

B.Sc. Biotechnology 2011 -2012

I Year

I Semester

Maximum Marks: 70; CCE Marks: 30

BT 101 : Biomolecules, Enzymology, Biochemical Techniques and Biophysics

UNIT I

1. Nature of biological material.
2. general properties of organic compounds for generation of structure, storage of energy and information - Peptidoglycans, polysaccharides, membrane lipids , the nucleic acids and the proteins.
3. Classification, structure and roles of biomolecules in bioprocesses
 1. Carbohydrates
 2. Proteins
 3. Lipids
 4. Nucleic Acids

UNIT II

1. Classification of Amino acids based on- solubility, shape, structure and R-groups
2. Physical and Chemical properties , Separation of amino acids
3. Protein structure-Primary, secondary, tertiary and quaternary , Denaturation and renaturation of proteins
4. Structure and functions of fibrous proteins, globular proteins, lipoproteins, metalloproteins, glycoproteins and nucleoproteins

UNIT III

1. Enzymes : Historical perspective, classification, nomenclature, E.C. number
2. Mechanism of enzyme action and properties of enzymes as catalyst
3. Subcellular localization and organization of enzymes
4. Effect of pH, temp, pressure on enzyme activity and enzyme inhibition.

UNIT IV

1. Expression of velocity of enzyme catalyzed reactions - activity, specific activity, turn over number and catalytic centre activity
2. Enzyme kinetics : Rate equation and determination of K_m and V_{max}
3. Enzyme inhibition
4. Energetics of living body, sources of heat limits of temperature, heat dissipation and conservation

UNIT V

1. Lambert Beer's, Spectrophotometry and colorimetry, primary events in photosynthesis .
2. Intra and intermolecular interactions in biological systems. Spatial and charge compatibility as determinant of such interactions.
3. Physical methods applied to find out molecular structure-X ray crystalluography and NMR
4. General spectroscopy-Uv vis, fluorescence, atomic absorption, IR, Raman spectra

PRACTICALS FOR I SEMESTER

BT 102 : Laboratory I

1. Qualitative estimation of carbohydrates
2. Qualitative estimation of lipids
3. Qualitative estimation of proteins
4. Qualitative estimation of RNA
5. Qualitative estimation of DNA
6. Extraction and separation of lipids
7. Assay of enzyme activity
8. Kinetic studies on enzymes
9. Chromatographic methods for separation of macromolecules

B.Sc. Biotechnology
I Year
II Semester

Maximum Marks: 70; CCE Marks: 30

BT 201 : Microbial Techniques & Recombinant DNA Technology

UNIT I

1. Development of microscope (Optical, TEM and SEM)
2. The concept of sterilization, Methods of sterilization (dry heat, wet heat, radiation, chemical and filtration etc.)
3. Concept of microbial species and strain, Genetic homogeneity in clonal populations
4. Measurement of growth-growth curve. Staining methods-gram's staining

UNIT II

1. Classification of microorganisms- by nutrition, shape, extreme environments (the thermophiles, alkalophiles)
2. Nature of the microbial cell surface. Gram positive and gram negative bacteria, kinds of flagella, serotypes
3. Spontaneous and induced variation arising in microbial population
4. Culture techniques, preservation methods.

UNIT III

1. Prokaryotes & Eukaryotic microbial cells
2. Gene transfer in microorganisms
3. Microbial metabolism, fermentation products, a survey of products from microorganism.
4. strain improvement by enrichment, selection and recombinant methods.

UNIT IV

1. Recombinant DNA technology Principle and concept.
2. Features of Cloning vectors for recombinant DNA -
 - Plasmids, • Cosmids • Phagemids
 - Plant and animal viruses
3. RNA, cDNA, RT enzymes and other reagents techniques
4. Purification of and manipulation of DNA from bacteria, plants and animal cells

UNIT V

1. Cloning vectors for *E. coli*, yeast, plants, plant viruses and animal viruses
2. Introduction of DNA into living cells- *E.coli* , plant and animal
3. Application of cloning in gene analysis - Studying clone of specific gene and gene location and structure
4. Gene cloning and expression of foreign gene -• Production of proteins from cloned genes, application of gene cloning in industry and Agriculture.

PRACTICALS FOR II SEMESTER

BT 202 : Laboratory II

1. Cleaning of glassware
2. Preparation of media, cotton plugging and sterilization personal hygiene- microbes
Isolation from air, water and soil samples
3. Dilution and pour plating, colony purification
4. Enumeration of microorganisms, total vs viable counts
7. Identification of isolated bacteria, Gram staining, other staining methods
9. Growth curve of microorganisms
10. Antibiotic sensitivity of microorganisms
11. Test for antibodies against given bacteria
15. Alcoholic and mixed acid fermentation
16. Isolation of DNA from tissues
17. Determination of absorption maxima
18. Isolation of plasmid DNA
19. Competent cell preparation