Books: -

S.No.	Name of Books/ Author/Publisher
1.	Chemical Engineering by R.K. Sinnott, J.M. Coulson and J.F. Richardsons. Publisher: Butterworth-Heinemann. Vol-6, Butterworth Heinemann III edition, 2002
2.	Applied Process Design for Chemical and Petrochemical Plants by E.E. Ludwig. Publisher: Butterworth-Heinemann, 2001
3.	Chemical Engineers Handbook by RH. Perry and D.W. Green. Publisher McGrawHill 8th edition, 2008
4.	Process Biotechnology Fundamentals by S.N. Mukhopadhyay. Publisher: Viva Books , 2010
5.	Plant Design and Economics for Chemical Engineers by M. Peters and K. Timmerhaus. Publisher: McGraw-Hill, 2002

POPULATION GENETICS

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Population genetics (BT406)	03	01	00	Nil

Course Objective:

Introduction to population genetics and evolutionary analysis

Course Outcome (CO):

1. Discuss basic scope and promises of population genetics.
2. Identify the population structure using various methods like hardy Weinberg equilibrium and Darwinian selection.
3. Differentiate between population genomics and proteomics.
4. Analyze evolutionary process using quantitative methods.
5. Define unselecting, quantitative traits and developmental constraints.
6. Define the genetic variation in the given population.

S.No.	Content	Contact Hours

1.	**Introduction:** Scope & Premises of Population Genetics, Genetic and Phenotypic Variation Random Mating, Loci and alleles, Mutations and Polymorphisms, Genotype and Allele Frequencies, Effect of Mutations on Fitness, Rate of Spontaneous Mutation	**6**
2.	**Population Structure:** The Hardy-Weinberg Principle, Testing for Hardy-Weinberg Equilibrium, Extensions of the Hardy-Weinberg Principle, Linkage and Linkage Disequilibrium, Genetic Drift, The Wright-Fisher Model of Random Genetic Drift, Effective Population Size, Gene Trees and Coalescence, Mutation, The Neutral Theory, Recombination, Migration, Inbreeding and Heterosis, Darwinian Selection, Selection in Haploid Organisms, Selection in Diploid Organisms Overdominance, More Complex Types of Selection Molecular Population Genetics, Molecular Polymorphisms, Patterns of Change in Nucleotide and Amino Acid Sequences, Polymorphism and Divergence, Molecular Phylogenetics, Transposable Elements, mtDNA, Y-DNA: Separating History from Gene Flow	**8**
3.	**Population Genomics and proteomics:** Genome-Wide Patterns of Polymorphism, Human Population Genetics, Human Polymorphism , Population Genetic Inferences from Human SNPs , Population Structure Inferred from Human Polymorphism, Mendelian Disease and Population Genetics, Genetic Basis for Variation in Risk of Complex Disease, Human Origins	**8**
4.	**Evolutionary Analysis:** Quantitative Genetics, Quantitative Genetics of Natural Populations, Quantitative Trait Loci (QTLs), Types of Quantitative Traits, Genes That Affect Quantitative Traits, the Number of Genes Affecting Quantitative Traits, Methods for Mapping QTLs	**7**
5.	**UniSelection:** Measures of Fitness & Constant Fitness Models, Nonrandom Mating: Identity by descent, Inbreeding; Selection on Quantitative Traits, Pleiotropy and Developmental Constraints, Interactions of selection with other evolutionary forces, The Shifting Balance Theory, The Unit of Selection, Meiotic and Molecular Drive, Sexual, Frequency & Density Dependent Selection.	**6**
6.	**Genetic Variability in Natural Populations:** Introduction, Measures of Genetic Variation, Gene Diversity within Populations- Enzyme and Protein Loci, Blood Groups and other loci; Genetic Diversity in Subdivided Populations, Mechanisms of Maintenance of Protein Polymorphisms: Overdominance hypothesis, Other types of Balancing Selection, Neutral Mutations, Transient Polymorphisms due to selection.	**7**
	Total	42

Books: -

S.No.	**Name of Books/ Author/Publisher**