GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Bio-Technology

Subject Name: **Advanced Molecular Biology –II**
Subject Code: **160401**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
3	0	3	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	**Recombination:** Types of recombination, models for Homologous recombination, molecular mechanisms of homologous recombination, Homologous recombination in eukaryotes, Mating –Type switching. Molecular mechanisms for site specific recombination, Biological role of site specific recombination	8
2.	**Conjugation:** Discovery of conjugation, Conjugation by *E coli* F factor, structure of F vector, Regulation of F factor fertility, Establishment of cell contact: DNA mobilization and transfer and separation of mating pair, Hfr conjugation and chromosomal transfer, F prime Conjugation and merodiploids, Conjugation of fertility inhibited F like plasmid, non conjugative, mobilizable plasmids, broad host range self –transmissible plasmids, chromosome mobilization by Non- F plasmids, interrupted mapping, Conjugation in Gram-positive bacteria, Haemophilus influenza	8
3.	**Transduction:** Historical background of transduction, Generalized transduction in P22, P1, T4, λ and Mu bactriophages, homologous recombination with recipients' chromosome, measuring transduction (Co transduction of markers, Marker effect, Abortive transduction, Transduction of plasmids) Applications of generalized transduction. Specialized transduction in λ and its applications.	5
4.	**Transformation:** History of transformation, Mechanisms of natural competence and transformation in *Streptococcus pneumonia* and *Haemorphilus influenza*, specificity and DNA uptake, Role of transformation, Transformation by inducing artificial competence.	5

5.	**Transposable Elements:** Types of transposable elements, structure, genetic organization and mechanism of transposition of Tn5, Tn3 and related transposons. Integrons, Retrotransposons, Conjugative and Mobilizable transposons, Assay of transposition.	6
6.	**DNA sequencing**: Maxam-Gilbert's and Sanger's methods, Shot gun sequencing, sequencing strategies for large genomes, primer walking, LM (Ligation mediateda) PCR, chemical synthesis of oligonucleotides; automated DNA sequencing, gene replacement and gene targeting	5
7.	**RNA splicing:** Biochemical mechanism, Splicing pathways, Spliceosomal introns, Spliceosome formation and activity, Alternative splicing, Splicing errors	4
8.	**Gene Mapping**: Genetic mapping, physical mapping, genetic linkage, linkage disequilibrium, DNA finger printing.	4
9.	**Phage Genetics** – T4 phage, Lambda phage, M13 phage, Retrovirus	3

Practical:

1. Isolation of DNA from whole blood
2. Isolation of RNA from Yeast
3. Isolation of DNA from plant tissue
4. Estimation of melting point of DNA
5. DNA amplification by PCR
6. Conjugation in *E. coli*.
7. Transduction in *E. coli*
8. Preparation of competent cells and Bacterial transformation
9. In vitro DNA ligation
10. Restriction digestion
11. DNA finger printing by RFLP analysis
12. Transposon assay

Text Book:

1. David Frifelder, Molecular Biology, Jones &Bartlett Learning, Second Edition.

Reference Books:

1. Genes IX: Lewin
2. Molecular biology of gene: Watson et al Vth edition.
3. Modern Microbial genetics: Uldis streips and Ronald Yasbin.
4. Microbial genetics: Stanley Molay, John Cronan and David Frifelder.
5. Molecular genetics of bacteria: Synder and Champness.
6. Molecular genetics: Stent and Calendar.
7. Principles of Genetics: Snustad and Simmons.
8. Molecular biology of Cell: Alberts et al.