

**SARDAR PATEL UNIVERSITY**  
**Programme: BSC (GENETICS)**  
**Semester: V**  
**Syllabus with effect from: June 2013**

<b>Paper Code:</b> US05CGEN03	<b>Total Credit: 3</b>
<b>Title Of Paper:</b> Introduction to Genetic engineering	

Unit	Description in detail	Weighting (%)
<b>1</b>	<b>RESTRICTION AND MODIFICATION OF DNA</b> Isolation of Genomic DNA and Plasmid DNA, Isolation of RNA, (Rationale behind usage of various chemicals and reagents, Precautions in handling DNA & RNA. Restriction enzymes, Nucleic acid modifying enzymes, DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase, Cohesive and blunt end ligation(Linkers; Adaptors, Homopolymer tailing) .	
<b>2</b>	<b>CLONING VECTORS</b> Cloning vectors and their properties, Plasmid based vectors (PBR-322, PUC), Ti-plasmid based vectors-cointegrate and binary vector, Yeast Plasmid based vector(YAC, YCP, YEP and shuttle vector). Bacteriophage vector-insertional and replacement vector, Virus based vector- SV40 and retrovirus, Role of vectors in Genetic-Engineering.	
<b>3</b>	<b>GENE CLONING</b> Gene cloning and its significance, Transformation in bacterial cells, Recombinant selection & screening. Safety measures and regulation of recombinant DNA technology. Biosafety: Introduction, Historical Background, Biosafety guidelines ,Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture.IPR	
<b>4</b>	<b>ANALYSIS OF CLONED GENES</b> Construction of Genomic & cDNA library and Colony hybridization, Nucleic acid probes (Radioactive and non-radioactive) and their applications, Hybridization, Detection of labeled (Autoradiography) and non-radioactive probes (coloured & chemiluminent detection), <i>In situ</i> hybridization, FISH, Hybridization techniques: Northern, Southern and Western blot techniques.	

**Basic Text & Reference Books:**

- Principles of Gene Manipulations - Sandy B. **Primrose**, Richard M. Twyman, Robert W. **Old**. Blackwell Publishing
- Gene cloning-T.A. Brown, Blackwell Publishing.
- Molecular Biotechnology: Principles and Applications of Recombinant DNA- Bernard R. Glick, Jack J. Pasternak, Cheryl L. Patten. 4<sup>th</sup> Ed, ASM Press
- Biotechnology: Fundamentals and Applications - S.K. Mathur, S.S. Purohit, Agrobios (India)
- Analysis of Genes & Genomes – Richard C. Reece, John Wiley & Sons.
- Modern concepts of Biotechnology- H.D. Kumar, Vikas Publishing House Pvt. Ltd
- <http://web.princeton.edu/sites/ehs/biosafety/biosafetypage/section3.html>

