

# **Principle Paper BT 301 Genetic engineering and Bioinformatics.**

## Unit 1

- 1.1. Fundamentals of rDNA technology.
- 1.2. Enzymes and proteins used in rDNA technology.
- 1.3. Cloning vectors and expression vectors: plasmid based, bacteriophage based, cosmid, phagemid, vectors for cloning and expression in plant cell and animal cell.
- 1.4. Advance special purpose high capacity cloning and expression vectors.

## Unit 2

- 2.1. Construction and uses of genomic and cDNA library.
- 2.2. Methods of gene transfer.
- 2.3. Expression of cloned gene: Monitoring gene expression, strategies for stability of foreign protein, Purification and characterization
- 2.4. Hybridization and blotting processes and their applications. In situ hybridization techniques

## **Section II**

## Unit 3

- 3.1. DNA sequencing: different methods, advancement in DNA sequencing and their applications. PCR and its variations and their applications
- 3.2. Chemical Synthesis of DNA, Protein sequencing
- 3.3. Applications of rDNA technology in healthcare, forensic science
- 3.4. Commercial possibilities of rDNA technology

## Unit 4

- 4.1. Database and Data base management system, Biological database : Sequence, Structure and classification
- 4.2. Sequence Analysis : concepts of sequence similarity, identity and homology, Global and Local alignment, Scoring matrices, BLAST, FASTA
- 4.3. Multiple sequence alignments (MSA): The need for MSA, basic concepts of various approaches for MSA (e.g. progressive, hierarchical etc.); Introduction to CLUSTALW and PileUp ; concept of dendrogram and its interpretation
- 4.4. Application of Bioinformatics: Gene finding, PCR Primer designing, Microbial identification, Comparative genomics, Secondary and tertiary protein structure prediction

## **References:**

1. Gibas and Jamback: Developing bioinformatics computer skills. O'Reilly Associates.
2. J. Peek, G. Todino & J. Straug: Learning unix operating system. O'Reilly Asso.
3. Bioinformatics : A. V. Subramanian
4. P. Baldi & S. Brunak. Bioinformatics: A machine learning approach. M. I. T. Press
5. A.D. Bzxevanis and B.F. F. Onellette Bioinformatics: A Practical guide to the analysis of lienes and Proteins.
6. Gene cloning : T. A. Brown
7. Principles of gene manipulation : Old & Primrose
8. Genetic engineering : Sandya Mitra