Syllabus for
Combined M.Sc Biotechnology and M.Sc Microbiology Entrance Test

The combined M.Sc Biotechnology/ M.Sc Microbiology Entrance examination conducted by the GJUS&T, Hisar will comprise total of 100 objective type questions. The test will be of 90 minutes duration. The syllabus is as follows:

MOLECULES AND THEIR INTERACTION RELAVENT TO BIOLOGY

Structure of atoms, molecules and chemical bonds, Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins)., Stablizing interactions, glycolysis, oxidative phosphorylation, Principles of catalysis, enzymes and enzyme kinetics.

CELLULAR ORGANIZATION

Membrane structure and function: Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps.

Structural organization and function of intracellular organelles. Organization of genes and chromosomes: Operon, structure of chromatin and chromosomes, transposons. Cell division and cell cycle

FUNDAMENTAL PROCESSES

DNA replication, repair and recombination: DNA damage and repair mechanisms, Protein synthesis, Cancer -oncogenes, tumor suppressor genes, apoptosis.

SYSTEM PHYSIOLOGY - PLANT

Photosynthesis, Respiration and photorespiration, Nitrogen metabolism, Plant hormones, Secondary metabolites, Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress, economically important agricultural crops and medicinal plants.

SYSTEM PHYSIOLOGY - ANIMAL

Blood and circulation, Cardiovascular System, Respiratory system, Nervous system, Excretory system, Digestive system, Endocrinology and reproduction.

INHERITANCE BIOLOGY

Mendelian principles, Concept of gene, Extensions of Mendelian principles: Codominance, incomplete dominance, linkage and crossing over, Gene mapping methods, Extra chromosomal inheritance, Microbial genetics, genetic disorders. Mutation: Types, causes and detection, mutant types Recombination: Homologous and non-homologous recombination, including transposition, site-specific recombination.

DIVERSITY OF LIFE FORMS

Principles and methods of taxonomy, biological nomenclature, Levels of structural organization, Outline classification of plants, animals and microorganisms, Organisms of health and agricultural importance- Common parasites and pathogens of humans, domestic animals and crops, The Environment- biotic and abiotic interactions, Habitat and niche, Ecosystem, Environmental pollution; global environmental change; biodiversity, Conservation biology: Principles of conservation. Emergence of evolutionary thoughts: Lamarck; Darwin– concepts of variation.

APPLIED BIOLOGY:

Microbial fermentation and production of small and macro molecules. Application of immunological principles (vaccines, diagnostics). tissue and cell culture methods for plants and animals, Transgenic plants & animals, Bioremediation and phytoremediation, Biosensors.

MICROBIOLOGY:

Introduction - Historical Background and scope, and impact of microbes on human affairs. Difference between Eubacteria, Archaebacteria and Eukaryotes, Pure culture techniques, Sterilization techniques, Principle of Microbial growth & microbial nutrition, Classification of Bacteria, Viruses: General characteristics, Morphology, Classification of plant, animal and bacterial viruses, Cultivation of viruses. Control of Microorganism by Physical & Chemical agents, Microbial Ecology, Role of Microorganisms in foods, agriculture, environment and industry.

INSTRUMENTATION TECHNIQUES:

Microscopic Techniques, Chromatography Techniques, Gel Electrophoresis Techniques, Spectroscopic Techniques etc.

RECOMBINANT DNA TECHNOLOGY:

Introduction- Historical background, Restriction enzymes, Gene cloning, vectors, Polymerase Chain Reaction- basic principle, Applications of PCR in biotechnology, Molecular Markers- types and applications, Construction of molecular maps (genetic and physical maps), DNA chip Technology & Microarrays (a brief account).

ANIMAL BIOTECHNOLOGY:

Transgenic Animals, Immuno-technology, Antigens and antigencity, Active and passive Immunity, Hybridoma technology, ELISA, RIA, Immuno-Diffusion, Immuno-Electrophoresis.

B.Sc level syllabus of physical, organic and inorganic chemistry, Introduction to computer science- Basics and languages

B.Sc level syllabus of Botany- Algae, Fungi, lichens, Bryophytes and Pteridophytes, Gymnosperms, Angiosperms, Plant Pathology- pathogenesis, Host – Parasite Interaction, Plant Disease Management, Symptoms , Causal organism, Disease cycle and Control measures of plant diseases, Embryology, plant anatomy etc, Palaeobotany & Palynology.