SARDAR PATEL UNIVERSITY
Programme: MSC (Biochemistry)
Semester: III
Syllabus with effect from: June 2011

Paper Code: PS03CBIC01	**Total Credits: 4**
Title Of Paper: R - Dna Technology	

Unit	Description in detail	Weightage (%)
1	Basic techniques involved in r-DNA technology. Concept and emergence of r-DNA technology. Relevance and future prospects. Principles involved, preparation and purification of genomic DNA from eukaryotic and prokaryotic organisms, plasmid DNA and bacteriophage DNA preparation. Generation of DNA fragments: Methods available and their advantages and Disadvantages; Ultrasonication; Restriction enzyme digestion and shearing of DNA. Cloning vectors – Plasmid and phage biology; vectors based on plasmids, cosmids, ?§, M13, phagemids, yeast artificial chromosomes (YACs), Bacterial Artificial Chromosomes (BACs) and animal viruses.	**25 %**
2	DNA modifying enzymes: Ligation: reaction kinetics and factors affecting ligation. Introduction of DNA/RNA in bacteria, yeast, fungi and in other eukaryotic host systems. Selection and screening of recombinant clones: Direct and indirect methods; probe selection and labelling; methods based on nucleic acid hybridization; immunochemical methods; reporter genes and other emerging methods for clone identification. In vitro translation.	**25 %**
3	**Generation of genomic and cDNA libraries:** Methods and strategies for preparation and screening of genomic and cDNA libraries; Advantages and disadvantages of various methods. Applications of the genomic and cDNA libraries. **Characterization of cloned DNA:** Mapping and DNA fingerprinting: Physical and molecular mapping. Methodology, merits and demerits and applications of Restriction mapping; RFLP; RAPD; AFLP; SSR; REMAP and SCAR analysis.	**25 %**
4	DNA sequencing: Principles and methods for DNA sequencing. Sequencing of whole genomes; data submission and validation. Polymerase Chain Reaction: Principle and basic types of PCR; Reverse Transcription and Real Time PCRs; Factors affecting PCR; Applications and precautions. **Modification of cloned DNA:** Techniques available, advantages and limitations of random and site-directed mutagenesis. Applications of DNA modifications in genetic engineering. **Applications of recombinant DNA technology:** Applications of genetic engineering in improvement of plants, animals and microbes; Gene therapy, pharmaceutical products and molecular diagnostics; Marker Assisted Selection; Molecular Pharming. Restriction and regulation for the release of GMOs. Patenting and IPR	**25 %**

Basic Text & Reference Books:

- Recombinant DNA: Watson et. al.
- Genetic engineering : Sandhya Mitra
- Principles of gene manipulation : Old & Primrose
- Gene cloning : T. A. Brown
- Molecular cloning: Sambrook and Russel
- From genes to clones: Ernst Whittaker