

### **Unit 1: Basic concepts of Cell Biology and Microbiology**

Cell and its types in Eukaryotes, cell and its organelles–structure and function, cell to cell communication, Cell cycle and its regulation, mitosis and meiosis, programmed cell death. Pure culture Techniques, Sterilization Techniques, Morphology, Ultrastructure of Bacteria, Fungi & Viruses, Microbial nutrition, Microbial growth process.

### **Unit 2: Biochemistry and Biochemical Techniques**

Carbohydrates and their classification, Amino acids and their classification, Peptide bond – Structure and conformation. Structure of proteins, naturally occurring peptides. Classification of lipids. Types of fatty acids, triglycerides, structure and biological activity. Principle and procedure of TLC, Ion-exchange Chromatography, Affinity Chromatography, HPLC, GLC. Introduction to spectroscopy, turbidometry, UV-Vis spectrophotometry, atomic spectrophotometry, Principles of Electrophoretic techniques.

### **Unit 3: Immunology**

Innate & Adaptive Immunity, Cells & Organs of Immune System, Complement and their activation, Immunoglobulin classes and sub classes, Antigens, Monoclonal antibodies, Elisa, Western Blotting.

### **Unit 4: Cell culture techniques**

Cellular totipotency, organogenesis, media constituents and their importance, Explant selection and culture, embryo culture, Somatic embryogenesis, isolation and culture of single cell. Protoplast isolation, culture and fusion, media for culturing cells and tissues of animals, culturing, developing and maintenance of different cell types and cryopreservation.

### **Unit 5: Molecular Biotechnology**

Organization of Prokaryotic and Eukaryotic Chromosomes, Central Dogma, DNA Replication – Prokaryotic & Eukaryotic, Protein Synthesis – Prokaryotic & Eukaryotic, restriction enzymes, Vectors in recombinant DNA technology: types of vectors and their applications, construction of genomic and c-DNA libraries, gene transfer techniques.