

Syllabus for B.Tech (Biotechnology Only)

PART 1

WEIGHTAGE 70%

Verbal Ability

Vocabulary: Pure and Contextual (Phrasal Verbs, Idioms, Root Words, One word Substitution and Synonyms & Antonyms,) Gramatical Error based questions on (Pronoun and Antecedents, Tenses, Parallel Construction, Conditionals, Subject Verb Agreement), Reading Comprehension, Verbal Reasoning (Parajumbles, Critical Reasoning)

Logical Reasoning

Arrangement (Linear, Circular, Tabular, Any other type), Blood Relation, Grouping and Team Formation, Coding Decoding, Series Completion, Direction Sense, Puzzles, Syllogism, Data Sufficiency, Data Interpretation

Quantitative Ability

Number System, Percentage, Profit Loss, Simple Interest and Compound Interest, Ratio Proportion, Averages, Mixtures and Solutions, Time, Speed and Distance, Time and Work, Basic Algebra, Permutation and Combination, Probability, Set Theory, Clocks, Calendar, Logarithms

PART 2

WEIGHTAGE 30%

Physics

1. Physical World & Measurement

Units, dimensions, significant figures, error analysis

2. Kinematics and Laws of Motion

Motion in 1D & 2D, Newton's laws, friction, circular motion

3. Work, Energy & Power

Work-energy theorem, conservation laws, collisions, power

4. System of Particles & Rigid Body

Centre of mass, momentum, torque, moment of inertia, rotation

5. Gravitation

Gravitational laws, field, potential, satellites

6. Oscillations & Waves

SHM, wave motion, sound waves, Doppler effect

7. Thermodynamics & Kinetic Theory of Gases

Thermal properties, laws of thermodynamics, ideal gases

8. Electrostatics & Current Electricity

Electric fields, potential, capacitance, electric circuits

9. Magnetic Effects of Current & Magnetism

Magnetic fields, forces, magnetic materials

10. Electromagnetic Induction, Alternating Currents & EM Waves

Faraday's laws, AC circuits, transformers, EM spectrum

11. Ray Optics, Wave Optics & Optical Instruments

Reflection, refraction, interference, diffraction, polarization

12. Dual Nature of Matter, Atoms & Nuclei, Electronic Devices & Communication Systems

Photoelectric effect, atomic & nuclear physics, semiconductors, communication basics

Chemistry

1. Chemical Bonding and Molecular Structure

Ionic Bonding, Covalent bonding, Valence bond theory, Molecular Orbital Theory, metallic bonding, hydrogen bonding.

2. Thermodynamics

First law of thermodynamics, Second law of thermodynamics

3. Solutions

molality, molarity, mole fraction, percentage

4. Electrochemistry

Electronic concepts of oxidation and reduction, redox reactions, oxidation number, Electrochemical cells Nernst equation and its applications

5. Chemical Kinetics

order and molecularity of reactions, Rate law, rate constant and its units, differential and integral forms of zero and first-order reactions, their characteristics and half-lives, the effect of temperature on the rate of reactions, Arrhenius theory

6. Classification of Elements and Periodicity in Properties

s, p. d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

7. p-block, d- and f- Block Elements

8. Coordination Compounds

IUPAC nomenclature of mononuclear co-ordination compounds, isomerism, Bonding

9. Some basic Principles of Organic Chemistry

Isomerism, Nomenclature, reaction intermediates, Electronic displacement in a covalent bond, Common types of organic reactions

10. Hydrocarbons

Classification, isomerism, IUPAC nomenclature, Alkanes, Alkenes, Alkynes, Aromatic hydrocarbons

11. Organic Compounds Containing Halogens, Oxygen, nitrogen

General methods of preparation, properties and reactions

12. Biomolecules CARBOHYDRATES, PROTEINS, VITAMINS, NUCLEIC ACIDS

Biology

1. Genetics and Evolution

Mendelian genetics, deviations from Mendelism, blood groups, sex determination, linkage and crossing over, sex-linked inheritance, genetic and chromosomal disorders. DNA/RNA structure, replication, transcription, translation, genetic code, lac operon, genome projects, DNA fingerprinting.

2. Biology and Human Welfare

Human diseases and pathogens, Basics concepts of Immunology, immunity and vaccines, cancer, HIV/AIDS, drug and alcohol abuse. Microbes in food, industry, sewage treatment, bioenergy, biocontrol, bio fertilizers, antibiotics and their proper use.

3. Biotechnology and Its Applications

Recombinant DNA Technology, Tools of genetic engineering (restriction enzymes, vectors, ligases), Gene cloning steps, PCR, gel electrophoresis, DNA isolation, Applications in health: insulin, vaccines, gene therapy, stem cells, Applications in agriculture: GM crops (Bt cotton), Transgenic animals, Biosafety issues, Biopiracy and patents, Reproductive health, STDs, contraception, MTP, infertility and assisted reproductive technologies (IVF, ZIFT, GIFT- basic awareness).

4. Biodiversity and Conservation

Population interactions, population growth, age distribution, Biodiversity concepts, loss and conservation, hotspots, endangered species, protected areas, Ramsar sites.

Fundamental of Computer Science

1. Computational Thinking and Programming

Basics: Variable naming conventions, Data Types, Operators, Control Flow: If-Else statements, Nested loops, for and while loops, break/continue statements, Functions: Built-in vs. User-defined functions, arguments, parameters, and scope (Global vs. Local), Logic & Flow: Predicting outputs for mathematical operations, string manipulations, and array/list handling, Dry Run Proficiency: The ability to trace a variable's value through a loop.

2. Data Structures & Algorithms (Basics)

Searching: Linear Search and Binary Search, Sorting: Bubble Sort and Insertion Sort, Abstract Data Types: Basic understanding of Stacks (LIFO) and Queues (FIFO), Dry Running: Predicting the output of given code snippets (Testing logical accuracy).

3. Database Management (SQL)

Concepts: Introduction to Databases, Keys (Primary, Candidate, Foreign Keys), SQL Commands: CREATE, DROP, ALTER. SELECT, INSERT, UPDATE, DELETE, Functions: Aggregate functions (SUM, AVG, COUNT, MAX, MIN).

4. Logical Reasoning & Pseudo-code

Pattern Recognition: Completing sequences or identifying logical errors in flowcharts, Pseudo-code interpretation: Solving logic-based problems presented in plain English rather than a specific programming language.