

SYLLABUS FOR THE EXAMINATION

▪ B. Sc Biotechnology

i. The test is of 2 hours duration and the test booklet will contain 100 questions carrying 3 marks each. For each correct response, the candidate will get 3 marks. There will be negative marking and for each incorrect response, 1 mark will be deducted from the total score. The maximum marks are 300.

ii. The examination will contain two sections: Section A and Section B. Section A will contain 20 questions covering general aptitude, physics and chemistry. Section B will contain 80 questions from Biology.

General Aptitude:

1	Verbal Ability: English Grammar, Sentence Completion, Verbal Analogies, Word Groups, Instructions, Critical Reasoning, Verbal Deduction, Comprehension.
2	Numerical Ability: Numerical Computation, Numerical Estimation, Numerical Reasoning And Data Interpretation.

Biology:

1	Diversity of Living Organisms: The living world, Biological classification, Plant Kingdom, Animal Kingdom.
2	Structural Organization in Animals and Plants: Morphology, Anatomy of flowering plants, Structural organization in Animals.
3	Cell Structure and Functions: Cell- the unit of life, Biomolecules, Cell cycle and Cell Division.
4	Plant Physiology: Transport in plants, Mineral Nutrition, Photosynthesis in higher plants, Respiration in Plants, Plant growth and Development.
5	Human Physiology: Digestion, absorption, Breathing and gaseous exchange, Body fluids and circulation, Excretory products and their elimination, Locomotion and movement, Neural control and co-ordination, Chemical co-ordination and integration.
6	Reproduction: Reproduction in organisms, sexual reproduction in flowering plants, Human reproduction, reproductive health.
7	Genetics and Evolution: Principles of inheritance and variation, Molecular Basics of Inheritance, Evolution.
8	Biology and Human Welfare: Human health and diseases, Strategies for enhancement in food production, Microbes in Human welfare.
9	Biotechnology and its applications: Biotechnology- principles and processes, Biotechnology and its applications.
10	Ecology and Environment: Organisms and populations, Ecosystem, Biodiversity and its conservation, Environmental issues.

Physics:

1	Physical world and measurement: Physical world, Units and measurements.
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2	Kinematics: Motion in a straight line, motion in a plane.
3	Laws of motion, Work, Energy, Power, Motion of systems of particles and rigid bodies, Gravitation.
4	Properties of Bulk matter: Mechanical properties of solids and fluids, Thermal properties of matter.
5	Thermodynamics, Behavior of perfect gases and kinetic theory of gases.
6	Mechanical waves and ray optics: Oscillations and waves, ray optics.
7	Electrostatics: Electric charges and fields, Electrostatic potential and capacitance.
8	Current Electricity
9	Magnetic effect of Current and Magnetism: Moving charges and magnetism, Magnetism and Matter.
10	Electromagnetic Induction and Alternating Currents, Electromagnetic waves.
11	Optics: Ray optics and optical instruments, wave optics. Dual nature of radiation and matter
12	Atoms and Nuclei, Electronic Devices, Communication systems: Semi-conductor electronics: Materials, devices and simple circuits.

Chemistry:

1	Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity in properties, Chemical Bonding and Molecular structure, States of Matter: Solids, Liquids, Gases, Chemical Thermodynamics and Equilibrium, Redox reactions, Hydrogen, s- block, p-block elements, Organic Chemistry- some basic Principles and Techniques, Hydrocarbons, Environmental Chemistry.
2	Solid State, Solutions, Electrochemistry, Chemical Kinetics, Surface Chemistry, General Principles and processes of isolation of elements, p-block elements, d- and f- block elements, Coordination compounds, Haloalkanes and Haloarenes, Alcohols, phenols and ethers, Aldehydes. Ketones and Carboxylic Acids, Organic compounds containing Nitrogen, Biomolecules, Polymers, Chemistry in Daily Life.

SYLLABUS FOR M.Sc. BIOTECHNOLOGY

General Aptitude:

1	Verbal Ability: English Grammar, Sentence Completion, Verbal Analogies, Word Groups, Instructions, Critical Reasoning, Verbal Deduction, Comprehension.
2	Numerical Ability: Numerical Computation, Numerical Estimation, Numerical

Life Science:

1	Biochemistry and microbiology: Cell structure and function; protein synthesis; genetic code; DNA and RNA; carbohydrate, protein and lipid metabolism; clinical biochemistry; hormones and their functions. Enzymes: classification, nomenclature, kinetics, etc., Metabolism and regulation of: carbohydrates, proteins, fats and nucleic acids, metabolic disorders, Classification and taxonomy of microorganisms; Growth and physiology; Laboratory cultivation of microbes, Method of microbial enumeration; Microbial metabolism, photosynthesis, fermentation, aerobic & anaerobic respiration, Pathogenic microorganisms, Microbial genetics, Microbes in industry, Endotoxins, viruses (enveloped and non-enveloped).
2	Molecular biology & Recombinant DNA Technology: Properties of nucleic acids, chromosomes, DNA replication, damage and repair, gene manipulation, cloning vectors, gene libraries, screening of libraries, gene cloning, applications of Recombinant DNA Technology, PCR, RFLP, Western, Northern and Southern Blotting, microarray technology, DNA fingerprinting, recombinant DNA technology, prokaryotic and eukaryotic expression systems; vectors: plasmids, phages and cosmids. Gene mutation: types of mutation; UV and chemical mutagens; Selection of mutants, Ames test for mutagenesis; Bacterial, yeast, cyanobacteria, fungi genetic system: transformation, conjugation, transduction, recombination, transposon genome shuffling, electroporation, DNA repair and chromosomal aberrations, synthetic biology for production of biochemical and biotech products.
3	Immunology: Cells of the immune system, lymphoid tissues, complement, antibodies, hybridoma technology, applications of monoclonal antibodies, antigen recognition, processing and presentation, cell mediated immunity cytokines, hypersensitivity, vaccine and vaccine technology, autoimmunity, transplantation, immune responses to various infections, immunotechnology, B-cells and T-cells, antibody structure, function and diversity, T-cell receptor, antigen-antibody reaction, complement systems and cytokines, Hypersensitivity, MHC and HLA, Hybridoma, immunodeficiency disease.

General Aptitude:

1	Verbal Ability: English Grammar, Sentence Completion, Verbal Analogies, Word Groups, Instructions, Critical Reasoning, Verbal Deduction, Comprehension.
2	Numerical Ability: Numerical Computation, Numerical Estimation, Numerical Reasoning And Data Interpretation.

Microbiology:

1	Scope and importance of Microbiology, Spontaneous generation-biogenesis theory; Germ theory of diseases; Recent developments of Microbiology.
2	Principles of microscopy. Principles of staining. Culture media. Sterilization methods. Isolation of pure cultures, maintenance and preservation of microbial cultures. Morphology and ultrastructure of typical eubacterial cell.
3	Bacterial classification. Discovery and nature of viruses. TMV, HIV, T4 and lambda phages. Cultivation and assay of phages, plant and animal viruses. Nutritional types of bacteria. Bacterial growth. Respiration. Fermentation. Antibiotics.
4	DNA and RNA structures and their role as genetic materials. Transcription and translation. Lac operon. Bacterial plasmids and transposons. DNA damage and repair mechanisms. Mutations. Gene transfer mechanisms in bacteria. Recombinant DNA technology.
5	Types of immunity. Organs of immune system. Cells of immune system. Antigens. Antibodies. Antigen- antibody reactions. Normal flora of human body. Infection, Disease, Defense mechanisms. Bacterial toxins, virulence and attenuation. Airborne diseases, Food water borne diseases and Blood borne diseases. General principles of diagnostic microbiology. Elements of chemotherapy-therapeutic drugs. Drug resistance.
6	Microorganisms in relation to plant growth. Biological nitrogen fixation, Biofertilizers. Microorganisms of the environment (soil, water and air). Microbial interactions. Microbiology of potable and polluted waters.
7	Microorganisms of food spoilage and their sources. General account of food .preservation. Microorganisms as food – SCP, edible mushrooms. Screening and isolation of industrially useful microbes, strain improvement and fermentation. Fermentor. Immobilization Industrial production of Alcohols, Glutamic acid, Citric acid, vitamin B12, Enzymes, and Antibiotics. Biomolecules: Carbohydrates, aminoacids, proteins, Biochemical techniques.