

ELECTIVE III

MICROBIAL BIOTECHNOLOGY

Semester	Subject code	Categor y	Lecture		Theory		Practical		Credi t
			Tota l hrs	Hrs/ wee k	Tota l hrs	Hrs / wee k	Tot al hrs	Hrs/ wee k	
VI		Core	45	3	45	3	0	0	3

COURSE OBJECTIVES

To provide the first- line knowledge of utilizing microbes for the industrial production of an array of economically viable products possessing a variety of human applications.

COURSE OUTCOMES

On the successful completion of the course, students will be able to develop strong and potential skills in the various aspects of microbial processes in industries.

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To enable the students to acquire knowledge in Microbial Biotechnology and Fermentation.	K3
CO2	To enable the students obtain the advanced knowledge in Industrial productions and to work in fermentation industries.	K2
CO3	To impart knowledge in producing SCP and Biofuels. Entrepreneurship can be established	K2

	with the gained knowledge.	
C04	To impart knowledge of various biofertilizers, biopesticides and transgenic animals. With the knowledge students can acquire interest in doing research in agricultural Microbiology.	K2
C05	To understand and acquire knowledge of IPR and Biological ethics.	K3

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
C01	S	S	S	S	S	S
C02	M	S	M	S	S	S
C03	S	S	S	S	S	S
C04	S	M	M	S	S	S
C05	S	M	M	S	S	S

S- Strong;

M- Medium;

L- Low

MICROBIAL BIOTECHNOLOGY

UNIT- I: Fermentation Technology

12 hrs

Basic design and construction of fermenter - Mode of operation – instrumentation and control, Fermentation- general concepts, Applications of fermentation; Types of fermentation- Submerged and solid state fermentation, Antifoams, Downstream processing.

UNIT-II: Microbial Biotechnology

12 hrs

Biotechnology: Definition – Milestones in History - Scope of microbial biotechnology and its applications. Microbial production

of streptokinase, Edible vaccine, Xanthan, Dextran, Biosurfactants, Microbial production of bioplastics.

UNIT-III: Algal Biotechnology

12 hrs

Single cell protein (algae and yeast). Microalgal technology – Industrial cultivation methods of *Spirulina* – biotechnological potentials of *Spirulina* as: food and feed – fuel production from microalgae – pharmaceutically valuable compounds from microalgae. Commercial production of bio-ethanol and bio-diesel using lignocellulosic waste, Biogas.

UNIT-IV: Plant and Animal Biotechnology

12 hrs

Microbial production of biofertilizers – (*Rhizobia*, *Azospirillum*, *Frankia* and VAM). Microbial production of bio-pesticides (*Bacillus thuriangiensis*) – Development of insect, virus and herbicide resistant plants. Transgenic animals: methods of creating transgenic mice and sheep.

UNIT-V: IPR and Bioethics

12 hrs

Intellectual Property Rights (IPR) - different types of IPRs - Principles of Bioethics (IB) - Definition of Ethics and Bioethics. - Ethics committee - Brief account on risks and ethics of modern biotechnology - Ethical concerns in human gene therapy - Ethical limits of animal use.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- ❖ **Lectures**
- ❖ **Power point presentation**
- ❖ **Charts**
- ❖ **Models**

- ❖ **Group discussion**
- ❖ **Group assignments**

TEXT BOOKS

Sl No:	Book Name	Author	Publisher	Year of Publication
01	Molecular Biotechnology	Glick BR. and Pasternak JJ	ASM press, Washington DC	2010
02	Biotechnology	Satyanarayana U.	Books and Allied Pvt. Ltd.	2013
03	A textbook of Biotechnology.	Dubey RC. 2013.	S. Chand and Company Ltd.	2014
04	Elements of Biotechnology	Gupta PK. 2nd edition.	Rastogi Publications.	2015

REFERENCES

Sl No	Book Name	Author	Publisher	Year of Publication
01	Principles of Gene Manipulation,	Old RW and Primrose SB.	Blackwell Scientific Publications, London.	2006
02	An Introduction to Genetic Engineering	Desmond ST Nicholl.	Cambridge university press.	2012
03	Biotechnology – The basic principles	Trevan MD, Boffey S, Coulding KH and	Tata McGraw Hill	1995

		Stanbury P edition.		
04	Recombinant DNA-	Watson JD, Gilman M, Witkowski J, Zoller M.	Scientific American Books.	1992

SYLLABUS DESIGNER:

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