Exam Pattern

Section	Subject	Questions	Total_Marks	Duration
1	Critical Thinking and Problem-Solving	40	80	60 minutes
2	Physics, Chemistry and Mathematics / Biology	60	120	90 minutes

UG - Engineering, Pharmacy, B.Optometry

Syllabus

Section 1

Critical Thinking and Problem-Solving

1. Analytical Reasoning
    a. Reading comprehension and inference,
    b. Identification of assumptions, conclusions, and logical fallacies
    c. Argument structure, pattern recognition, and classification of statements

2. Quantitative & Data Reasoning
    a. Interpretation of graphs, tables, charts, and visual patterns
    b. Numerical problem-solving involving ratios, percentages, and arithmetic
    c. Algebraic manipulation, inequalities, and basic equation solving
    d. Mensuration: 2D geometry, perimeters, areas, 3D volumes, and surface area
    e. Commercial mathematics (profit–loss, simple mathematical modelling)

3. Problem-Solving & Situational Analysis
    a. Multi-step reasoning in real-world scenarios
    b. Selection of optimal solutions in constrained situations
    c. Logical synthesis of information across diverse contexts

Section 2

Physics

1) Units, Measurements & Scientific Literacy
    a) SI units, significant figures, errors, and dimensional analysis
2) Mechanics
    a) Kinematics: motion in 1D & 2D, projectile motion, circular motion
    b) Newton's laws, friction, momentum, impulse, and equilibrium
    c) Work, energy, power; conservative/non-conservative forces
    d) Rotational motion, torque, angular momentum, moment of inertia
    e) Gravitation, satellites, escape velocity
3) Properties of Matter
    a) Elasticity, stress–strain
    b) Fluid mechanics: pressure, Pascal's law, Bernoulli's principle, viscosity
    c) Surface tension, capillarity
4) Thermodynamics & Kinetic Theory
    a) Heat transfer (conduction, convection, radiation)
    b) Thermal expansion, calorimetry
    c) Laws of thermodynamics, thermodynamic processes
    d) Kinetic theory of gases, RMS velocity, degrees of freedom
5) Waves & Oscillations
    a) SHM, energy in SHM
    b) Wave motion, sound, superposition, resonance, beats
6) Electricity & Magnetism
    a) Electrostatics: charge, field, potential, Gauss's law
    b) Current electricity: Ohm's law, resistivity, series/parallel circuits, cells
    c) Magnetic effects of current, Ampere's law, Lorentz force
    d) Electromagnetic induction, AC circuits, transformers
7) Optics & Modern Physics
    a) Reflection, refraction, lenses, mirrors, telescopes, microscopes
    b) Wave optics: interference, diffraction, polarization
    c) Dual nature of matter and radiation, photoelectric effect
    d) Atoms & nuclei, radioactivity
    e) Semiconductor devices: diodes, Zener diode, logic gates

Chemistry

1) PHYSICAL CHEMISTRY
    a) Basic Concepts: Mole concept, stoichiometry, chemical equations
    b) Atomic Structure: Bohr model, quantum numbers, orbitals, electronic configuration
    c) Chemical Bonding: Ionic/covalent bonding, VSEPR, hybridization, MO theory
    d) Thermodynamics: First & second law, enthalpy changes, Gibbs energy
    e) Solutions: Concentration terms, colligative properties, Raoult's law
    f) Equilibrium: Chemical & ionic equilibrium, pH, solubility product
    g) Redox & Electrochemistry: Redox reactions, Nernst equation, galvanic/electrolytic cells
    h) Chemical Kinetics: Rate laws, order, molecularity, Arrhenius equation

2) INORGANIC CHEMISTRY
    a) Periodic table & periodicity
    b) p-block elements (Group 13–18)
    c) d- & f-block elements, lanthanoids & actinoids
    d) Coordination compounds: VBT, CFT, nomenclature

3) ORGANIC CHEMISTRY
    a) Purification & characterisation of organic compounds
    b) Basic principles: hybridization, isomerism, electronic effects
    c) Hydrocarbons: alkanes, alkenes, alkynes, aromatic compounds
    d) Organic compounds with halogens, oxygen, and nitrogen
    e) Biomolecules (carbohydrates, proteins, vitamins, nucleic acids)
    f) Principles of Practical Organic Chemistry

Mathematics

1. Sets, Relations & Functions
2. Complex Numbers & Quadratic Equations
3. Matrices & Determinants

4. Permutations & Combinations
5. Binomial Theorem
6. Sequences & Series
7. Limits, Continuity & Differentiability
8. Integral Calculus (indefinite & definite integrals, areas)
9. Ordinary Differential Equations
10. Coordinate Geometry (straight lines, circles, conics)
11. 3D Geometry
12. Vector Algebra
13. Statistics & Probability
14. Trigonometry

Biology

1) Diversity of Life
    a) Classification systems
    b) Plants, animals, microorganisms
2) Cell Biology & Tissues
    a) Cell structure, organelles, and cell division
    b) Plant & animal tissues
3) Human Physiology
    a) Nutrition, digestion, respiration
    b) Circulation, excretion, nervous & endocrine systems
    c) Reproduction & growth
4) Genetics, Evolution & Ecology
    a) Mendelian genetics, inheritance, evolution
    b) Ecosystems, adaptation, environmental biology
5) Microbiology & Health Sciences
    a) Microorganisms & human welfare
    b) Immunity, diseases, hygiene, nutrition