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

V SEMESTER **BIOCHEMISTRY** TIME:4HRS/WEEK

BCH-E3-5803 (3) **GENETIC ENGINEERING** MAX.MARKS:100

w.e.f. 2020-2021 (20AH) **SYLLABUS**

**Course Objectives- To enable the students to-**

* **Imbibe basics of cloning and uses of DNA libraries**
* **Understand Gene transfer techniques and their application**
* **Analyse gene transfer methods usage to improve agricultural yield**
* **Imbibe knowledge on gene transfer techniques in microorganisms**
* **Learn genetic engineering role in preserving environment**

**Course Outcomes: Students will be able to-**

**CO1: Analyse and use the vectors based on gene inserts**

**CO2: Identify methods suitable for gene transfer in animals**

**CO3: Identify methods suitable for gene transfer in plants**

**CO4: Illustrate gene transfer methods in microbes**

**CO5: Apply the knowledge of genetic engineering in Bioremediation**

**UNIT -I**

Basics of Genetic engineering

Introduction, historical perspective, basics of cloning, Vectors, Restriction enzymes, plasmids

PBR 322, PUC vector, Cosmids, YACs, cDNA libraries.

**UNIT -II**

Genetic Engineering in Animals

Gene transfer methods in Animals. Transfection. Microinjection, Embryonic-stem cells Gene transfer and Retro-virus Gene transfer methods to create transgenic animals. Applications of transgenic animals in agriculture, medicine and pharmaceuticals.

**UNIT -III**

Genetic engineering in Plants

Manipulation of Plant Genes-Electroporation, Shotgun method, Agrobacterium mediated gene transfer. Applications in Crop improvement, disease and pest resistance, tolerance to environmental stress. Genetically engineered foods.

**UNIT- IV**

Genetic engineering in Microorganisms

Gene transfer methods in microorganisms - transformation, transduction and conjugation. Transposons.

**UNIT- V**

Genetic engineering-Environment

Bioremediation Biodegradation, Biofuels and Bioplastics from genetically engineered rape oil seed and other crops as substitutes for fossil fuels, Biosensors.

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

V SEMESTER **BIOCHEMISTRY** TIME:2HRS/WEEK

BCH-E3-5853 (2) **GENETIC ENGINEERING LAB** MAX.MARKS:50

w.e.f. 2020-2021 (20AH) **SYLLABUS**

**List of Experiments**

1. PCR

2. Restriction mapping

3. CaCl2 mediated transfection

4. Restriction Fragment Length Polymorphism (RFLP)

5. Random Amplified Polymorphic DNA (RAPD)

6. Plasmid isolation from E. coli

**Suggested books**

1. Genes and Probes, A Practical Approach Series (1995) by Hames and SJ Higgins; Oxford

2. Gel Electrophoresis of Nucleic Acids, A practical Approach (1990) by D Rickwood and BD Hames. Oxford Univ. Press.

3. Genetics by Gardinar

4. Biotechnology by U.Satyanarayana