JEE Main Syllabus for Paper 1 (B.E./B.Tech)

Physics Syllabus

The Physics syllabus covers Mechanics, Thermodynamics, Electrodynamics, Optics, Modern Physics, and more. Key topics include:

- **Physics and Measurement**: Units of measurement, dimensional analysis, significant figures.
- **Kinematics**: Motion in straight line and plane, projectile motion.
- **Laws of Motion**: Newton's laws, friction, circular motion.
- **Work, Energy, and Power**: Conservation laws, potential and kinetic energy.
- **Rotational Motion**: Moment of inertia, torque, angular momentum.
- **Gravitation**: Universal law, gravitational potential, escape velocity.
- **Properties of Solids and Liquids**: Elasticity, viscosity, surface tension.
- **Thermodynamics**: Laws of thermodynamics, heat transfer.
- **Kinetic Theory of Gases**: Ideal gas equation, kinetic energy.
- **Oscillations and Waves**: Simple harmonic motion, wave motion, Doppler effect.
- **Electrostatics**: Coulomb's law, electric field, potential, capacitors.
- **Current Electricity**: Ohm's law, Kirchhoff's laws, electrical instruments.
- **Magnetic Effects of Current and Magnetism**: Biot-Savart law, Ampere's law, magnetic materials.
- **Electromagnetic Induction and Alternating Currents**: Faraday's law, LCR circuits.
- **Electromagnetic Waves**: Electromagnetic spectrum.
- **Optics**: Ray optics, wave optics, optical instruments.
- **Dual Nature of Matter and Radiation**: Photoelectric effect, de Broglie wavelength.
- **Atoms and Nuclei**: Atomic models, radioactivity, nuclear reactions.
- **Electronic Devices**: Semiconductors, diodes, transistors.
- **Communication Systems**: Modulation, bandwidth, satellite communication.

Chemistry Syllabus

Chemistry is divided into Physical, Inorganic, and Organic sections, emphasizing fundamentals and applications.

Physical Chemistry

- **Some Basic Concepts in Chemistry**: Matter, mole concept, stoichiometry.
- **Atomic Structure**: Bohr model, quantum numbers, electronic configuration.
- **Chemical Bonding and Molecular Structure**: Ionic and covalent bonds, VSEPR theory.
- **Chemical Thermodynamics**: Enthalpy, entropy, Gibbs free energy.
- **Solutions**: Concentration terms, colligative properties.
- **Equilibrium**: Chemical and ionic equilibrium, Le Chatelier's principle.
- **Redox Reactions and Electrochemistry**: Oxidation numbers, Nernst equation.
- **Chemical Kinetics**: Rate laws, Arrhenius equation.

Inorganic Chemistry

- **Classification of Elements and Periodicity**: Periodic trends.
- **P-Block Elements**: Group 13 to 18 elements, compounds.
- **D- and F-Block Elements**: Transition metals, lanthanoids, actinoids.
- **Coordination Compounds**: Werner's theory, isomerism.
- **Environmental Chemistry**: Pollutants, greenhouse effect.

Organic Chemistry

- **Purification and Characterization of Organic Compounds**: Methods, qualitative analysis.
- **Some Basic Principles of Organic Chemistry**: Nomenclature, isomerism.
- **Hydrocarbons**: Alkanes, alkenes, alkynes, aromatic hydrocarbons.
- **Organic Compounds Containing Halogens**: Haloalkanes, haloarenes.
- **Organic Compounds Containing Oxygen**: Alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids.
- **Organic Compounds Containing Nitrogen**: Amines, diazonium salts.
- **Biomolecules**: Carbohydrates, proteins, nucleic acids.
- **Principles Related to Practical Chemistry**: Detection of elements, preparations.

Mathematics Syllabus

Mathematics focuses on Algebra, Calculus, Coordinate Geometry, Trigonometry, and Vectors.

- **Sets, Relations, and Functions**: Types of functions, equivalence relations.
- **Complex Numbers and Quadratic Equations**: Argand plane, quadratic roots.
- **Matrices and Determinants**: Operations, inverse, applications.
- **Permutations and Combinations**: Fundamental principle, binomial theorem.
- **Binomial Theorem and Its Simple Applications**: General term, expansions.
- **Sequences and Series**: AP, GP, HP, sums.
- **Limit, Continuity, and Differentiability**: Limits, derivatives, Rolle's theorem.
- **Integral Calculus**: Indefinite and definite integrals, area under curves.
- **Differential Equations**: Order, degree, solutions.
- **Coordinate Geometry**: Straight lines, circles, conic sections.
- **Three Dimensional Geometry**: Direction cosines, planes, lines.
- **Vector Algebra**: Scalar and vector products, applications.
- **Statistics and Probability**: Mean, variance, Bayes' theorem.
- **Trigonometry**: Identities, equations, heights and distances.
- **Mathematical Reasoning**: Statements, logical operations.

Preparation Tips

- Focus on NCERT textbooks for Class 11 and 12 as the base.
- Practice previous years' papers and mock tests to understand the pattern.
- Revise formulas and concepts regularly.
- The syllabus may be subject to minor changes; always check official notifications.