



MEER SIR ACADEMY

Building Engineers for Tomorrow

JEE MAIN 2027

Complete Syllabus — Physics, Chemistry & Mathematics

Important note: NTA has not yet released a separate JEE Main 2027 information bulletin or syllabus PDF as of this document's preparation. The syllabus below is based on the latest officially available NTA JEE Main syllabus (used for JEE Main 2026), which has historically carried over from year to year with no major changes. Students should treat this as the current working syllabus for JEE Main 2027 preparation and cross-check with the official NTA website (jeemain.nta.nic.in) once the 2027 bulletin is released.

Exam Pattern Overview

Paper 1 (B.E./B.Tech) is a computer-based test of 3 hours duration, with equal weightage given to Mathematics, Physics, and Chemistry. Each subject contributes 100 marks, for a total of 300 marks.

Subject	Section A (MCQ)	Section B (Numerical)	Total Questions	Marks
Mathematics	20	5 (out of 10, attempt any 5)	25	100
Physics	20	5 (out of 10, attempt any 5)	25	100
Chemistry	20	5 (out of 10, attempt any 5)	25	100
Total	60	15	75	300

Marking scheme: +4 for each correct answer; -1 for each incorrect MCQ response; 0 for unattempted questions. For numerical (Section B) questions, +4 for correct and 0 for incorrect/unattempted — no negative marking in Section B.

Mathematics Syllabus

Chapter-Wise List

S.No	Chapter / Unit Name
1	Sets, Relations and Functions
2	Complex Numbers and Quadratic Equations
3	Matrices and Determinants

4	Permutations and Combinations
5	Binomial Theorem and its Simple Applications
6	Sequence and Series
7	Limit, Continuity and Differentiability
8	Integral Calculus
9	Differential Equations
10	Coordinate Geometry
11	Three-Dimensional Geometry
12	Vector Algebra
13	Statistics and Probability
14	Trigonometry



Unit-Wise Detailed Topics

Unit	Topics Covered
1. Sets, Relations and Functions	Sets and representation; union, intersection and complement of sets and their algebraic properties; power set; relations and types of relations; equivalence relations; functions; one-one, into and onto functions; composition of functions.
2. Complex Numbers & Quadratic Equations	Complex numbers as ordered pairs of reals; representation in the form $a+ib$ and in a plane; Argand diagram; algebra of complex numbers; modulus and argument; quadratic equations in real and complex number systems; relations between roots and coefficients; nature of roots; formation of equations with given roots.
3. Matrices and Determinants	Matrices, algebra of matrices, types of matrices; determinants and matrices of order 2 and 3; evaluation of determinants; area of triangle using determinants; adjoint and inverse of a square matrix; consistency and solution of linear equations using matrices.
4. Permutations and Combinations	Fundamental principle of counting; permutations and combinations; meaning of $P(n,r)$ and $C(n,r)$; simple applications.
5. Binomial Theorem	Binomial theorem for a positive integral index; general term; middle term; simple applications.
6. Sequence and Series	Arithmetic progression, geometric progression; insertion of arithmetic and geometric means between two numbers; relation between A.M. and G.M.
7. Limit, Continuity & Differentiability	Real-valued functions, algebra of functions; polynomial, rational, trigonometric, logarithmic and exponential functions; inverse functions; limits, continuity and differentiability; differentiation of sum, difference, product, quotient; differentiation of composite/implicit functions; derivatives up to order two; applications — rate of change, increasing/decreasing functions, maxima and minima.

8. Integral Calculus	Integral as anti-derivative; standard integrals of algebraic, trigonometric, exponential and logarithmic functions; integration by substitution, parts and partial fractions; fundamental theorem of calculus; properties and evaluation of definite integrals; area under simple curves.
9. Differential Equations	Ordinary differential equations, order and degree; solution by separation of variables; homogeneous and linear first-order differential equations of type $dy/dx + P(x)y = Q(x)$.
10. Coordinate Geometry	Cartesian coordinates; distance and section formula; locus; slope, parallel/perpendicular lines; forms of a straight line; angle between lines; distance of a point from a line; centroid, orthocentre, circumcentre; equation of a circle; conic sections — parabola, ellipse, hyperbola in standard forms.
11. Three Dimensional Geometry	Coordinates of a point in space; distance between points; section formula; direction ratios and cosines; angle between two lines; equation of a line; skew lines and shortest distance.
12. Vector Algebra	Vectors and scalars; addition of vectors; components in 2-D and 3-D; scalar (dot) product; vector (cross) product.
13. Statistics and Probability	Measures of dispersion; mean, median, mode of grouped/ungrouped data; standard deviation, variance, mean deviation; probability of an event; addition and multiplication theorems; Bayes' theorem; probability distribution of a random variable.
14. Trigonometry	Trigonometric identities and functions; inverse trigonometric functions and their properties.

Physics Syllabus

Chapter-Wise List

S.No	Chapter / Unit Name
1	Units and Measurements
2	Kinematics
3	Laws of Motion
4	Work, Energy and Power
5	Rotational Motion
6	Gravitation
7	Properties of Solids and Liquids
8	Thermodynamics
9	Kinetic Theory of Gases
10	Oscillations and Waves
11	Electrostatics

12	Current Electricity
13	Magnetic Effects of Current and Magnetism
14	Electromagnetic Induction and Alternating Currents
15	Electromagnetic Waves
16	Optics
17	Dual Nature of Matter and Radiation
18	Atoms and Nuclei
19	Electronic Devices
20	Experimental Skills



Unit-Wise Detailed Topics

Unit	Topics Covered
1. Units and Measurements	Units of measurement, SI units; fundamental and derived units; least count; significant figures; errors in measurement; dimensions and dimensional analysis and its applications.
2. Kinematics	Frame of reference; motion in a straight line; speed and velocity; uniform/non-uniform motion; velocity-time and position-time graphs; relative velocity; motion in a plane; projectile motion; uniform circular motion.
3. Laws of Motion	Force and inertia; Newton's laws of motion; momentum and impulse; conservation of linear momentum; equilibrium of concurrent forces; static and kinetic friction; dynamics of uniform circular motion — vehicle on level and banked road.
4. Work, Energy and Power	Work by constant and variable force; kinetic and potential energy; work-energy theorem; power; conservation of mechanical energy; conservative and non-conservative forces; elastic and inelastic collisions in one and two dimensions.
5. Rotational Motion	Centre of mass; torque and angular momentum and their conservation; moment of inertia and radius of gyration; parallel and perpendicular axes theorems; equilibrium of rigid bodies; equations of rotational motion.
6. Gravitation	Universal law of gravitation; acceleration due to gravity and variation with altitude/depth; Kepler's laws; gravitational potential energy and potential; escape velocity; orbital velocity, time period and energy of a satellite.
7. Properties of Solids and Liquids	Elastic behaviour, stress-strain, Hooke's law, Young's/bulk/rigidity modulus; fluid pressure, Pascal's law; viscosity, Stoke's law, terminal velocity; streamline/turbulent flow, Bernoulli's principle; surface tension and applications; heat, thermal expansion, specific heat, calorimetry, latent heat, modes of heat transfer.
8. Thermodynamics	Thermal equilibrium and zeroth law; heat, work and internal energy; first law of thermodynamics; isothermal and adiabatic processes; second law of thermodynamics; reversible and irreversible processes.

9. Kinetic Theory of Gases	Equation of state of a perfect gas; kinetic theory assumptions; concept of pressure; kinetic interpretation of temperature; RMS speed; degrees of freedom and law of equipartition of energy; mean free path; Avogadro's number.
10. Oscillations and Waves	Periodic motion, SHM and its equation; energy in SHM; simple pendulum; wave motion — longitudinal and transverse; speed of waves; principle of superposition; standing waves in strings and organ pipes; beats.
11. Electrostatics	Coulomb's law; electric field and field lines; electric dipole; Gauss's law and applications; electric potential and potential energy; capacitors and capacitance, energy stored in a capacitor.
12. Current Electricity	Drift velocity, mobility; Ohm's law; resistance, resistivity, conductivity; series-parallel combination of resistors; Kirchhoff's laws; Wheatstone bridge and metre bridge; emf and internal resistance of a cell.
13. Magnetic Effects of Current and Magnetism	Biot-Savart law; Ampere's law; force on a moving charge and current-carrying conductor; force between parallel conductors; moving coil galvanometer; magnetic dipole moment; bar magnet; para-, dia- and ferromagnetism.
14. Electromagnetic Induction and AC	Faraday's law, Lenz's law, eddy currents; self and mutual inductance; alternating current, RMS and peak values; LCR series circuit and resonance; AC generator and transformer.
15. Electromagnetic Waves	Displacement current; characteristics of EM waves; electromagnetic spectrum and applications.
16. Optics	Reflection and refraction, mirror and lens formulae; total internal reflection; prism; microscope and telescope; wave optics — Huygens' principle, interference (YDSE), diffraction, polarization.
17. Dual Nature of Matter and Radiation	Photoelectric effect, Einstein's photoelectric equation; de Broglie relation and matter waves.
18. Atoms and Nuclei	Alpha-particle scattering, Rutherford and Bohr models; hydrogen spectrum; nuclear composition, mass-energy relation, binding energy; nuclear fission and fusion.
19. Electronic Devices	Semiconductors, p-n junction diode, I-V characteristics; diode as rectifier; LED, photodiode, solar cell, Zener diode as voltage regulator; logic gates (OR, AND, NOT, NAND, NOR).
20. Experimental Skills	Familiarity with laboratory apparatus, use of vernier callipers and screw gauge, measurement of resistance and internal resistance, verification of laws, plotting graphs.

Chemistry Syllabus

Physical Chemistry — Chapter List

S.No	Chapter / Unit Name
1	Some Basic Concepts in Chemistry
2	Atomic Structure

3	Chemical Bonding and Molecular Structure
4	Chemical Thermodynamics
5	Solutions
6	Equilibrium
7	Redox Reactions and Electrochemistry
8	Chemical Kinetics



Inorganic Chemistry — Chapter List

S.No	Chapter / Unit Name
9	Classification of Elements and Periodicity in Properties
10	p-Block Elements
11	d- and f-Block Elements
12	Coordination Compounds

Organic Chemistry — Chapter List

S.No	Chapter / Unit Name
13	Purification and Characterisation of Organic Compounds
14	Some Basic Principles of Organic Chemistry
15	Hydrocarbons
16	Organic Compounds Containing Halogens
17	Organic Compounds Containing Oxygen
18	Organic Compounds Containing Nitrogen
19	Biomolecules
20	Principles Related to Practical Chemistry

Unit-Wise Detailed Topics

Unit	Topics Covered
1. Some Basic Concepts in Chemistry	Matter and its nature, Dalton's atomic theory; atoms, molecules, elements, compounds; laws of chemical combination; atomic/molecular masses; mole concept, molar mass; percentage composition; empirical and molecular formula; stoichiometry.
2. Atomic Structure	Electromagnetic radiation, photoelectric effect, hydrogen spectrum; Bohr model and its limitations; dual nature of matter, de Broglie relation, Heisenberg uncertainty principle; quantum mechanical model, atomic orbitals, quantum numbers, shapes of s/p/d orbitals; Aufbau principle, Pauli exclusion principle, Hund's rule; electronic configuration.

3. Chemical Bonding and Molecular Structure	Ionic and covalent bonds, lattice enthalpy; electronegativity, dipole moment; VSEPR theory and molecular shapes; valence bond theory, hybridisation; resonance; molecular orbital theory, bond order; hydrogen bonding.
4. Chemical Thermodynamics	System and surroundings; state functions, entropy; first law of thermodynamics — work, heat, internal energy, enthalpy; Hess's law; second law of thermodynamics, Gibbs energy and spontaneity.
5. Solutions	Concentration terms — molality, molarity, mole fraction; Raoult's law; ideal and non-ideal solutions; colligative properties — vapour pressure lowering, boiling point elevation, freezing point depression, osmotic pressure; van't Hoff factor.
6. Equilibrium	Physical and chemical equilibrium; law of chemical equilibrium, K_p and K_c ; Le Chatelier's principle; ionic equilibrium — Arrhenius, Bronsted-Lowry and Lewis acid-base concepts; pH, common ion effect, hydrolysis, solubility product, buffer solutions.
7. Redox Reactions and Electrochemistry	Oxidation and reduction, oxidation number, balancing redox reactions; electrolytic and metallic conduction; molar conductivity, Kohlrausch's law; electrode potential, Nernst equation; galvanic cells; dry cell, lead accumulator, fuel cells.
8. Chemical Kinetics	Rate of reaction and factors affecting it; order and molecularity; rate law and rate constant; zero and first order reactions; Arrhenius equation, activation energy; collision theory.
9. Classification of Elements & Periodicity	Modern periodic law and periodic table; s, p, d, f block elements; periodic trends — atomic/ionic radii, ionisation enthalpy, electron gain enthalpy, valence, oxidation states.
10. p-Block Elements	Groups 13 to 18 — electronic configuration, trends in physical and chemical properties, anomalous behaviour of first member of each group.
11. d- and f-Block Elements	Transition elements — electronic configuration, oxidation states, colour, catalytic and magnetic properties, complex formation, alloy formation; preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$; lanthanoids and actinoids.
12. Coordination Compounds	Werner's theory; ligands, coordination number, denticity, chelation; IUPAC nomenclature; isomerism; valence bond and crystal field theory; colour, magnetic properties; applications in extraction of metals and biological systems.
13. Purification & Characterisation of Organic Compounds	Crystallisation, sublimation, distillation, chromatography; qualitative analysis for N, S, P, halogens; quantitative estimation and empirical/molecular formula calculations.
14. Basic Principles of Organic Chemistry	Tetravalency of carbon; classification and nomenclature; structural and stereoisomerism; homolytic/heterolytic bond fission; carbocations, carbanions, free radicals; inductive, electromeric and resonance effects, hyperconjugation; substitution, addition, elimination and rearrangement reactions.
15. Hydrocarbons	Alkanes, alkenes, alkynes — preparation, properties, reaction mechanisms (halogenation, electrophilic addition, Markovnikov's rule); aromatic hydrocarbons — benzene structure, aromaticity, electrophilic substitution.
16. Organic Compounds Containing Halogens	Preparation, properties and reactions of haloalkanes/haloarenes; nature of C-X bond; environmental effects of chloroform, iodoform, freons, DDT.



17. Organic Compounds Containing Oxygen	Alcohols, phenols, ethers, aldehydes, ketones and carboxylic acids — preparation, properties, key name reactions (aldol, Cannizzaro, haloform), acidity trends.
18. Organic Compounds Containing Nitrogen	Amines — classification, basic character, preparation; diazonium salts and their synthetic importance.
19. Biomolecules	Carbohydrates, proteins (amino acids, peptide bond, protein structure), enzymes, vitamins, nucleic acids (DNA, RNA), hormones.
20. Practical Chemistry Principles	Detection of extra elements; chemistry involved in common titrations and qualitative salt analysis; laboratory principles relevant to preparations and tests.

High-Weightage Chapters (Priority Focus)

Based on trends from previous years' JEE Main papers, the following chapters typically carry the highest weightage. While the entire syllabus must be covered, prioritise these during revision.

Mathematics

- Calculus: Limits, Continuity & Differentiability; Integral Calculus; Differential Equations
- Coordinate Geometry: Straight Lines, Circles, Parabola, Ellipse, Hyperbola
- Vector & 3D Geometry
- Algebra: Complex Numbers, Matrices & Determinants, Sequences & Series, Permutations & Combinations, Probability

Physics

- Mechanics: Kinematics, Laws of Motion, Work-Energy-Power, Rotational Motion, Gravitation
- Electricity & Magnetism: Electrostatics, Current Electricity, Magnetic Effects, EMI & AC
- Waves, Optics & Modern Physics: Oscillations & Waves, Ray & Wave Optics, Dual Nature, Atoms & Nuclei, Electronic Devices

Chemistry

- Physical: Mole Concept, Atomic Structure, Chemical Bonding, Thermodynamics, Equilibrium, Electrochemistry, Kinetics
- Inorganic: Periodicity, p-Block, d- & f-Block, Coordination Compounds
- Organic: Basic Principles, Hydrocarbons, Halogens/Oxygen/Nitrogen compounds, Biomolecules

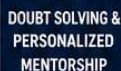
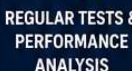
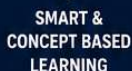
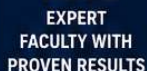
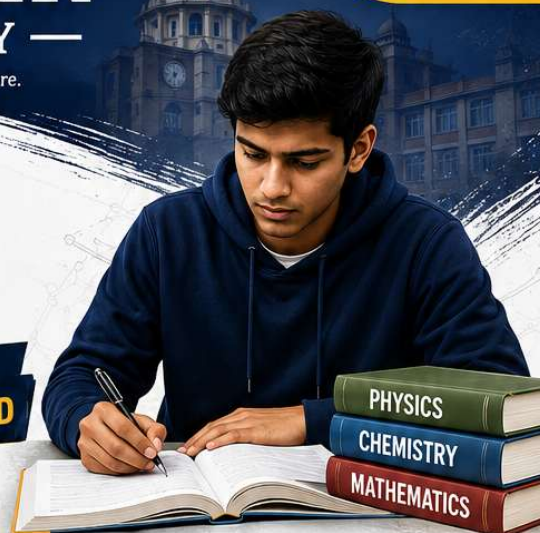
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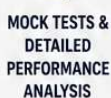
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LEADS TO A BRIGHT ENGINEERING TOMORROW!

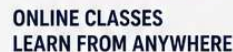
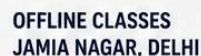


START EARLY
STAY AHEAD
Be the Topper!

**COMPLETE
SYLLABUS
COVERAGE
JEE MAINS &
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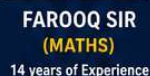
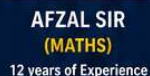


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