

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)

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

60 Hours

Basics of Genetic engineering

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

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

UNIT -II

60 Hours

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

60 Hours

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

60 Hours

Genetic engineering in Microorganisms

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

UNIT- V

60 Hours

Genetic engineering-Environment

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

Suggested books

1. Genome Mapping: A practical approach. Dear P (Editor). 1st Ed. 2000. Oxford University.
2. Developing Bioinformatics Skills. Alfonso Valencia and Blaschke. L (2005) Oreilles
3. Bioinformatics sequence, structure and data banks ed. By Des Higgins Willie Taylor (2006).
4. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins" (Andreas D. Baxevanis, B. F. Ouellette), Paperback, 2nd ed., 470 pp., ISBN: 0471383910, Publisher: Wiley, John & Sons, Inc.Pub.

5. David W. Mount, *Bioinformatics: Sequence and Genome Analysis*, 2nd edition, Cold Spring Harbor Laboratory, 2004.
6. *Introduction to Bioinformatics* by T.K. Altwood and D.J Parry-Smith (Pearson Education Asia 1999).