MSc MICROBIOLOGY

SEMESTER 2

MIC 407: Fermentation technology

COURSE CODE: MIC 407
NO. OF CREDITS: 04

COURSE OUTCOMES (COs)

- **CO1** Defining basic principles of fermentation technology.
- **CO2** Use of microbes in the industry of fermentation, pharmaceutical, food, andenvironment are inculcated to the students in depth.
- **CO3** Processes in the fermentation industries are explained in depth.
- **CO4** Economics and ethics of environmental safety are explained in length to students.

Unit 1 Elements of Bioprocess

- Isolation, screening, and preservation of industrially important microorganisms
- Strain Improvement: Isolation of mutants producing primary metabolites, secondarymetabolites, auxotrophic mutants, resistant and revertant mutants
- Media formulation energy sources, antifoams
- Optimization of fermentation medium

Unit 2 Fermenter Design & Control

- Design of Fermenter
- Types of Fermenters
- Instrumentation and control of process variables
- Control systems

Unit 3: Upstream processing

- Sterilization of media, air, and reactor
- Development of inoculum for industrial fermentations
- Aeration-agitation system,
- Heat transfer, mass transfer of oxygen, KLa and factors affecting KLa, rheological andfluid-flow properties
- Fundamentals of scale-up

Unit 4 Downstream processing & Fermentation economics

- Methods of cell separation and product recovery: Filtration, Centrifugation, Membraneprocesses, Extraction, Chromatography
- Methods of cell disruption: Mechanical and non-mechanical
- Fermentation economics: Expenses for industrial organisms, strain improvement, mediasterilization, heating, cooling, aeration, agitation, Batch process cycle time, and continuous culture
- Fermentation economics: Cost of fermenter plant and other equipment, productrecovery and effluent treatment, cost due to recovery, waste usage, and recycling

REFERENCE

No.	Name	Author
1.	Principles of Fermentation Technology	P F Stanbury, A Whitaker, S J Hall
2.	Industrial Microbiology: An Introduction	M J Waites, N L Morgan, J S Rockey
3.	Bioprocess Engineering	P.K. Ghosh
4.	Fermentation Microbiology and Biotechnology	EL-Mansi & C.F.A.Bryce eds

5.	Manual of Industrial Microbiology and Biotechnology	Demain & Davies, 2nd ed.

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WEBLINKS

https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NuAs6SreCGryddEfs4kkBA==

- Paper-06 Module-16 Fermentation Technology Overview
- Paper-06 Module-17 Downstream processing
- Paper-06 Module-18 Bioreactors

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