MICROBIAL AND INDUSTRIAL BIOTECHNOLOGY

Semester	Subject code	Category	Lecture		Theory		P	C
VI	21CBT6A	Core - VIII	6hrs per week	90	6hrs per week	90	0	5

COURSE OBJECTIVE:

- ✓ To provide students the introduction to the overall industrial bioprocess so as to help them to manipulate the processes according to industrial needs.

COURSE OUTCOMES: Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K4)
CO1	Understand the knowledge about microbial physiology	K2
CO2	Understand the knowledge about fermentation biotechnology	K2
CO3	Analyze the different types of microbial culture methods	K4
CO4	Analyze the meaning and scope of primary and secondary metabolites and its products	K4 & K5
CO5	Apply knowledge for the applications of microbial and industrial biotechnology.	K3

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- Analyze

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	S	S	S	M	M	M
CO3	M	S	S	S	M	M
CO4	S	S	M	S	S	S
CO5	M	M	S	M	S	S

S-Strong, M-Medium, L-Low

UNIT-I

MICROBIALPHYSIOLOGY **18 Hours**

Microbiological media, composition and types: Selective and Differential media. Developmental of pure cultures – Maintenance and preservation of cultures. Influence of environmental factors on microbial growth. Bacterial growth curve and kinetics.

UNIT-II

INTRODUCTION TO INDUSTRIAL BIOTECHNOLOGY **18 Hours**

Introduction and Scope of Industrial Biotechnology, Historical overview of Industrial fermentation. Bioreactors in fermentation technique outline of upstream and downstream process. Medium requirement for fermentation: Carbon and Nitrogen sources, minerals, vitamins, antibiotics. Simple and complex media.

UNIT-III

STRAIN IMPROVEMENT **18 Hours**

Strain Improvement Microbial Culture: Introduction to strain improvement, Different types of microbial culture methods Continuous culture methods, Batch culture methods and Fed-batch culture methods. Isolation and preservation of industrial microbes, Improvement of Industrial microbes.

UNIT-IV

PRIMARY AND SECONDARY METABOLITES PRODUCTION **18 Hours**

Role of primary and secondary metabolites. Production of primary metabolites – Organic solvents Productions-Ethanol and Acetone, Vitamins productions- B_{12} and A, Organic Acids productions-Citric acid and Lactic acid. Production of Secondary metabolites: Antibiotics – Tetracycline and Erythromycin.

UNIT-V

APPLICATIONS OF MICROBIAL AND INDUSTRIAL BIOTECHNOLOGY **18 Hours**

Production of Beer, Wine, Milk products. Natural Preservatives. Production of Biopesticides, Bio fertilizers, SCP and Mushroom cultivation. Various Aerobic and Anaerobic processes for solid and wastewater treatment. Microbes in mining, oil recovery and production of Bio-fuels.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY:

- Class room teaching
- Assignments
- Discussions
- Homework
- PPT presentations
- Seminars
- Models and charts

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Patel A.H	Industrial Microbiology	McMillan Publishers	2005
2.	Ponmurugan P, Nithya Rand Fredimoses	Experimental Procedures in Bioprocess technology and Downstream processing	Anjana Book House, Chennai	2012
3.	Stanbury PF and Whitaker A	Principles of Fermentation Technology	Pergamon Press, Oxford, UK.	1984
4.	MansE.l, and Bryce C.F.A	Fermentation Microbiology and Biotechnology	Taylor and Francis group.	2002
5	Reddy S.M and Ram Reddy	Basic Industrial Biotechnology	New age international Publisher	2012

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Pelczar M. Chanecs, Kreig N.R	Microbiology	Tata McGraw Hill, New Delhi	1996
2	NdukaOkafor	Modern Industrial Microbiologyand biotechnology	SP publisher	2007
3	Lee Yuan Kun	Microbial Biotechnology	World scientific	2003
4	Albert G. Moat and John W. Foster	Microbial Physiology	John Wiley & sons	2003
5	WimSoetaert and Erick J.Vandamme	Industrial Biotechnology	John Wiley & sons	2010

WEB SOURCES

1. https://www.omicsonline.org/microbial-physiology/articles
2.https://www.youtube.com/watch?v=bblvBA7K24M
3. https://www.slideshare.net/jeevaraj9/strain-improvement-techniques
4.https://byjus.com/biology/metabolites
5. https://www.slideshare.net/melamoon/applications-of-industrial-biotechnology

Syllabus Designer:

- Dr.J. Ilamathi
  Assistant Professor