Syllabus for B.Tech
(All Branches except Biotechnology)

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 Antecendents, 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**

Mathematics

1. **Sets, Relations, and Functions**
   Sets and their representation; union, intersection, complement and algebraic properties of sets; power set; relations and types of relations; equivalence relations; functions.
2. **Complex Numbers and Quadratic Equations**
   Complex numbers as ordered pairs of real numbers; Argand plane; modulus and argument; quadratic equations in real and complex number systems; relations between roots and coefficients; nature and formation of quadratic equations.
3. **Matrices and Determinants**
   Matrices and their types; determinants of order two and three; area of triangles using determinants; adjoint and inverse of matrices; consistency and solution of simultaneous linear equations using matrices.
4. **Permutations, Combinations, and Binomial Theorem**
   Fundamental principle of counting; permutations and combinations; binomial theorem for positive integral index.
5. **Sequences and Series**
   Arithmetic and geometric progressions; insertion of arithmetic and geometric means.
6. **Trigonometry**
   Trigonometric identities and trigonometric functions; inverse trigonometric functions and their properties.
7. **Limits, Continuity, and Differentiation**
   Real-valued functions and their algebra; limits, continuity and differentiability; derivatives of algebraic, composite and implicit functions; derivatives up to second order, maxima and minima.
8. **Integral Calculus and Differential Equations**
   standard integrals , definite integrals; properties and applications of definite integrals; areas bounded by simple curves; Ordinary differential equations; order and degree; solution by separation of variables.
9. **Coordinate Geometry, Vector Algebra**
   Cartesian coordinate system; distance and section formula; locus; straight lines and their various forms; angle between lines); vectors and scalar and vector products.
10. **Statistics, and Probability**
    Measures of dispersion; mean, median, mode; standard deviation and variance; probability, addition and multiplication theorems; Bayes' theorem.

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.