GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4

BIO-TECHNOLOGY

Subject Name: MOLECULAR BIOLOGY AND GENETICS

Sr. No.	Course content
1.	**Basics of Genetics** History and development of early genetics, Mendel's experiments and laws of heredity, various types of crosses, Mendelian Inheritance and Probability, Nature and properties of genetic material, linkage and crossing over, pleiotropy, epistasis, types of chromosomes, structure of bacterial chromosome, structure of eukaryotic chromosome, cytoplasmic inheritance and its significance, sex-determination, sex-linked inheritance and chromosomal disorders.
2.	**Concept of Genetic material and Gene** Properties of Genetic material, Evidence of DNA as genetic material in akaryotes, prokaryotes and eukaryotes, Denaturation and renaturation of DNA, Concept of gene, cistron, recon and muton, One gene one protein hypothesis, Repetitive Nucleotide Sequences in Eukaryotic Genomes, Nucleotide Sequence Composition of Eukaryotic Genomes, prokaryotic gene structure, eukaryotic gene structure.
3.	**DNA Replication** Conservative, Semi-conservative and Dispersive model of DNA replication, Uni- and bi- directional replication, Enzymology of prokaryotic and eukaryotic DNA replication, Role of primer in DNA replication, Concept of Primosome, Replisome and replicons, Mechanism of DNA replication in prokaryotes and eukaryotes, post-replicational modification.
4.	**Transcription** Basic features of transcription, Requirement of transcription, Enzyme- RNA polymerase, Concept of Auxillary proteins, Promoter, silencer and enhancer. Mechanism of Transcription in prokaryotes and eukaryotes. Monocistronic and Polycistronic mRNA, Post transcriptional modification of MRNA, TRNA and RRNA.

5.	**Genetic Code and Translation** The discovery of genetic code, concept of genetic code, types and characteristics of genetic code, Redundancy of genetic codon, Wobble and adaptor hypothesis, Overview of protein synthesis, mechanism of translation in prokaryotes and eukaryotes, post translational modification

LIST OF PRACTICALS

1. To estimate DNA by DPA method.
2. To estimate the amount of RNA by orcinol method.
3. Quantitation of DNA by spectrophotometric method.
4. To perform Agarose Gel Electrophoresis.
5. To observe the effect of Ultraviolet rays on survival of *Serratia/E.coli.*
6. To isolate lactose non fermenter mutant of *E.coli* using physical mutagen.
7. To isolate antibiotic resistant mutant of *E.coli* using physical mutagen.
8. To isolate non pigmented mutant of *Serratia* using physical mutagen.
9. To study repair mechanism in *E.coli*.
10. To isolate Genomic DNA from *E.coli*.
11. To isolate plasmid from *E.coli* by alkaline lysis method.
12. To isolate plasmid from E.coli by lysozyme boiling method.