

## OPTIONAL I: PRACTICALS CELL BIOLOGY AND GENETICS

1. Microscopic observation of cells: bacteria, fungi, plant and animal
2. Preparation of different stages of Mitosis (onion root tips)
3. Preparation of different stages of Meiosis (grasshopper testis)
4. Preparation of Polytene chromosome from *Drosophila* salivary gland
5. Monohybrid and dihybrid ratio in *Drosophila*
6. Monohybrid and dihybrid ratio in Maize
7. Problems on co-dominance, epistasis, two point and three point test cross, gene mapping.
8. Statistical applications of Hardy-Weinberg Equilibrium

### Spotters:

1. Prokaryotic Cell (Bacteria)
2. Mitochondria
3. Chloroplast
4. Polytene Chromosomes
5. Test Cross
6. Blood Grouping
7. Hemophilia Pedigree
8. Crossing Over
9. Synaptonemal Complex
10. Nucleosome Model

### REFERENCE BOOKS

1. Cell & Molecular Biology. E.D.D De Robertis & E.M.F De Robertis, Waverly publication
2. An introduction to Genetic Analysis by Anthony, J.F. J.A. Miller, D.T. Suzuki, R.C. Richard Lewontin, W.M-Gilbert, W.H. Freeman publication
3. Principles of Genetics by E.J.Gardner and D.P. Snusted. John Wiley & Sons, New York
4. The science of Genetics, by A.G. Atherly J.R. Girton, J.F. Mcdonald, Saundern College publication
5. Principles of Genetics by R.H. Tamarin McGrawhill
6. Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
7. Molecular Cell Biology Lodish, H., Baltimore, D; fesk, A., Zipursky S.L., Matsudaride, P. and Darnel. American Scientific Books. W.H. Freeman, New York
8. The cell: A molecular approach. Geoffrey M Cooper, Robert E Hausman, ASM press
9. Cell and Molecular Biology, Concepts and Experiments – Gerald Karp, John Wiley & Sons, Inc.
10. Cell Biology And Genetics by P.K. GUPTA

**B.Sc BIOTECHNOLOGY I YEAR**  
**SEMESTER- II**  
**OPTIONAL I (DSC-1B)**  
**BS 204: BIOLOGICAL CHEMISTRY AND MICROBIOLOGY**

**1. Unit: Biomolecules**

- 1.1. Carbohydrates - importance, classification; structure and functions of monosaccharides (glucose & fructose), disaccharides (sucrose, lactose & maltose) and polysaccharides (starch, glycogen & insulin)
- 1.2. Amino acids - importance, classification, structure, physical and chemical properties of amino acids; peptide bond formation
- 1.3. Proteins - importance, structure of proteins- primary, secondary, tertiary and quaternary
- 1.4. Lipids - importance, classification- simple lipids (triacylglycerides & waxes), complex lipids (phospholipids & glycolipids), derived lipids (steroids, terpenes & carotenoids)
- 1.5. Nucleic acids: structure and chemistry of DNA (Watson and crick) and RNA(TMV) structure and forms of DNA (A, B and Z)
- 1.6. Enzymes - importance, classification and nomenclature; Michaelis-Menton Equation, factors influencing the enzyme reactions; enzyme inhibition (competitive, uncompetitive & mixed), co-enzymes

**2. Unit: Bioenergetics**

- 2.1. Glycolysis, Tricarboxylic Acid (TCA) Cycle
- 2.2. Electron Transport, Oxidative Phosphorylation
- 2.3. Gluconeogenesis and its significance
- 2.4. Transamination and Oxidative deamination reactions of amino acids
- 2.5.  $\beta$ -Oxidation of Fatty acids
- 2.6. Glyoxalate cycle.

**3. Unit: Fundamentals of Microbiology**

- 3.1. Historical development of microbiology and contributors of microbiology
- 3.2. Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Fluorescent microscopy, Scanning and Transmission electron microscopy
- 3.3. Outlines of classification of microorganisms
- 3.4. Structure and general characteristics of bacteria and virus
- 3.5. Disease causing pathogens and symptoms (eg: *Mycobacterium*, *Hepatitis*)
- 3.6. Structure and general characteristics of micro-algae and fungi

**4. Unit: Culture and identification of microorganisms**

- 4.1. Methods of sterilization - physical and chemical methods
- 4.2. Bacterial nutrition - nutritional types of bacteria, essential macro, micro nutrients and growth factors.
- 4.3. Bacterial growth curve - batch and continuous cultures, synchronous cultures measurement of bacterial growth-measurement of cell number and cell mass
- 4.4. Factors affecting bacterial growth
- 4.5. Culturing of anaerobic bacteria and viruses
- 4.6. Pure culture and its characteristics