



**JYOTI NIVAS COLLEGE AUTONOMOUS BANGALORE – 560 095**  
**DEPARTMENT OF GENETICS**  
**B.Sc. V SEMESTER GENETICS PAPER VI SYLLABUS (2021 NEP BATCH)**

**PLANT AND ANIMAL TISSUE CULTURE TECHNOLOGY**

<b>COURSE TITLE</b>	<b>PLANT AND ANIMAL TISSUE CULTURE TECHNOLOGY</b>
<b>COURSE CODE</b>	<b>21VGT6 (T)</b>
<b>COURSE CREDITS</b>	<b>04</b>
<b>TOTAL CONTACT HOURS</b>	<b>60 Hours</b>
<b>DURATION OF ESE</b>	<b>2 ½ Hours</b>
<b>CONTINUOUS INTERNAL ASSESSMENT (CIA)</b>	<b>40 Marks</b>
<b>END SEMESTER EXAMINATION (ESE)</b>	<b>60 Marks</b>

**COURSE OBJECTIVES:**

1. To understand the different types of techniques and methods used in cell and tissue culture for plants.
2. To acquire knowledge of animal cell culture techniques and comprehend their applications
3. To learn the procedure and protocols of plant and animal cell culture and its applications

**COURSE OUTCOMES (Cos):**

1. At the end of the course the students will be able to
2. Define the differences between cell and tissue culture in plants
3. Identify the Principles of plant and Animal cell culture and its applications
4. Explain the role of media, sterilization, and methodology of tissue culture
5. Comprehend various types of plant tissue culture
6. Apply the principles of culture techniques in employment or entrepreneurial setting

## CO Mapping with Knowledge Levels

CO No.	Course outcomes statement	Knowledge level
1	Define the differences between cell and tissue culture in plants	K1, K2, K3, K4
2	Identify the Principles of plant and Animal cell culture and its applications	K1, K2, K3, K4, K5
3	Explain the role of media, sterilization, and methodology of tissue culture	K1, K2, K3, K4, K5, K6
4	They will also have an understanding on the role of genetics in human society Comprehend various types of plant tissue culture	K1, K2, K3, K4, K5
5	Apply the principles of culture techniques in employment or entrepreneurial setting	K1, K2, K3, K4, K5

**Knowledge Levels-** K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

## Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	CO1	CO2	CO3	CO4	CO5
PO1	✓	✓	✓	✓	✓
PO2	✓	✓	✓	✓	✓
PO3			✓		✓
PO4	✓	✓	✓	✓	✓
PO5					
PO6					
PO7	✓	✓	✓	✓	✓
PO8					
PO9	✓	✓	✓	✓	✓
PO10	✓	✓	✓	✓	✓

## Programme Objectives aligned with Graduate attributes

PO1- Knowledge, PO2- Scientific thinking, PO3- Entrepreneurial skills  
 PO4- Analytical skills, P O 5- Communication skills, PO6- Social commitment  
 PO7- Research and Inquiry, PO8- Conservation of Environment\  
 PO9- Employability, PO10- Academic orientation

**UNIT- 1****15 Hrs.**

Requirements in Plant Cell Culture: Equipment used in Cell culture, Culture vessels, Aseptic techniques.

Cell culture media: Natural and defined, Role of hormones in cell culture media

Types of cells and tissue culture and their applications: Node, embryo, haploid (anther and ovary), shoot and root meristem cultures.

Callus culture from undifferentiated cell, protoplast culture.

**UNIT - 2****15 Hrs.**

Applications of plant cell and tissue culture.

Conservation of plant genetic resources, Germplasm classification, germplasm activities, organization associated with germplasm, gene bank.

Cryo-preservation of plant cells and tissues.

**UNIT – 3****15 Hrs.**

Animal cell culture: Principles of cell culture, cell types, cell lines, contaminations,

Requirements in Animal Cell Culture: Equipment used in Cell culture, Culture vessels, Aseptic techniques.

Cell culture media: Natural and defined, role and components of serum in culture. Invitro transformation of animal cells.

**UNIT - 4****15 Hrs.**

Types of cell culture. Primary culture, trypsinization and passaging, secondary culture, organotypic culture Applications of animal cell culture: Cell culture in biomedical research, karyological studies, amniocentesis, mutagenesis, Cytotoxicity assays, proliferation and anti-proliferation assays. Cryopreservation of animal cells and tissues (including embryos).

## GENETICS PRACTICAL PAPER 6

<b>COURSE TITLE</b>	<b>PLANT AND ANIMAL TISSUE CULTURE TECHNOLOGY</b>
<b>COURSE CODE</b>	<b>21VGT6 (P)</b>
<b>COURSE CREDITS</b>	<b>02</b>
<b>TOTAL CONTACT HOURS</b>	<b>4 Hours/week</b>
<b>DURATION OF ESE</b>	<b>3 Hours</b>
<b>CONTINUOUS INTERNAL ASSESSMENT (CIA)</b>	<b>25 Marks</b>
<b>END SEMESTER EXAMINATION (ESE)</b>	<b>25 Marks</b>

### Experiments

#### **Plant Tissue culture (8 units)**

1. General laboratory instructions/sterility techniques
2. Preparation of synthetic seeds
3. Pollen fertility
4. Preparation of nutrient medium
5. Culturing of node, internode, embryo and leaf

#### **Animal Tissue culture (4 units)**

6. Media preparation
7. Trypan blue staining
8. Demonstration - Primary explant culture, secondary explant culture

### References

1. Plant Tissue Culture: An Introductory Text by Sant Saran Bhojwani and Prem Kumar Dantu, Springer; 2013th edition
2. Advances in Plant Tissue Culture: Current Developments and Future Trends, Dr. Avinash Chandra Rai et al, Academic Press Inc, 2022
3. Plant Cell and Tissue Culture, S. Narayanaswamy, McGraw Hill Education, 1992
4. Animal Cell Culture and Technology (THE BASICS (Garland Science)), M Butler, Taylor & Francis; 2nd edition (2003)
5. Animal Tissue Culture, P Ramadass and A Wilson Aruni, Mjp Publishers (2011)
6. Introduction to Cell and Tissue Culture: Theory and Technique (Introductory Cell and Molecular Biology Techniques), Jennie P. Mather, Springer (1998).