

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

BIO-TECHNOLOGY

Subject Name: **Advanced Molecular Biology - I**

Subject Code: **150401**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Internal Assessment (I)
3	0	0	3	70	30	50

UNIT-I

Sr. No.	Course content
1.	Mutation: General properties and terminologies of mutation, Molecular basis of mutation, Types of mutation, Detection and selection of mutants, Reverse mutation and suppression of mutation DNA repair: Mismatch repair, Photodeactivation, Excision repair, Mismatch repair, Post replicational repair, Recombinational repair and SOS system.

UNIT- II

Sr. No.	Course content
1.	Genetic Engineering and rDNA Technology: Introduction to genetic engineering and rDNA technology, Introduction to gene cloning, types of cloning and cloning strategies, Basic tools used in genetic engineering, Basic terminology – Restriction endonuclease – types and cleavage patterns, Vectors – types, properties, Capacities and uses, Gene Libraries, Types and its construction, Steps of Gene cloning in detail, Gene therapy and its applications, Concept of reverse genetics and chromosome walking, Applications of genetic engineering, Giant Salmon with engineered growth hormone, Engineered male sterility with suicide genes, Other commercial opportunities, Uses in research, Production of useful proteins, Diagnosis of hereditary diseases, etc.
2.	Techniques of Genetic Engineering: Electrophoretic techniques, Southern blotting, Western blotting, Northern blotting, PCR and its types, Isoelectric focusing.

UNIT-III

Sr. No.	Course content
1.	Regulation of Replication: Replication errors, Editing and methyl-directed mismatch repair, Role of editing and mismatch repair in maintaining replication fidelity, Antibiotics that affect replication and DNA structure.
2.	Regulation of Transcription: Positive and negative regulation, lac-, ara-, his- and trp- operon regulation, Antitermination, Global regulatory responses, Regulation of gene expression in eukaryotes, Transcriptional, Translational and processing level control mechanisms, Antibiotics that block transcription, etc.
3.	Regulation of Translation: Regulation of translation by small RNA molecules (RNAs), Control at ruminations, Attenuation and anti-termination, etc.
4.	Regulation of Different Metabolic Pathways: Feedback inhibition by an end product of the pathway, Positive regulation (precursor activation), Regulation by covalent modification, etc.

Reference Books:

1. Molecular Biology, David Freifelder, Second Edition, Narosa Publication
2. Genes IX: Lewin.
3. Principles of Genetics: Snustad and Simmons.
4. Molecular Biology of Cell: Alberts *et al.*
5. Molecular Biology of Gene: Watson *et al* Vth Edition.
6. Modern Microbial Genetics: Uldis Streips and Ronald Yasbin.
7. Microbial Genetics: Stanley Molay, John Cronan and David Frifelder.
8. Molecular Genetics of Bacteria: Synder and Champness.
9. Molecular Genetics: Stent and Calendar.