Course	**Discipline Specific Core**
Semester	V
Paper Number	MBTCR5122T & MBTCR5122P
Paper Title	RECOMBINANT DNA TECHNOLOGY
No. of Credits	6
Theory/Composite	Composite
No. of periods assigned	4 Theory + 3 Practical
Course description/objective	Students will be introduced to the basics and applications of recombinant DNA technology. They will learn various aspects about generating clones and gene expression using modern and relevant techniques. Students will be provided with an overview of the application of molecular tools and Polymerase chain reaction (PCR). Students will be provided with further knowledge about viral vectors (in continuation of the knowledge imparted in General Microbiology Module (Semester III). In practical module the students will be given hands on training of some of the techniques discussed in theory classes. The module seeks to make students well versed with the technological aspects of the knowledge about recombinant DNA technology.
Syllabus	**Theory** **Module A: (36 marks)** **UNIT I: Molecular tools and applications**- Restriction modification system, restriction mapping, DNA modifying enzymes: ligases, polymerases (DNA and RNA), alkaline phosphatases, polynucleotide kinases, inhibitors; Gene Recombination and Gene transfer: Transformation, Episomes, Microinjection, Electroporation, Ultrasonication; Screening of recombinants. **UNIT II: Principle and applications of Polymerase chain reaction (PCR):** RT- (Reverse transcription) PCR; Inverse PCR, Nested PCR, Ligation mediated PCR, Indirect end labeling, Rapid Amplification of 5' and 3' cDNA ends (RACE), Real time PCR, Random and site- directed mutagenesis, Primer extension and PCR based methods of site directed mutagenesis. Differential display and subtractive hybridization. **UNIT III:** Construction and comparison of genomic and cDNA library, reverse transcription, Genome mapping, DNA fingerprinting, artificial chromosomes (YAC-BAC-PAC). Yeast two hybrid assay; Phage display. **No. of Classes:** 3 Classes per week **Module B: (14 marks)** **UNIT IV: Vectors**: Different types of cloning vectors (Plasmids, Bacteriophage λ-based vectors, Cosmids, M13 bacteriophage-based vectors, BACs, YACs, Expression Vectors and Shuttle Vectors), Applications of Genetic Engineering in animals: production and applications of transgenic mice, role of ES cells in gene targeting in mice, therapeutic products produced by genetic engineering-blood proteins, human hormones,

	immunemodulators and vaccines (one example each).
	No. of Classes: 1 Class / week **Practical** 1. Making competent cells . Transformation of competent cells. Calculation of transformationefficiency. 3. Isolation and agarose gel electrophoresis of DNA 4. Restriction digestion of DNA 5. Isolation of chromosomal DNA from bacteria 6. Demonstration of PCR from genomic DNA to amplify an insert . Recombinant expression of protein in bacteria: IPTG induction andSDS PAGE. 8. Qualitative and quantitative analysis of DNA using spectrophotometer
Readings	1. Principles of Gene Manipulation & Genomics-Primrose &Twyman. *2*. Molecular Cloning- Sambrook *et al.*
Evaluation	Theory: Continuous Internal Assessment: 10 marksEnd-Semester Theory Examination: 50 marks Practical: Continuous Internal Assessment: 32 marksEnd-Semester Examination: 8 marks
Paper Structure for End SemTheory	Module A (36 marks) Compulsory: 1 question of 8 marks (1 x 8 = 8 marks) 4 out of 6 questions to be answered of 7 marks each (7 x 4= 28 marks)Module B (14 marks) Answer any one of the two questions given, each carrying 14 marks.(Part questions will not be less than 1 mark and more than 5 marks.)