

# Bhakta Kavi Narsinh Mehta University, Junagadh



## B.Sc. BIOTECHNOLOGY

### (SEMESTER I & II)

**On Effective - 2016**

**Semester-I**

**PAPER BT-101**

**Introduction to Biotechnology and Cell Biology**

**Semester -II**

**PAPER BT-201**

**Fundamentals of Biochemistry**

## **BIOTECHNOLOGY SEMESTER - I**

### **PAPER 1- INTRODUCTION TO BIOTECHNOLOGY AND CELL BIOLOGY**

#### **Unit-1:- INTRODUCTION AND SCOPE OF BIOTECHNOLOGY**

- 1.1 Historical perspective and Definitions of Biotechnology
- 1.2 Current Status of Biotechnology and Future of Biotechnology in Developing World.
- 1.3 Recombinant DNA Technology
- 1.4 Applications of Biotechnology- Agriculture, Medicine & Environment
- 1.5 Ethical and Social Impacts

#### **UNIT-2:- BASIC CONCEPT AND UNDERSTANDING OF CELL**

- 2.1 Concept of Life, Origin and Evolution of Cell and Cell Theory
- 2.2 Cell Structure (organization of plant and animal cell, chemical composition of cell, comparison of plant, animal and prokaryotic cell)
- 2.3 Diversity of Cell Size and Shape
- 2.4 Ultrastructure and Function of Prokaryotic cell and Virus
- 2.5 Microscopic Techniques for Study of Cell

#### **UNIT-3:- STRUCTURE AND FUNCTION OF CELL ORGANELLES**

- 3.1 Cell Wall and Plasma Membrane
- 3.2 Mitochondria and Chloroplast
- 3.3 Endoplasmic Reticulum and Golgi Bodies
- 3.4 Lysosomes, Glyoxisomes and Peroxisomes
- 3.5 Ribosomes

#### **UNIT-4:- NUCLEUS, CELL CYCLE AND CELL DIVISION**

- 4.1 Nucleus
- 4.2 Structure and Ultrastructure of chromosomes
- 4.3 overview of cell cycle
- 4.4 Mitosis and Meiosis
- 4.5 Regulation of cell cycle

#### **UNIT-5:- ADVANCE STUDIES IN CELL BIOLOGY**

- 5.1 Cytoskeleton
- 5.2 Cell Locomotion – Amoeboid, Flagella, Cilia, Cytoplasmic Streaming
- 5.3 Cell – Cell Interaction
- 5.4 Overview of Stem cells
- 5.5 Cancer biology

#### **LIST OF PRACTICALS**

- Exp.1. Introduction to LAB and lab environment

- Exp.2. Preparation of solution
- Exp.3. Staining techniques (Simple and Differential)
- Exp.4. Calibration of stage and ocular micrometer and measurement of given biological samples
- Exp.5. Cytology and histology of various organs (Permanent slides or fresh preparation)
- Exp.6. Preparation of slides showing different stages of cell division – Mitosis and meiosis
- Exp.7. Human Karyotyping
- Exp.8. Preparation of slide of Polytene and Lampbrush chromosomes from drosophila Larvae
- Exp.9. Isolation of chloroplast and microscopic observation
- Exp.10. Observation of bacterial motility by performing hanging drop method
- Exp.11. One day Field visit

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10. Cytogenetics, P.K.Gupta, Rastogi Pub.
11. Basic Biotechnology, Prave Fanst,Sitting & Sukatsch, Panima Pub.
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19. Becker & Hardin, The world of the Cell, Pearson Pub.
20. Desiker, Cell & Development Biology, Dominant Pub.
21. BioInquiry- making connections in Biology, Nancy L. Pruitt,William Surver, John Wiley & Sons
22. Explore Life, Postlethwait J.H., & Hopson J.H., Thomson book Pub.
23. Essential Biology (3rd Edition), Campbell, Reece & Simon,

24. Biotechnology Fundamental & application, S.S.Purohit, Agrobios
25. Analyzing Chromosome, B. Czepulkowski, BIOS Scientific Publishers Ltd
26. Biotechnology, Demystifying the concepts. By David Bourgaize. Alp 2000
27. Introduction to Biotechnology, Brown Campbell priest, Panima Pub. Cell Biology, Sadava, Panima Pub.

## **SEMESTER II**

### **B.SC. (BIOTECHNOLOGY) SYLLABUS**

#### **FUNDAMENTALS OF BIOCHEMISTRY, BIOCOMPUTING AND BIostatISTICS**

##### **Unit 1:- Chemistry of Life: An Introduction**

- 1.1 The Properties of Water
- 1.2 The Properties of Biomolecules
- 1.3 Chemical Bonds/Interactions : Ionic, Covalent, Nonpolar, Polar, Hydrogen Bonds, Hydrophobic Interactions, Vander Wall's Attractive Force
- 1.4 pH, pKa, Acids, Bases and Buffers
- 1.5 Thermodynamics of Biological System : The First Law, The Second Law, The Third Law, Free Energy, ATP and other High Energy Compounds

##### **Unit 2:- The Molecules of Life - I (Carbohydrates)**

- 2.1 Chemistry of Carbohydrates: Functions And Classifications, Monosaccharides: Configuration and Conformation,
- 2.2 Reactions of Monosaccharides and Sugar Derivatives
- 2.3 Disaccharides
- 2.4 Polysaccharides: Classifications and Functions
- 2.5 Glycoconjugates: Proteoglycans, Glycoproteins and Glycolipids

##### **Unit 3:- The Molecules of Life – II (Proteins)**

- 3.1 Amino Acids: Structures, General Properties, Classifications, Nomenclature, Nonstandard Amino Acid (Amino Acid Derivatives)
- 3.2 Proteins: An Overview of Four Levels of Structures in Proteins, Classifications of Proteins, Properties of Proteins, Biologically Important Peptides
- 3.3 Protein folding
- 3.4 DNA-protein and Protein-Protein Interactions
- 3.5 Protein sequencing

##### **Unit 4:-The Molecules of Life – III (Nucleic acids)**

- 4.1 Basic Understanding of Nucleotides, Structure and Properties of Nitrogen Basis, Functions of Nucleotides. Nucleotide Analogs
- 4.2 Nucleic Acids: Historical aspects of DNA as Genetic Material, Semi Conservative Nature of DNA, Chargaff's Rule
- 4.3 Watson and Crick DNA Double Helix Structure, other Types of DNA Structure, Denaturation and Renaturation of DNA
- 4.4 Types of RNA and their Functions, Catalytic RNAs (Ribozymes)
- 4.5 Nucleic acid sequencing

## **UNIT:-5 The Molecules of Life – IV (Lipids and vitamins)**

5.1 Lipids: Classifications of Lipids and Functions of Lipids

5.2 Structure of Fatty Acids, Triacylglycerols, Phospholipids and Steroids

5.3 Functions of Fatty Acids, Triacylglycerols, Phospholipids and Steroids

5.4 Vitamins: Classification, Functions and Sources

5.5 Vitamins: Deficiency Disorders

### **LIST OF PRACTICALS**

Exp.1 Operation of pH meter.

Exp.2 Preparation of buffer

Exp.3 Qualitative tests for carbohydrates

Exp.4 Qualitative tests for Amino acids

Exp.5 Titration curve of amino acids and determination of pI, pK1 and pK2.

Exp.6 Qualitative test for Lipids

Exp.7 Qualitative test for Nucleic acids

Exp.8 Estimation of reducing and non-reducing sugars

Exp.9 Titrimetric analysis of Ascorbic acid

Exp.10 Estimation of Saponification value of Lipids

Exp.11 One day Field visit

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2. Stryer – Biochemistry. W.H. Freeman & Co.
3. Plummer. An introduction to practical Biochemistry, 3rd Edition
4. J. Jayaraman. Lab Manual in Biochemistry.
5. Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
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11. Switzer and Garrity. Experimental Biochemistry WH Freeman. 2nd Edition
12. Hames and Hooper. 2000. Instant notes in Biochemistry. BIOS Sci. Publ.
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