

Entrance Test Syllabus for Admission to MSc Biochemistry (2025)

Note: The syllabus prescribed for the entrance test has been divided into fifteen units. Each unit carries weightage of four marks. Paper setters are required to set four multiple choice type questions with only one correct or most appropriate answer separately for each unit, giving uniform representation to the whole syllabus contained therein.

Unit 1

- Concept of chemical bonding: ionic, covalent and metallic bonds
- Factors affecting bond formation: electronegativity, electron affinity and ionization energy
- Non-covalent interaction: hydrogen bond, van der Waals force, dipole–dipole interactions, hydrophobic and hydrophilic interactions
- Isomerism: Structural isomerism: Chain, Position and Functional isomerism
Stereoisomerism: Geometrical and Optical isomerism

Unit 2

- Laws of thermodynamics and their application
- Concept of heat reaction, enthalpy
- Entropy and its change in physical processes
- Free energy
- Criteria for thermodynamic equilibrium and spontaneity
- Introduction to electrochemistry, electrolytes and their dissociation, types of electrodes, measurement of EMF of a cell
- Acid base equilibrium

Unit 3

- Importance of water to plant life
- Photosynthesis and its mechanism: Photosystem I and II
- Carbon fixation pathways: C₃, C₄ and CAM pathway
- Photorespiration
- Transpiration mechanism
- Phytohormones: auxin, gibberellin, cytokinin, abscisic acid and ethylene
- Nitrogen fixation in plants
- Plant secondary metabolites: Terpenes, Phenolics and Alkaloids

Unit 4

- Ecology and environmental conservation
- Air Pollution, water pollution and their control
- Conservation and management of biological resources
- Nitrogen, phosphorous and carbon cycle
- Macro- and micronutrients: uptake and role
- Metal toxicity and its impact on biodiversity

Unit 5

- Introduction to microbial systems
- Bacteria: morphology, nutrition and their growth
- Structure, transmission and role of viruses
- Host-microbe interactions: Infection, colonization, pathogenicity
- Pathogen virulence and transmission
- Methods for studying microbes: staining and microscopy
- Importance of microbiology in human health and environment

Unit 6

- Carbohydrates: Structure, classification and properties
- Amino acids: Structure, classifications and isomerism
- Proteins: Structure, classification and properties
- Lipids: Structure, classification and properties
- Nucleic acids: Structure, composition and properties
- Importance of biomolecules in human health

Unit 7

- Enzymes: classification and nomenclature
- Enzyme activity, factors affecting enzyme activity
- Enzyme kinetics: Michaelis Menten equation, Lineweaver-Burk plot
- Enzyme inhibition: competitive, uncompetitive and noncompetitive
- Enzyme regulation: allosteric enzymes
- Mechanism of enzyme action

Unit 8

- Glycolysis, TCA cycle, pentose phosphate pathway, gluconeogenesis
- Glycogen synthesis and breakdown
- Electron transport chain and ATP synthesis
- β -oxidation of fatty acids, biosynthesis of fatty acids
- Transamination and deamination reactions, urea cycle
- Metabolism of purines and pyrimidines

Unit 9

- Structure, composition and functions of cell wall and plasma membrane
- Structure and functions of cell organelles: nucleus, mitochondria, plastids, endoplasmic reticulum, golgi apparatus, lysosomes and ribosomes
- Cell-Cell Interactions
- Composition of extracellular matrix (ECM)
- Cell cycle and its regulation
- Cell death: apoptosis and necrosis

Unit 10

- DNA as genetic material, Central dogma of molecular biology
- Chromatin organization and structure of chromosome
- Replication, transcription, genetic code, translation
- RNA: Structure, function and types of RNAs (mRNA, rRNA, tRNA, lncRNA and miRNA)
- Hereditary, linkage and recombination
- Mutations: types and consequences
- Mendelian laws of genetics

Unit 11

- Safety practices in the laboratory
- Preparation of solutions and buffers
- Spectroscopy: basic concepts and applications
- Chromatography: gel filtration, ion exchange and affinity
- Electrophoresis and its types
- Centrifugation: principle and its applications

Unit 12

Anatomy and physiology of:

- Circulatory system
- Respiratory system
- Digestive system
- Endocrine system

Unit 13

- Basic concept of nutrition: calorific values, balanced diet, BMR and BMI
- Scope of Biochemistry in Medicine
- Clinical significance of aspartate aminotransferase, alanine aminotransferase, creatine kinase, lactate dehydrogenase, alkaline phosphatase, acid phosphatase
- Liver function test (LFT): Estimation of ALT, AST, ALP, AP
- Kidney function test (KFT): Estimation of Creatinine, Bilirubin, Na, K
- Cardiac function tests

Unit 14

- Cells and organs of immune systems
- Antibodies: structure, function and classes
- Types of immunity and immune response (innate, humoral and cell mediated)
- Hypersensitivity
- Infection and immune response
- Immunological techniques: ELISA and RIA

Unit 15

- Recombinant DNA technology: concept and applications
- Restriction endonucleases: types and specificity
- Cell culture: basic concepts
- Types of cloning vectors: plasmid, bacteriophage, cosmid, BACs and YACs
- Polymerase chain reaction (PCR) and types