**ST.JOSEPH’S COLLEGE FOR WOMEN(A)**

**ZOOLOGY**

**ANIMAL BIOTECHNOLOGY**

**V Semester SYLLABUS “AG”**

**z 5501(3) max marks:100**

**OBJECTIVES:**

1. To understand the importance of biotechnology in the utilization of microorganisms, cellular components and transgenic animals for beneficial use.

2. To study the techniques of recombinant DNA technology.

3. Application of biotechnology in industries, aquaculture, &medicine.

4. To inculcate interest in research.

**Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors**

**Restriction modification systems:** Types I, II and III. Mode of action , nomenclature, applications of Type II restriction enzymes in genetic engineering.

**DNA modifying enzymes and their applications:** DNA polymerases.

Terminal de -oxynucleotidyl transferase , kinases and phosphatases, and DNA ligases

**Cloning Vectors:** Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs.

**Unit 2: Techniques of Recombinant DNA technology**

**Cloning**: Use of linkers and adaptors

**Genomic and cDNA libraries**: Preparation and uses.

**GENE AMPLIFICATION TECHNIQUES : PCR:** Basics of PCR, steps and types.

**DNA Sequencing**: Sanger’s method of DNA sequencing- traditional and automated sequencing

**Hybridization techniques:** Southern, Northern and Western blotting,

DNA fingerprinting.

**UNIT 3 : Animal Cell Technology**

**Cell culture media:** Natural and Synthetic

**Cell cultures:** primary culture, secondary culture, continuous cell lines; Protocols for Primary Cell Culture; Established Cell lines (common example HeLa); Organ culture; Cryopreservation of cultures, tissue culture.

**Somatic cell hybridisation:** Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

**Stem cells:** Types of stem cells, applications.

**Unit 4: Reproductive Technologies & Transgenic Animals**

**Manipulation of reproduction in animals:** Artificial Insemination, *In vitro* fertilization, micro fertilization, super ovulation, GIFT (gamete intrafallopian transfer), Embryo transfer, Embryo cloning.

**Gene delivery:** Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated delivery

**Transgenic Animals:** Strategies of Gene transfer; Transgenic - sheep, - fish; applications.

**Unit 5 : Applied Biotechnology**

**Industry:**  Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized; Downstream processing - Filtration, centrifugation, extraction, chromatography, spray drying and lyophilisation.

**Aquaculture:** fisheries – monoculture in fishes, polyploidy in fishes;

**TEXT BOOKS**

1. Genetic Engineering by Mohan P.Arora. Himalaya Publishers.
2. Genetics by Sinott, Dunn, Dobzanhansky . T.M.H Edition
3. Genomics and Biotechnology by P.K.Gupta .
4. A Text book of Biotechnology by U.Satyanarayana.
5. Biotechnology by B.D.Singh.
6. Text book of Biotechnology by R.C.Dubey.
7. Genetics and Evolution by P.L.Kochhar.
8. CellBiology,Genetics &Molecular Biology by N.Arumugam.

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

**ZOOLOGY**

**z5551(2) ANIMAL BIOTECHNOLOGY marks:50**

**practical syllabus for V semester**

**OBJECTIVES:**

1. Gain knowledge on the molecular and genetic principles and processes involved in biotechnology.
2. Be familiar with the techniques in recombinant DNA technology.
3. Acquire skill in following correct procedures for use of scientific apparatus.
4. Demonstrate skill in handling equipment and conduct experiments using standard procedures.
5. Understand the importance of sterilization of glass ware and plastic wares using autoclave.

ANY SIX OF THE FOLLOWING.

1. Isolation of Plasmid DNA from *E.coli*

2. Preparation of genomic DNA from *E. coli*/animals/ human.

3. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.

4. Preparation for insertion and vector for ligation.

5. Performance of ligation reaction using T4 DNA ligase.

6. Preparation of competent cells

7. Transformation of *E. coli* with plasmid DNA using CaCl2,

8. Selection of transformants on X-gal and IPTG

9. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting(with pcr demo only).

10. Amplification of DNA by PCR (Demo).

11. Packing and sterilization of glass and plastic wares for cell culture.

12 ,Preparation of culture media.