CORE – IX

ADVANCES IN BIOTECHNOLOGY

Semester	Subject code	Category	Lecture		Theory		Practical		Credit
			Total hrs	Hrs/ week	Total hrs	Hrs / week	Total hrs	Hrs/ week	
III		Core	60	4	60	4	0	0	4

COURSE OBJECTIVES

To enable the students to understand the Advances in Biotechnology.

COURSE OUTCOMES

On the successful completion of the course, students will be able to develop sound knowledge and potential skills in the various advancements of Biotechnology.

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the advanced concepts in plant Biotechnology	**K2**
CO2	To analyze the various gene transfer methodologies adapted in animal biotechnology and in the production of Transgenic animals.	**K4**
CO3	To apply the knowledge of Genetic Engineering in the field of medical biotechnology	**K3**
CO4	To remember the various bioremediation	**K1 & K3**

	strategies, environmental problems and to apply genetic engineering for bioremediation	
CO5	To understand the various aspects and applications of Nanobiotechnology	**K3**

MAPPING WITH PROGRAMME OUTCOMES:

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

S- Strong; M- Medium; L- Low

Unit-I: Plant Biotechnology 12 hrs

Plant Genetic Engineering: Direct and Indirect transformation techniques- Transgenic plants - Genetically modified (GM) plants (Bt cotton, Bt Brinjal), Herbicide and insect resistance, Golden Rice, Plant Molecular Farming - Edible vaccines, Plantibodies – Avicidin, CaroRX, Antisense RNA Technology and its role in Plant Improvement - Flavr savr Tomato.

Unit-II: Animal Biotechnology 12 hrs

Gene transfer technology in animals: Viral and non-viral methods- Retroviral, Microinjection, Embryonic stem cells methods. Production of transgenic animals and molecular farming – sheep - wool production, Goats, Fishes, Poultry. Cryopreservation Technique.

Unit-III: Medical Biotechnology **12 hrs**

Gene therapy – Approaches for gene therapy - *Ex-vivo* - vectors - Human Artificial Chromosome and Bone marrow cells - Therapy for ADA. *In vivo* – viral and nonviral systems. Gene therapy for Cancer & AIDS. DNA in disease diagnosis – Infectious diseases - Tuberculosis, AIDS, Genetic disorders - Alzheimer's disease, Cystic Fibrosis.

Unit-IV: Environmental Biotechnology **12 hrs**

Bioremediation and its types – *In situ & Ex situ*, Xenobiotic compounds, Reactions in Bioremediation – Aerobic – Anaerobic – Sequential; Bioremediation of hydrocarbons, Genetic Engineering for Bioremediation – superbug; Bioaugemntation, biosurfactants, MEOR, Global Environmental Problems – Global warming – Acid Rain.

Unit-V: Nanobiotechnology **12 hrs**

Nanobiotechnology – Introduction, History and Recent developments, Sources of Nanoparticles - Plants and Microbes. Materials Characterization by X-ray diffraction, Fourier transform Infrared spectroscopy (FTIR) – Ultraviolet and visible spectroscopy (UV Vis), SEM & TEM. Microbial Nanoparticles and its applications in Solar energy conversion and catalysis, biosensors - Nanomedicine - Nanotoxicology challenges.

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

TEACHING METHODOLOGY:

- **Lectures**
- **Power point presentation**

- **Charts**
- **Models**
- **Group discussion**
- **Group assignments**
- **Seminars**

TEXT BOOKS:

Sl No:	**Book Name**	**Author**	**Publisher**	**Year of Publication**
01	Biotechnology	U Satyanaranyana	Books & Allied (P) Ltd	2017
02	Text book of Microbiology	D.R.Arora,	CBS Publishers & Distributors	2003
04	Microbiology	Pelczar, Michael J, Chan, E C S	Mc Graw-Hill	1999

REFERENCE BOOKS:

Sl No	**Book Name**	**Author**	**Publisher**	**Year of Publication**
01	Molecular Biotechnology, Principles and application of Recombinants	Bernad R. Glick and Jack J. Pasternak	A.S.M. Press Washington D.C	1998
02	Recombinant DNA Technology	James D. Watson . Michacl Gilman, Jan Witkowski, Mark Iolles	Scientific American Books	2001
03	Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials 1st Edition,	Thomas Varghese, K.M. Balakrishna	Atlantic publishers and Distributors	2012

04	Practical Applications of plant molecular Biology	Henry R.J	Chapman Hall Landon	1997

WEB SOURCES:

www.freebookcentre.net

https://nptel.ac.in

https://www.aboutbioscience.org

https://gurukpo.com

https://biotechnologyall4u.weebly.com

SYLLABUS DESIGNER:

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