

# Advance Forte Scholarship Test Syllabus

## FOR STUDENTS APPEARING FOR CLASS 11

### PHYSICS

- **Physical World and Measurement:** Scope of physics, units and dimensions, dimensional analysis, significant figures, errors in measurement
- **Kinematics:** Frame of reference, position, velocity, acceleration, motion in straight line, motion in a plane, projectile motion, uniform circular motion
- **Laws of Motion:** Force, inertia, Newton's laws, momentum, impulse, conservation of momentum, equilibrium, friction
- **Work, Energy and Power:** Work done by constant and variable force, kinetic and potential energy, work-energy theorem, power, conservative forces, collision
- **Motion of System of Particles and Rigid Body:** Center of mass, motion of center of mass, torque, angular momentum, equilibrium of rigid body, moment of inertia, theorems of perpendicular and parallel axes, rotational kinetic energy
- **Gravitation:** Kepler's laws, universal law of gravitation, acceleration due to gravity, gravitational potential energy, escape velocity, orbital velocity, satellites, geostationary satellites
- **Properties of Bulk Matter:** Elastic behavior, stress, strain, Hooke's law, Young's modulus, bulk modulus, shear modulus, pressure, Pascal's law, Archimedes' principle, surface tension, viscosity, Bernoulli's theorem
- **Thermodynamics:** Thermal equilibrium, temperature, heat, work, first law, isothermal and adiabatic processes, second law, Carnot engine, reversible and irreversible processes
- **Kinetic Theory of Gases:** Assumptions, pressure of ideal gas, kinetic energy, degrees of freedom, specific heat capacity, mean free path
- **Oscillations and Waves:** Periodic motion, SHM, spring-mass system, pendulum, waves, wave motion, speed, longitudinal and transverse waves, superposition, standing waves, beats, Doppler effect

### CHEMISTRY

- **Some Basic Concepts of Chemistry:** Matter, properties, laws of chemical combinations, Dalton's atomic theory, mole concept, stoichiometry, percentage composition
- **Structure of Atom:** Discovery of electron, proton, neutron, atomic models (Thomson, Rutherford, Bohr), quantum mechanical model, quantum numbers, electronic configuration, aufbau principle, Pauli exclusion principle, Hund's rule
- **Classification of Elements and Periodicity:** Modern periodic law, periodic table, periodic trends (atomic radius, ionization enthalpy, electron gain enthalpy, electronegativity)
- **Chemical Bonding and Molecular Structure:** Ionic bond, covalent bond, Lewis structures, VSEPR theory, valence bond theory, hybridization, molecular orbital theory, hydrogen bonding
- **States of Matter:** Three states, intermolecular forces, gas laws, ideal gas equation, kinetic molecular theory, liquefaction of gases, liquid state
- **Thermodynamics:** System and surroundings, internal energy, enthalpy, first law, Hess's law, standard enthalpy, entropy, Gibbs energy, spontaneity
- **Equilibrium:** Equilibrium in physical and chemical processes, law of mass action, equilibrium constant, Le Chatelier's principle, ionic equilibrium, acids and bases, buffer solutions, solubility product, common ion effect
- **Redox Reactions:** Oxidation number, balancing redox reactions, oxidizing and reducing agents
- **Hydrogen:** Position in periodic table, isotopes, preparation, properties, uses, water, hydrogen peroxide
- **s-Block Elements:** Alkali and alkaline earth metals, general characteristics, properties, uses
- **p-Block Elements:** Group 13 and 14 elements, general characteristics, properties, uses
- **Organic Chemistry - Some Basic Principles:** Introduction, classification, nomenclature, isomerism, electronic displacements, inductive effect, resonance, hyperconjugation, homolytic and heterolytic fission, electrophiles and nucleophiles, carbocations, carbanions, free radicals
- **Hydrocarbons:** Classification, alkanes (nomenclature, preparation, properties, reactions), alkenes (nomenclature, structure, preparation, properties), alkynes (nomenclature, structure, preparation, properties), aromatic hydrocarbons (benzene - structure, preparation, properties)
- **Environmental Chemistry:** Environmental pollution, atmospheric pollution, water pollution, soil pollution, industrial waste

## BIOLOGY (FOR NEET ASPIRANTS)

- **The Living World:** Diversity, taxonomic categories, taxonomical aids
- **Biological Classification:** Five kingdom classification, viruses, viroids, prions, lichens
- **Plant Kingdom:** Algae, bryophytes, pteridophytes, gymnosperms, angiosperms
- **Animal Kingdom:** Basis of classification, non-chordata, chordata
- **Morphology of Flowering Plants:** Root, stem, leaf, inflorescence, flower, fruit, seed, semi-technical description, economic importance
- **Anatomy of Flowering Plants:** Tissues, tissue systems, anatomy of dicot and monocot, secondary growth
- **Structural Organisation in Animals:** Animal tissues, organ systems (frog)
- **Cell - The Unit of Life:** Cell theory, prokaryotic and eukaryotic cells, cell envelope, cell membrane, cell wall, cell organelles, nucleus
- **Biomolecules:** Proteins, carbohydrates, lipids, nucleic acids, enzymes
- **Cell Cycle and Cell Division:** Cell cycle, mitosis, meiosis, significance
- **Transport in Plants:** Movement of water, food and minerals, transpiration, uptake and translocation of mineral nutrients, phloem transport, diffusion, osmosis
- **Mineral Nutrition:** Essential elements, macro and micronutrients, functions, deficiency symptoms, nitrogen metabolism, nitrogen cycle
- **Photosynthesis in Higher Plants:** Photosynthesis as means of autotrophic nutrition, site of photosynthesis, pigments, light and dark reactions, C<sub>3</sub> and C<sub>4</sub> pathways, photorespiration, factors affecting
- **Respiration in Plants:** Glycolysis, fermentation, TCA cycle, electron transport system, aerobic and anaerobic respiration
- **Plant Growth and Development:** Growth regulators, auxin, gibberellin, cytokinin, ethylene, ABA, seed dormancy, vernalization, photoperiodism
- **Digestion and Absorption:** Alimentary canal, digestive glands, digestion, absorption, disorders
- **Breathing and Exchange of Gases:** Respiratory organs, mechanism, exchange of gases, transport of gases, regulation, disorders
- **Body Fluids and Circulation:** Blood, lymph, circulatory pathways, heart, cardiac cycle, ECG, disorders
- **Excretory Products and Their Elimination:** Modes of excretion, human excretory system, urine formation, regulation, disorders
- **Locomotion and Movement:** Types of movement, skeletal system, muscular system, joints, disorders
- **Neural Control and Coordination:** Neuron, nerve impulse, central nervous system, peripheral nervous system, reflex action, sensory reception
- **Chemical Coordination and Integration:** Endocrine glands and hormones, hypo and hyper secretion disorders, mechanism of hormone action

## MATHEMATICS (FOR JEE ASPIRANTS)

- **Sets and Functions:** Sets, relations, types of relations, functions, types of functions, composition, inverse functions
- **Trigonometric Functions:** Angles, trigonometric functions, domain and range, graphs, trigonometric equations
- **Principle of Mathematical Induction:** Principle, applications
- **Complex Numbers and Quadratic Equations:** Complex numbers, algebra of complex numbers, modulus and argument, square root, quadratic equations in complex number system
- **Linear Inequalities:** Algebraic solutions, graphical solution
- **Permutations and Combinations:** Fundamental principle of counting, permutations, combinations
- **Binomial Theorem:** Statement and proof, general and middle term, simple applications
- **Sequence and Series:** Arithmetic progression, geometric progression, arithmetic mean, geometric mean, relation between AM and GM, sum to n terms
- **Straight Lines:** Slope, angle between two lines, distance of a point from a line, equations of lines, general equation
- **Conic Sections:** Sections of a cone, circle, parabola, ellipse, hyperbola, standard equations
- **Introduction to Three Dimensional Geometry:** Coordinate axes and planes, distance between two points
- **Limits and Derivatives:** Limits, limits of trigonometric functions, derivatives, algebra of derivatives, derivatives of polynomial and trigonometric functions
- **Mathematical Reasoning:** Statements, logical operations (and, or, not, implies), understanding implications, validating statements
- **Statistics:** Measures of dispersion, range, mean deviation, variance, standard deviation, analysis of frequency distributions
- **Probability:** Random experiments, outcomes, sample space, events, types of events, probability, addition and multiplication theorems, conditional probability, independent events, total probability, Bayes' theorem

## FOR STUDENTS APPEARING FOR CLASS 12

### PHYSICS

- **Electrostatics:** Electric charges, conductors and insulators, Coulomb's law, electric field, electric flux, Gauss's theorem, electric potential, capacitors, combination of capacitors, energy stored, dielectrics
- **Current Electricity:** Electric current, drift velocity, Ohm's law, resistance, resistivity, series and parallel combinations, Kirchhoff's laws, Wheatstone bridge, meter bridge, potentiometer, cells (EMF, internal resistance)
- **Magnetic Effects of Current and Magnetism:** Biot-Savart law, Ampere's law, solenoid, toroid, moving coil galvanometer, force on current-carrying conductor, force between two parallel conductors, torque on current loop, bar magnet, magnetic field lines, earth's magnetism, magnetic materials
- **Electromagnetic Induction and Alternating Currents:** Faraday's laws, induced EMF, Lenz's law, eddy currents, self and mutual induction, AC generator, AC circuits (LCR), resonance, power in AC, wattless current, LC oscillations, transformers
- **Electromagnetic Waves:** Displacement current, electromagnetic waves, spectrum, characteristics
- **Optics:** Reflection (spherical mirrors), refraction (spherical lenses, lens maker's formula, magnification), total internal reflection, optical instruments, wave optics (Huygen's principle, interference, diffraction, polarization)
- **Dual Nature of Radiation and Matter:** Photoelectric effect, Einstein's equation, particle nature of light, matter waves, de Broglie relation, Davisson-Germer experiment
- **Atoms and Nuclei:** Alpha particle scattering, Rutherford's model, Bohr model, hydrogen spectrum, composition of nucleus, mass defect, binding energy, nuclear fission and fusion, radioactivity (alpha, beta, gamma decay), half-life
- **Electronic Devices:** Semiconductors, p-n junction diode, LED, photodiode, solar cell, Zener diode, transistor, logic gates

### CHEMISTRY

- **Solid State:** Classification, crystalline and amorphous solids, unit cell, crystal lattices, packing efficiency, imperfections, electrical and magnetic properties
- **Solutions:** Types, concentration terms, Raoult's law, colligative properties (vapor pressure lowering, boiling point elevation, freezing point depression, osmotic pressure), abnormal molecular mass, Van't Hoff factor
- **Electrochemistry:** Redox reactions, conductance, Kohlrausch's law, electrolysis, electrochemical cells, Nernst equation, fuel cells, corrosion
- **Chemical Kinetics:** Rate of reaction, factors affecting rate, order and molecularity, integrated rate equations, half-life, Arrhenius equation, collision theory
- **Surface Chemistry:** Adsorption, catalysis, colloids (properties, classification, emulsions)
- **General Principles and Processes of Isolation of Elements:** Concentration, extraction, refining, metallurgy of iron, copper, zinc, aluminum
- **p-Block Elements:** Group 15 (nitrogen family), Group 16 (oxygen family), Group 17 (halogens), Group 18 (noble gases) - preparation, properties, uses, oxides, oxyacids
- **d and f Block Elements:** Electronic configuration, properties, preparation and properties of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and KMnO<sub>4</sub>, lanthanoids, actinoids
- **Coordination Compounds:** Werner's theory, nomenclature, isomerism, bonding (VBT, CFT), magnetic properties, uses
- **Haloalkanes and Haloarenes:** Nomenclature, preparation, properties, reactions, polyhalogen compounds
- **Alcohols, Phenols and Ethers:** Nomenclature, preparation, properties, reactions, uses
- **Aldehydes, Ketones and Carboxylic Acids:** Nomenclature, preparation, properties, reactions, uses
- **Amines:** Classification, nomenclature, preparation, properties, reactions
- **Biomolecules:** Carbohydrates, proteins, vitamins, nucleic acids, enzymes, hormones
- **Polymers:** Classification, types of polymerization, addition and condensation polymers, molecular mass, biodegradable polymers
- **Chemistry in Everyday Life:** Drugs, drug-target interaction, therapeutic action, chemicals in food, cleansing agents

## BIOLOGY (FOR NEET ASPIRANTS)

- **Reproduction in Organisms:** Asexual and sexual reproduction, vegetative reproduction, modes
- **Sexual Reproduction in Flowering Plants:** Pre-fertilization structures and events, pollination, fertilization, post-fertilization structures and events, apomixis, polyembryony
- **Human Reproduction:** Male and female reproductive systems, gametogenesis, menstrual cycle, fertilization, implantation, embryonic development, pregnancy, parturition, lactation
- **Reproductive Health:** Population explosion, birth control, medical termination of pregnancy, sexually transmitted diseases, infertility
- **Principles of Inheritance and Variation:** Mendel's laws, inheritance patterns, chromosomal theory, linkage and crossing over, sex determination, sex-linked inheritance, mutations, genetic disorders
- **Molecular Basis of Inheritance:** DNA structure, replication, transcription, genetic code, translation, gene expression and regulation, genome, human genome project, DNA fingerprinting
- **Evolution:** Origin of life, biological evolution, evidences, theories, Hardy-Weinberg principle, speciation
- **Human Health and Disease:** Common diseases, immunity (types), vaccines, cancer, drugs and alcohol abuse
- **Strategies for Enhancement in Food Production:** Plant breeding, tissue culture, single cell protein, Biofortification
- **Microbes in Human Welfare:** Household products, industrial products, sewage treatment, biogas, biocontrol agents, biofertilizers
- **Biotechnology - Principles and Processes:** Genetic engineering, recombinant DNA technology, tools, processes, PCR
- **Biotechnology and Its Applications:** Application in agriculture, medicine, transgenic animals, biosafety
- **Organisms and Populations:** Habitat and niche, population interactions, population attributes
- **Ecosystem:** Structure, productivity, decomposition, energy flow, ecological pyramids, nutrient cycling, succession
- **Biodiversity and Conservation:** Biodiversity, patterns, importance, loss, conservation
- **Environmental Issues:** Air pollution, water pollution, solid wastes, agrochemicals, radioactive wastes, greenhouse effect, ozone depletion, deforestation

## MATHEMATICS (FOR JEE ASPIRANTS)

- **Relations and Functions:** Types of relations, equivalence relations, one-to-one and onto functions, composition, invertible functions, binary operations
  - **Inverse Trigonometric Functions:** Definition, range, domain, principal value, properties, graphs
  - **Matrices:** Types, operations, transpose, symmetric and skew-symmetric, determinants, adjoint, inverse, applications
  - **Determinants:** Determinant of square matrix, properties, minors and cofactors, adjoint, inverse, applications (solving system of linear equations)
  - **Continuity and Differentiability:** Continuity, differentiability, derivatives of composite functions, chain rule, derivatives of inverse trigonometric functions, implicit functions, logarithmic differentiation, parametric forms, second order derivatives, Rolle's and Lagrange's mean value theorems
  - **Applications of Derivatives:** Rate of change, tangents and normals, increasing and decreasing functions, maxima and minima, approximations
  - **Integrals:** Integration as anti-derivative, methods of integration (substitution, partial fractions, by parts), definite integrals, properties, fundamental theorem of calculus
  - **Applications of the Integrals:** Area under curves, area between curves
  - **Differential Equations:** Order and degree, formation, solution of first order and first degree, separation of variables, homogeneous, linear differential equations
  - **Vector Algebra:** Vectors, direction cosines, addition, scalar and vector products, scalar and vector triple products
  - **Three Dimensional Geometry:** Direction cosines and ratios, equation of a line, angle between lines, shortest distance, equation of a plane, angle between planes, distance from a point to plane
  - **Linear Programming:** Introduction, mathematical formulation, graphical method, feasible and infeasible regions, optimal solution
  - **Probability:** Conditional probability, multiplication theorem, independent events, total probability, Bayes' theorem, random variable, probability distribution, mean and variance, binomial distribution
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## **FOR DROPPERS (12TH PASS)**

**(Class 12 Completed - Comprehensive Revision)**

### **COMPLETE SYLLABUS COVERAGE**

**Class 11 + Class 12 Full Syllabus** (as detailed above for respective streams - JEE or NEET)

## **GENERAL TEST INSTRUCTIONS**

### **Test Pattern**

- **Type:** Multiple Choice Questions (MCQs)
- **Sections:** Subject-wise (Physics, Chemistry, Mathematics/Biology, Mental Ability)
- **Negative Marking:** Yes (typically -1 for incorrect, +4 for correct)
- **Duration:** Varies by class level (2-3.5 hours)

### **Scholarship Benefits**

Based on performance, students will receive:

- Fee waivers (25%, 50%, 75%, 100%)
- Study material support
- Special mentoring sessions
- Performance-based incentives

### **Preparation Strategy**

1. Complete thorough revision of previous class
2. Focus on NCERT textbooks as base
3. Practice numerical and conceptual problems daily
4. Take regular mock tests
5. Maintain formula sheets and revision notes
6. Analyze errors and work on weak areas

**Note:** This syllabus is designed considering that students will be tested on their **PREVIOUS CLASS completed syllabus** to assess their foundation before entering the next class. The difficulty level and question pattern will match competitive exam standards while being age-appropriate.