

## SYLLABUS FOR ENTRANCE EXAMINATION MBT-2023

Students appearing for the entrance examination for admission to M.Sc. Biotechnology/M.Sc. Medical Biotechnology/ M.Sc. Bioinformatics, should be thorough with the syllabus studied at Bachelor's level. The syllabus given below may be followed as a general guideline for the entrance test. A brief outline of the subject-wise topics is as follows:

### BOTANY:

Botanical Nomenclature; Classification; Taxonomy; Plant development; Embryogenesis; Types of plant reproduction; Methods of plant improvement; Plant cell biology; Plant genetics; Mutations and Polyploidy; Mendel's experiments and principles of inheritance; Multiple allelism; Quantitative Genetics; Linkage and recombination; Cytoplasmic inheritance; Alterations in genetic make-up: Change at genetic level and in chromosome structure; General account of plant pathogens; Pathogen attack and defense mechanism; Plant disease epidemiology; Plant disease management; Principles of plant protection; Molecular plant pathology; Air-borne biological materials; Analysis of aerospora; Plant genomes; Plant genetic engineering; Plant tissue culture; Fermentation technology; Bio-fuels.

### CELL BIOLOGY & MOLECULAR BIOLOGY

Classification of animals, invertebrates and vertebrates

Structure of prokaryotic and eukaryotic cell, cell organelles, membrane structure and function, cytoskeleton, cell cycle, nucleic acids properties and functions, genetic code, replication, Transcription, Translation; Genetic code; DNA damage and repair. Recombinant DNA technology and Molecular Biology techniques: - Dot-blot hybridization, PCR, Finger printing RFLP, Genome mapping, in-situ hybridization; Animal and plant cell culture: - Techniques and applications; Vaccines; Media for industrial fermentations; Strain improvement; Recovery and purification of fermentation products; Different types of bioreactors; Bio-inoculants; Fermentation processes.

### BIOCHEMISTRY:

Compounds of carbon; Functional groups and their chemistry; Macromolecules:-carbohydrates, lipids, proteins; Enzymes; Vitamins; Concept of molecular weight, molecular mass, their related units; Standard solutions:- Normality, Molarity, pH-calculations; Buffers; Water; Osmosis; Osmotic pressure; Hypertonic-hypotonic-Isotonic solutions; Density gradient; Basics of plant and animal cell:-their structure-function relationships; Basic concepts related to instruments like pH meter, spectrophotometer; Concepts related to potential difference, potential gradient, electrochemical cell, emf.

### MICROBIOLOGY:

General properties and principles of classification of actinomycetes, bacteria, fungi and viruses; Bacterial structure: Nutrition, overview of metabolism, Virus diversity; Virus replication cycle; Medically important bacteria: Staphylococci, Enterobacteria, *Clostridium*, *Pseudomonas* etc ; Epidemiology and public health; Antimicrobials and their mode of action; Principles of microscopy : Types of Microscopes: Bright field, Dark field, Phase contrast ; Antigen-antibody structure, functions and reactions; Innate and adaptive immunity; Organs and cells of immune system; Transformation; Transduction; Conjugation; Plasmids; Industrial Microbiology: Introduction to fermentation process; Preservation and importance of industrially important micro-organisms; Strain Improvement; Media for industrial fermentations; Inoculum development; Bioinoculants; Fermentor design; Instrumentation and control; Types of Bioreactors; Aeration and agitation; Recovery and purification of fermentation products; Effluent treatment; Recombinant DNA Technology: Basic principles of gene cloning; Vectors for gene cloning: plasmids and bacteriophages; DNA modification enzymes; Purification of DNA from living cells; Introduction of DNA into living cells; Techniques use in RDT; Cloning vectors for *E.coli*.

### BIOINFORMATICS:

Basic of Bioinformatics Basic of Computer, Introduction to Programming Languages