

GUJARAT TECHNOLOGICAL UNIVERSITY

B.Pharm

SEMESTER: VIII

Subject Name: Genetic engineering and gene therapy

Subject Code: 2280015

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	Theory		Practical	
				External	Internal	External	Internal
3	0	0	3	80	20	0	0

Sr No	Course Content	Teaching hrs
1.	Introduction to genetic engineering, basis of genetic engineering (gene organization, gene expression, genes and genomes)	2
2.	Isolation of DNA and RNA, handling and quantification of nucleic acids, Radiolabelling of nucleic acids, nucleic acid hybridisation, gel electrophoresis, DNA sequencing	5
3.	Types and uses of - Restriction enzymes, DNA modifying enzymes, DNA ligases	2
4.	Host cells and vectors (Host cell types, Plasmid vectors, bacteriophage vectors, vectors for use in eukaryotic cells, DNA delivery methods (transformation, transfection, packaging phase DNA invitro))	6
5.	Cloning strategies (cloning from mRNA, cloning from genomic DNA, advanced cloning strategies)	3
6.	Polymerase chain reaction ((methodology- features of PCR, primer designing and DNA polymerases for PCR) ,PCR techniques, processing of PCR products and applications of PCR)	5
7.	Genetic selection (use of chromogenic substrates), screening method (immunological screening for expressed genes), analysis of cloned genes (blotting techniques and DNA sequencing)	3
8.	Applications of ribozymes, antisense-oligonucleotide based therapy	3
9.	Genetic engineering and biotechnology products (proteins, enzymes, therapeutic products, DNA vaccines (against cancer and viruses))	3
10.	Applications of gene manipulation: diagnosis and characterization of medical conditions, treatment using rDNA technology , DNA profiling, Transgenic plants, Transgenic animal models (including knock out models)	4
11	Gene therapy for hematopoietic disorders, cardiovascular diseases, respiratory conditions, cancer, neurological diseases, inborn errors of metabolism, HIV infection, skin and systemic disorders, childhood onset blindness, immunodeficiencies, pain management	9

References Books:

1. Gene and cell therapy. Nancy Smyth Templeton. Marcel Dekker Inc. 2004.
2. Gene therapy- tools and potential applications. Francisco Martin Molina. Intech publications. 2013.
3. Nicholl Desmond ST, "An Introduction to Genetic Engineering" Cambridge University Press, 2002.
4. Concepts of genetics- William S Klug. Macmillan 1994.
5. Emery's Elements of Medical Genetics- Peter D Turnpenny, Sian Ellard. Churchill Livingstone. 2007
6. Pharmaceutical biotechnology by O Kayser and R. H. Muller. Wiley – VCH Verlag GmbH & Co. KGaA.
7. Old RW and Primrose SB .Sixth edition, "Principles of gene manipulation ", BlackWell Scientific Publications, 2001.
8. Gene cloning and DNA analysis. T.A. Brown. 6th edition. Wiley Blackwell Publications.
9. Biotechnology – U. Satyanarayan