

Syllabus for Biotechnology

Microbiology

Bacterial identification, nomenclature and classification, New approaches to bacterial taxonomy / classification including ribotyping and ribosomal RNA sequencing

General structure and features, Brief account of all group of bacteria and cyanobacteria, Rickettsia, Chlamydia and Mycoplasma

Archaea : Archaeobacteria and extremophilic microbes – their biotechnological potentials

The definition of growth, growth curve, measurement of growth and growth yields, Culture collection and maintenance of cultures

Different modes of nutrition in bacteria, Sulfate reduction, Nitrogen metabolism – nitrate reduction, nitrifying and denitrifying bacteria, Nitrogen fixation and Microbes used as biofertilizer

Genetics and Molecular Biology

Organization of prokaryotic and eukaryotic genomes, supercoiling, repetitive DNA

DNA replication: Mechanism of replication of Prokaryotic & Eukaryotic Chromosome

Mutation: Types and molecular mechanisms of mutations, mutagens, DNA Repair

Transposition: Mechanisms of transposition, role of transposons in mutation

Gene transfer in prokaryotes: Transformation, conjugation, transduction, construction of genetic maps in bacteria

Biochemistry & Biophysics

Proteins: Protein structure (primary, secondary, tertiary & quaternary), Globular, Fibrous proteins; Ramachandran plot, Circular Dichroism, Hydrophobic and hydrophilic interactions. PAGE, SDS-PAGE, Diagonal Electrophoresis

DNA - protein interactions; DNA-drug interactions

Cell Biology & Virology

Structure and function of organelles (Mitochondria, Chloroplast, Nucleus, Golgi apparatus, Lysosomes, Ribosomes) and Cytoskeletal elements

Cell adhesion

Basic concepts of signal transduction

Transport across biomembranes: facilitated transport, group translocation, Active transport, Na⁺-K⁺ ATPase pump

Biology of the Immune System

Regulation of the immune response: Activation of B and regulation, MHC restriction, Immunological tolerance T-lymphocytes, Cytokines, T-cell

Cell-mediated cytotoxicity : Mechanism of cytotoxic T cells and NK cells mediated target cell lysis, Antibody dependent cell mediated cytotoxicity, macrophage mediated cytotoxicity

Hypersensitivity

Autoimmunity

Enzymology & Enzyme Technology

Classification and nomenclature of enzymes

Steady state kinetics: Methods for estimation of rate of enzyme catalyzed reaction with special reference to Michaelis-Menten equation. Effects of substrate, temperature, pH and inhibitors on enzyme activity and stability

Applications of enzymes

Immobilization of Enzymes