SARDAR PATEL UNIVERSITY
Programme: MSC (Integrated Biotechnology)
Semester: VI
Syllabus with effect from: December 2012

Paper Code: PS06CIGB02	**Total Credits: 3**
Title Of Paper: Genetic Engineering	

Unit	Description in detail	Weightage (%)
1	**Introduction to Genetic Engineering and tools for gene cloning:** Overview of the principles and progress in genetic engineering. Vectors and hosts: Properties of plasmid and host. Cloning and expression vectors: plasmid (pBR322, pUC18, pET-22b), λ-bacteriophages, M13, phagemids, cosmids, BAC, YAC and Transposons. Types of host and methods for transformation: Chemical based transformation, Conjugation, Transduction, Electroporation, Agrobacterium mediated transformation, biolistic and microinjection)	
2	**Strategies for cloning:** Overview of cloning strategies. Integration of DNA insert into vector by linker, adaptor or homopolymer tailing. Generation of genomic, cDNA and metagenomic libraries: Methods and strategies for preparation and screening of genomic and cDNA libraries, advantage and disadvantage of various methods, application of genomic, metagenomic and cDNA libraries.	
3	**Selection and Screening of recombinant clones:** Direct and indirect methods, Probe preparation (radiolabelling and non-radiolabelling), Methods based on nucleic acid homology (Southern, northern, western, subtractive, colony and plaque hybridization, in situ chromosomal hybridization, chromosomal walking)	
4	**Recombinant product:** Subcloning, nested deletion, site-directed mutagenesis, expression of cloned gene, Promoters (prokaryotic and eukaryotic promoters). Isolation and purification of expressed product, Processing of recombinant protein. Safety in genetic engineering, Restriction and regulation for the release of GMOs.	
	Practical:	
	• Isolation of plasmid DNA • Restriction mapping • Isolation of blood DNA • Preparation of competent cells of E. coli • Transformation • Conjugation • Purification of DNA / RNA from agarose gel • Gene expression • Analysis of expressed gene product	

Basic Text & Reference Books:

- Recombinant DNA: Watson et. al.
- Principle of gene manipulation: Old and Primerose
- Gene cloning: T.A. Brown
- Genetic engineering: Sandya Mitra.
- Molecular Biotechnology – Glick
- Applied Molecular Genetics – Roger Miesfeld
- Biotechnology – H. K. Das
- Genetic Engineering- Smita Rastogi and Neelam Pathak
- Animal biotechnology- P. Ramadass