ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER   **BIOTECHNOLOGY** TIME:4HRS/WEEK

BTH-Ma1-3701(3) **PLANT AND ANIMAL BIOTECHNOLOGY** MARKS:100

w.e.f 2024-2025 (23AK Batch) **SYLLABUS**

**OBJECTIVES:** To enable the students to

1. Acquire knowledge about Plant tissue culture its uses and techniques involved in tissue culture.
2. Be trained in various advanced techniques for production of transgenic plants.
3. Swot about the basic concepts in animal tissue culture techniques.
4. Get insight on advanced applications of animal biotechnology.
5. Acquire knowledge about ethics, bio-safety and patent rights

**COURSE OUTCOMES: Students will**

* **CO1:** Capable to indentify the economized protocols for both the classical & hybrid

Varieties, with the available tissue culture concepts.

* **CO2:** Be abundant in producing transgenic plants
  + - **CO3:** Able to evaluate animal culture media constituents and their role

to manufacture the desired products.

* **CO4:** Be proficient in on health care products.
* **CO5:** Acquire knowledge in generation and protection of patents, copyrights and

trade marks.

**UNIT- I: Plant Tissue Culture Techniques & Secondary Metabolites Production**

1. Plant tissue culture: totipotency, media preparation – nutrients and plant growth regulators
2. Sterilization techniques.
3. Establishment of cultures – callus culture, cell suspension culture, protoplast culture and anther culture.
4. Applications of tissue culture-micro propagation, somatic hybridization, Somatic embryogenesis; synthetic seed production. Cryopreservation.
5. Plant secondary metabolites- concept and their importance.

**UNIT – II: Transgenesis and Molecular markers**

1. Plant transformation technology-- *Agrobacterium* mediated Gene transfer (Ti plasmid), hairy root features of Ri-plasmid.
2. Transgenic plants as bioreactors. Herbicide resistance – glyphosphate, Insect resistance- Bt-cotton.
3. Molecular markers -RAPD, RFLP and DNA fingerprinting-principles and applications.

**UNIT – III: Animal Tissue Culture Techniques**

1. Animal cell culture: cell culture media and reagents; Culture of mammalian cells, tissues and organs; primary culture, secondary culture, cell lines, stem cell cultures.
2. Tests: cell viability and cytotoxicity.
3. Trans-fection methods (calcium phosphate precipitation, electroporation, Microinjection) and applications.

**UNIT – IV: Transgenic Animals & Gene Therapy**

1. Production of vaccines, diagnostics, hormones and other recombinant DNA products in medicine (insulin, somatostatin, vaccines)
2. IVF (*In-vitro* Fertilization)
3. Concept of Gene therapy.
4. Concept of transgenic animals – Merits and demerits -ethical issues in animal biotechnology

BTH-Ma1-3701(3) ::2::

**UNIT – V: BIOETHICS, BIO-SAFETY AND IPR**

1. Bioethics in cloning and stem cell research, Human and animal experimentation, animal rights/welfare.
2. Bio-safety-introduction to biological safety cabinets; primary containment for biohazards; bio-safety levels; GLP, GMP.
3. Introduction to IP-Types of IP: patents, trademarks & copyright

**REFERENCES**

1. Introduction to Plant Tissue Culture..M.K. Razdan ,2003,Science Publishers
2. Plant Tissue Culture, kalyan Kumar De,199 M7,New Central Book Agency
3. Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan,1998
4. Biotechnology – By U. Satyanarayana ;1997
5. Plant Cell, Tissue and Organ Culture, Applied and Fundamental Aspects By Y.P.S. Bajaj and A. Reinhard ,2001
6. Introduction to Plant Tissue Culture,M. K. Razdan, 2003,Science Publishers
7. A Textbook of Biotechnology,R C Dubey,S. 2014,Chand Publishing
8. Elements of Biotechnology,P. K. Gupta, 1994,Rastogi Publications
9. R. Ian Freshney, “Culture of animal cells –A manual of basic techniques” 4thedition, John Wiley & Sons, 2000 ,Inc, publication, New York
10. Daniel R. Marshak, Richard L. Gardner, David Gottllieb “Stem cell Biology” edited by Daniel 2001,Cold Spring Harbour Laboratory press, New York
11. M.M. Ranga, Animal Biotechnology; Agrobios (India) ,2006.

\*\* \*\* \*\*