Department of Biochemistry

(Supported by DST-FIST)

University of Kashmir

(NAAC Accredited A^{++})

Entrance Test Syllabus (NEP 2020)

Two-year M. Sc. Biochemistry Programme

2026 Onwards

Entrance Test Syllabus (NEP 2020) for Two-year PG Biochemistry (2026)

Note: The syllabus prescribed for the entrance test has been divided into 12 (twelve units). Paper setters are required to set 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, vander waals force, dipole –dipole interactions, hydrophobic and hydrophilic interactions
- Isomerism: structural isomerism: chain, position and functional isomerism
  Stereoisomerism: geometrical and optical isomerism

Unit 2

- 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 3

- 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 4

- 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 5

- Laws of thermodynamics and their application
- Concept of heat reaction, enthalpy
- Entropy and its change in physical processes
- Free energy and its significance
- Relation between entropy, enthalpy and free energy
- Criteria for thermodynamic equilibrium and spontaneity

- Energy rich compounds, phosphoryl transfer potential
- Coupled reactions
- Concept of biological oxidation

Unit 6

- 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 7

- 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 tolerance
- Immunological techniques: ELISA and RIA

Unit 8

- 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
- Polymerase chain reaction (PCR) and types

Unit 9

- Circulatory system: physiology and anatomy of heart, cardiac cycle
- Respiratory system: exchange of gases in lungs and tissues
- Digestive system: secretions in digestive tract, digestion and absorption of food
- Nervous system: structure of nervous system-CNS and PNS, mechanism of nerve impulse conduction
- Musculoskeletal system: physiology of muscle, molecular mechanism of contraction

Unit 10

- Mendel's Laws of inheritance
- Concept of alleles
- Gene interactions
- Linkage
- Mutations: gene mutations, chromosomal mutations and their causes and effects
- Genetic disorders: clinical features and karyotype of syndromes
- Methods for identification of genetic disorders

Unit 11

- 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)
- DNA demage and repair mechanism

Unit 12

- 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
- Normal microbial flora