	Pithapur Rajah's Government College(Autonomous)Kakinada	Program &Semester II B.Sc Semester -IV			
CourseCode	PLANT AND ANIMAL BIOTECHNOLOGY				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:		3	-	-	4

Course Objectives:

The objectives of this course are to introduce students to the principles, practices and application of animal biotechnology, plant tissue culture, plant and animal genomics, genetic transformation

Outcomes:

On Completion of the course, the students will be able to-

CO1	Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications
CO2	The course will provide complete exposure as how plant and animal cells are isolated, cultured and genetically manipulated in laboratory.
CO3	Understand the mechanism of different gene transfer methods in plants and animals.
CO4	Understand the applications of Transgenic plants and animals.

SkillDevelopment		Employability		Entrepreneurship	
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Syllabus:

UNIT-I:

Plant tissue culture techniques & secondary metabolites production

- 1.1 Plant tissue culture: totipotency, media preparation – nutrients and plant hormones
- 1.2 Sterilization techniques
- 1.3 Establishment of cultures – callus culture, cell suspension culture.
- 1.4 Micro propagation, Somatic embryogenesis,
- 1.5 Synthetic seed production, protoplast culture - applications.

UNIT-II:

Transgenesis and Molecular markers

- 2.1 Plant transformation technology- *Agrobacterium* mediated Gene transfer (Ti plasmid).
- 2.2 Hairy root features of Ri plasmid
- 2.3 Transgenic plants as bioreactors.
- 2.4 Herbicide resistance – glyphosphate, Insect resistance- Bt cotton.
- 2.5 Molecular markers- RAPD, RFLP.

UNIT-III:

Animal tissue culture techniques:

- 3.1** Animal cell culture: cell culture media and reagents; culture of mammalian cells, tissues and organs
- 3.2** Primary culture, secondary culture
- 3.3** Cell lines, stem cell cultures;
- 3.4** Cell viability and cytotoxicity, Cryopreservation.
- 3.5** Transfection methods (calcium phosphate precipitation, electroporation, Microinjection) and applications.

UNIT-IV:

Transgenic animals & Gene Therapy:

- 4.1** Production of vaccines, diagnostics, hormones and other recombinant DNA products in medicine (insulin, somatostatin, vaccines),
- 4.2** IVF
- 4.3** Concept of Gene therapy.
- 4.4** Concept of transgenic animals – Merits and demerits
- 4.5** Ethical issues in animal biotechnology.

UNIT – V

Bioethics, Biosafety and IPR:

- 5.1** Bioethics in cloning and stem cell research, Human and animal experimentation, animal rights/welfare.
- 5.2** Bio safety-introduction to biological safety cabinets
- 5.3** Primary containment for biohazards
- 5.4** Biosafety levels; GLP, GMP
- 5.5** Introduction to IP-Types of IP: patents, trademarks & copyright.

Textbooks

1. Biotechnology – By U. Satyanarayana ;1997
2. Elements of Biotechnology,P. K. Gupta, 1994,Rastogi Publications
3. A Textbook of Biotechnology,R C Dubey,S. 2014,Chand Publishing


Referencebooks:

4. Introduction to Plant Tissue Culture, M. K. Razdan, 2003,Science Publisher
5. M.M. Ranga, Animal Biotechnology; Agrobios (India) ,2006.
6. Daniel R. Marshak, Richard L. Gardner, David Gottlieb “Stem cell Biology” edited byDaniel 2001,Cold Spring Harbour Laboratory press, New York.

CO-PO Mapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High]:No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	3	3	2	3	3	2	2
CO2	3	2	2	3	2	2	3	2	3	2	3	2
CO3	2	3	3	2	3	3	2	3	2	2	2	3
CO4	3	2	3	2	3	2	3	3	2	3	2	2

	Pithapur Rajah's Government College(Autonomous)Kakinada	Program &Semester II B.Sc Semester -IV			
CourseCode	PLANT AND ANIMAL BIOTECHNOLOGY				
Teaching	Hours Allocated: 30 (Lab)	L	T	P	C
Pre-requisites:		-	-	2	1

Course 4: Plant and Animal Biotechnology Lab

Total Hours: 30

Credits: 1

List of Practical's:

1. Plant culture media and composition of MS media
2. Raising of aseptic seedlings
3. Induction of callus from different explants, cytology of callus
4. Plant propagation through Tissue culture (shoot tip and Nodal culture)
5. Establishing a plant cell culture (both in solid and liquid media)
6. Suspension cell culture
7. Cell count by hemocytometer
8. Establishing primary cell culture of chicken embryo fibroblasts.
9. Animal tissue culture – maintenance of established cell lines.
10. Animal tissue culture – virus cultivation.
11. Estimation of cell viability by dye exclusion (Trypan blue).
12. ELISA – Demonstration