## BTPC3002 GENETIC ENGINEERING (3-0-0)

**Module-I: (08 hours)**
Scope of Genetic engineering, Basic principles of DNA isolation and purification, Enzymes used in genetic engineering, Cloning Vectors (Plasmid, Bateriophage Cosmid, YAC ), Expression vector, Gene library

**Module-II: (08 hours)**
Selection and identification of recombinant bacterial cells, principle, methodology and applications of PCR, DNA fingerprinting- methodology and its application, site directed mutagenesis, antisense RNA, siRNA and miRNA, Ribozyme technology

**Module-III: (08 hours)**
Principles, procedure and applications of RFLP, Gene targeting, Gene mapping, restrictions mapping, Protein engineering concept with examples, Southern and Northern blotting, Molecular markers and its applications

**Module-IV: (08 hours)**
DNA transfection-physical methods (microinjection, electroporation, biolistic), Chemical mediated DNA transfection, viral DNA transfection, Saccharomyces cerevisiae expression system, Baculovirus-insect cell expression system, Gene therapy and its application

**Module-V: (08 hours)**
Genetic engineering in animal-production and application of transgenic mice, Manufacturing of therapeutic products (insulin and immune modulators by rDNA technology), Genetic engineering regulations and safety guidelines, DNA vaccine technology

**Course outcomes (Cos)**
CO1: Explain the fundamental concepts, tools, and techniques used in genetic engineering, including restriction enzymes, vectors, ligases, and host systems.
CO2: Apply Molecular Cloning Techniques Demonstrate the ability to design and perform molecular cloning experiments, including DNA isolation, gene insertion, transformation.
CO3: Analyze and Interpret Genetic Modification Results: evaluate the outcomes of genetic manipulations using molecular techniques like gel electrophoresis, PCR, and DNA sequencing.
CO4: Design Genetic Constructs for Desired Traits: Construct and analyze recombinant DNA molecules for applications in research, medicine, and agriculture.
CO5: Assess Ethical, Legal, and Social Issues: Critically discuss the ethical, legal, and biosafety considerations involved in genetic engineering research and applications.

**Books:**

1. Molecular Cloning by Sambrook
2. Gene Cloning by T.A Brown
3. Principles of Gene Manipulation: An Introduction to Genetic Engineering by R.W. Old & S.B Primrose
4. Plant Biotechnology by H S Chawla