Historical perspective in India and around the World.
- 1.2 Principles of industrial microbiology: Growth conditions of microbes at large scale, Introduction of fermenters and their types; Batch, Fed batch and Continuous cultures. Introduction to fermentation media, sterilization, inoculation, agitation, aeration and anti-flocculation techniques in fermenters.
- 1.3 Selection of microbial strains for high yield: Methods of isolation and screening of industrially important strains. Strategies of strain improvement and preservation methods of stock culture.

Unit 2

- 2.1 Industrial enzyme technology: Nature and application of enzymes, limitations of microbial cells used as catalysts in fermentation, multi-enzyme reactors,
- 2.2 Genetic engineering & protein engineering of enzymes, cloning strategy for enzymes, technology of enzyme Immobilization, their uses
- 2.3 Industrial products recovery: Methods of purification, detection and concentration of fermentation products

Unit 3

- 3.1 Microbial Production of Antibiotics and Organic acids : Antibiotics (Penicillin and Streptomycin), Organic acids (Citric acid and Acetic acid).
- 3.2 Microbial Production of Amino Acids and Vitamins: Amino acids (Glutamic acid and Lysine), Vitamins; Cyano cobalamin and Riboflavin



33, Microbial production of Polysaccharides and Enzymes: Polysaccharides (xamhan, alginate and polyesters-Hioplastics) Enzymes (Lipase, Amylase, Protease)

Unit 4

4.1 Microbial Production of Single Cell proteins: General description

4.2 Microbial interactions in textile industries: Microbes for creating sustainable fibres, Biofilms, microbial biopolymers.

4.3 Biotransformation techniques.

Method of microbial production practical's Group B Paper I

1. Working of fermenter, media preparation, sterilization and loading of fermenter.
2. Performing immobilization of yeast cells in calcium alginate gels.
3. Production and estimation of Citric acid from fungi.
4. Estimation of Citric acid from solution by titrimetric method
5. Isolation of xylanase or lipase producing bacteria and demonstration of their activity.
6. Quantification of microbes in potable and other water samples using Most Probable Number (MPN) technique.
7. Analysis of different soil microorganisms from various sites.
8. Performing serial dilution of soil bacteria and making curve.
9. Measurement of the amount of biodegradable material in water and calculate Biological Oxyge Demand (BOD) and Chemical Oxygen Demand (COD).
10. Demonstration of biotransformation techniques by soil microbes: Oxidation of sulphur, de hydrogenation activity.
11. . Determination of nitrate reduction in soil by microorganisms.
12. Visit to industrial microbial manufacturing unit/Biogas plant paper/Textile industry.
13. . Any other experiment may be designed on the basis of theoretical Aspects.