

UG Programs (BTech all, BTech Lateral all, BSc all)

Syllabus

Subject: Chemistry

1. Structure of Atom: Atomic Models, Dalton's Atomic Theory, Thomson Atomic Model, Rutherford's Atomic Theory, Subatomic Particles, Atomic Structure of Isotopes, Bohr's Atomic Theory, Dual Nature of Matter
2. Classification of Elements and Periodicity in Properties, Genesis of Periodic Classification, Modern periodic table, Classification of elements in the modern periodic table, Periodic properties and their trends
3. Chemical Bonding and Molecular Structure, Lewis Theory, Kossel's Theory, Types of Chemical Bonds, Ionic Bond, Lewis Structures, Bond Characteristics, Redox Reactions
4. Oxidation and Reduction, Oxidizing and Reducing Agents, Identification of Oxidizing and Reducing reagents, Balancing Redox Reaction
5. Solid State, Physical and Chemical Properties of Solids, Solid State Chemistry, Types of Solid States, Amorphous Solid State, Crystalline Solid State
6. Solutions, Characteristic of Solution, Types of Solutions, Properties of Solution, Expression of Concentration of Solutions, Boiling Point Elevation, Depression of Freezing Point, Osmotic Pressure
7. Alcohols, Phenols, and Ethers, Classification, properties, and chemical reactions of Alcohol, Classification, properties, and chemical reactions of Phenol, Classification, Properties, and chemical reactions of Ether,
8. Aldehydes, Ketones, and Carboxylic Acids, Preparation, Properties, Nomenclature, and Uses of Aldehydes, Preparation, Properties, Nomenclature, and Uses of Ketones Preparation, Properties, Nomenclature, and Uses Carboxylic Acids

Subject: Physics

1. Vector, Units and Measurements

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement.

2. Scalar and vectors

Scalar and vector quantities; position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors, relative velocity, Unit vector; resolution of a vector in a plane, rectangular components, Scalar and Vector product of vectors.

3. Friction and Laws of Motion

Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion (recapitulation only). Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces, Static and kinetic friction, laws of friction.

4. Oscillations and Waves

Periodic motion, time period, frequency, displacement as a function of time, periodic functions and their application. Simple harmonic motion (S.H.M) and its equations of motion; phase; oscillations of a loaded spring- restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum.

5. Electrostatics and Current Electricity

Coulomb's law -force between two-point charges, continuous charge distribution. Electric field, electric field due to a point charge, electric field lines, electric dipole, electric dipole moment electric field due to a dipole (on axial and equatorial lines only). Equivalent resistance, Electric resistance, Ohm's law, series and parallel combinations of resistors.

6. Wave Optics

Reflection and refraction of light, lenses, lens formula, Magnification, power of a lens, dispersion of light through a prism. Scattering of light blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: Human eye. Total internal reflection and its applications, optical fibers.

7. Atoms and Nuclei

Nucleus, Isotopes, Isobars, Isotones, Isomers, Nuclear Force, Mass Defect, Nuclear Binding Energy, Radioactivity, Nuclear Fission, Nuclear Reactor.

8. Electronic Devices

Types of Semiconductors, PN junction diode, I-V, characteristics curve in forward and reverse bias, diode as a rectifier; Logic gates (OR, AND, NOT, NAND and NOR).

Syllabus of Mathematics (Common for B. Tech. and B. Sc.)

Unit 1: Sets, Relations, and Functions

Sets and their representation, Union, intersection, and complement of sets and their algebraic properties, Powerset, Relation, types of relations, equivalence relations, Functions; one-one, into and onto functions, the composition of functions.

Unit 2: Complex Numbers

Complex numbers as ordered pairs of reals, Representation of complex numbers in the form $(a+ib)$ and their representation in a plane, Argand diagram. Algebra of complex numbers, modulus and argument (or amplitude) of a complex number, square root of a complex number, Triangle inequality.

Unit 3: Matrices and Determinants

Matrices: Algebra of matrices, types of matrices, and matrices of order two and three, Determinants: Properties of determinants, evaluation of determinants, the area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.

Unit 4: Limit, Continuity and Differentiability

Real-valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse functions, Graphs of simple functions, Limits, continuity, and differentiability. Differentiation of the sum, difference, product, and quotient of two functions, Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order up to two, Rolle's and Lagrange's mean value theorems, Applications of derivatives: Rate of change of quantities, monotonic increasing and decreasing functions, Maxima, and minima of functions of one variable, tangents, and normal.

Unit 5: Integral Calculus

Integral as an antiderivative, Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions, Integration by substitution, by parts, and by partial fractions, Integration using trigonometric identities, Integral as limit of a sum, Evaluation of simple integrals

Unit 6: Coordinate Geometry

Cartesian system of rectangular coordinates in a plane, distance formula, section formula, locus, and its equation, translation of axes, the slope of a line, parallel and

perpendicular lines, intercepts of a line on the coordinate axes, Straight lines: Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines. Distance of a point from a line, equations of internal and external bisectors of angles between two lines, coordinates of the centroid, orthocentre, and circumcentre of a triangle, equation of the family of lines passing through the point of intersection of two lines. Circles, conic sections: Standard form of the equation of a circle, the general form of the equation of a circle, its radius and centre, equation of a circle when the endpoints of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent. Sections of conics, equations of conic sections (parabola, ellipse, and hyperbola) in standard forms, condition for $y = mx + c$ to be a tangent and point (s) of tangency.

Unit 7: Permutations and Combinations

The fundamental principle of counting, Permutation as an arrangement and combination as a selection, The meaning of $P(n,r)$ and $C(n,r)$, simple applications.

Syllabus of Biology for BSc Biotechnology

Unit I cell: cell theory, types of cells prokaryotic and eukaryotic, cell cycle, cell division Mitotic and meiosis

Unit II Principles of inheritance: Mendel's law of inheritance, Mendelian Disorder, Law of dominance, Law of Segregation, Incomplete Dominance, Co- Dominance, Chromosomal disorder

Unit III Molecular basis of Inheritance: Central Dogma, Replication, Transcription, Translation, Human genome project

Unit IV Biodiversity and Conservation:

Species area relationship, Causes of biodiversity losses, Biodiversity conservation- Insitu and exsitu

Unit V Biotechnology- Principle, Process and applications:

Agarose gel electrophoresis, cloning vectors, Recombinant DNA, PCR. Genetic engineering, Gene Therapy

PG Programs (MTech All, MSc all streams)

Syllabus

Quantitative Aptitude: Multiplication, Division, Addition & Subtraction of Real Numbers & Integers, Application of BODMAS, Ration & Proportion, Percentage, Index Number, Simple & Compound Interest, Time & Distance, HCF & LCM, Probability.

Verbal Ability: Reading Comprehension, Error Detection, Cloze Test, Fill in the Blanks, Jumbled word/Paragraphs, Vocabulary & Grammar, One Word Substitution, Idioms and Phrases, Antonyms and Synonyms.

Logical Reasoning: Deductive and Inductive Reasoning, Verbal Reasoning, Analytical Reasoning and Decision Making, Cause and Effect Relationship, Assertion and Reason, Blood Relationship.