

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VIII

### BIOTECHNOLOGY

Subject Name: **ANIMAL AND PLANT BIOTECHNOLOGY**

Sr. No.	Course Contents	Total Hrs
<b>Part-A: Animal Biotechnology</b>		
<b>1</b>	<b>Animal Cell and Tissue Culture:</b> History and scope of animal cell and tissue culture; advantages and disadvantages of tissue culture; laboratory facilities for tissue culture; the substrate on which cells grow; treatment of substrate surfaces; feeder layers on substrate; the gas phase for tissue culture; culture media for cells and tissues; culture procedures, Disaggregation (enzymatic and mechanical) of tissue and primary culture; cultured cells and evolution of cell lines; maintenance of culture-cell lines, Tissue culture (slide, flask and test tube cultures); organ culture; whole embryo culture; tissue engineering (artificial skin and artificial cartilage).	<b>11</b>
<b>2</b>	<b>In Vitro Fertilization &amp; Transgenic Animals:</b> In vitro fertilization (IVF) in humans; embryo transfer (ET) in humans; superovulation, IVF and embryo culture in farm animals (e.g. cow); embryo transfer in cattle, Gene transfer or transfection (using eggs and cultured stem cells); targeted gene transfer; transgenic animals. (mice, sheep, pigs, rabbits, goats, cows, fish).	<b>5</b>
<b>Part-B: Plant Biotechnology</b>		
<b>3</b>	<b>Plant tissue culture:</b> Introduction, History, Laboratory organization, Nutrition medium, media composition, different kinds of sterilization techniques for the preparation of sterile media, containers & instruments, maintenance of aseptic conditions.	<b>5</b>
<b>4</b>	<b>Types of culture:</b> Cytodifferentiation, Organogenic differentiation, Types of culture - Seed culture, Embryo culture, Mature embryo culture, Immature embryo culture/embryo rescue, Application of embryo culture, Callus culture, Organ culture, Nucellus culture, Application Endosperm culture, Application cell culture, Micropropagation, secondary metabolite production, haploid production, protoplast isolation & fusion, somaclonal variation.	<b>12</b>
<b>5</b>	<b>Transgenics in crop improvement:</b> Resistance of biotic stresses, Insect resistance, Resistance genes from microorganisms, Resistance genes from higher plants, Resistance genes from animals, Virus resistance, Coat protein mediated cross protection, Non structural protein mediated resistance, Antisense and sense mediated resistance, Satellite RNA protection, Pathogen targeted resistance, Disease resistance, Pathogenesis related proteins, Phytoalexins, Manipulation of disease resistance genes, Resistance of abiotic stresses, Herbicide resistance, Transgenic for quality, Transgenic for improved storage, Longer life transgenic flowers, Transgenic for male sterility, Terminator technology for use in hybrid seed production, Commercial transgenic crops.	<b>14-16</b>

#### TEXT BOOK:

##### PART [A]

Introduction to Biotechnology, P.K.Gupta, Kalyani Publishers, second edition.

##### PART [B]

Introduction to plant Biotechnology, H.S.Chawala, second ed., PHI

**REFERENCES:**

1. Plant Biotechnology – P. C. Trivedi
2. Applied Plant Biotechnology – Ignacimuthu
3. Animal Biotechnology – Babinnk and Philips.
4. Biotechnology – B. D. Singh.
5. Plant Tissue Culture – S.S. Bhojwani, M.K. Razdan.

**LIST OF PRACTICALS:**

1.	To study the various aspects of laboratory organization for plant tissue culture.
2.	To collect various explants for their manipulation and surface sterilization.
3.	To study the aseptic handling of explants and performing assay to identify common contaminants
4.	Preparation of Murashige-Skoog (MS) media
5.	To perform induction of callus in <i>Solenum tuberosum</i> .
6.	To perform callus induction in <i>Daucus carrota</i> .
7.	To perform callus induction in <i>Zea mays</i> .
8.	Initiation of anther culture and haploid production.
9.	Establishment of primary culture of chicken liver hepatocytes.
10.	Establishment of primary culture of chicken cardiac myocytes.