Strategic Six-Month Pedagogical Framework and Week-by-Week Curriculum for IIT JEE Preparation

The Indian Institute of Technology Joint Entrance Examination (IIT JEE) represents one of the most intellectually rigorous undergraduate engineering entrance assessments globally, demanding a simultaneous command of deep conceptual theory, analytical adaptability, and rapid computational execution under strict temporal constraints. Designing an effective six-month curriculum requires a structured pedagogical framework capable of converting a 26-week timeframe into an intensive mastery timeline. Recent empirical analyses of JEE examination patterns reveal an accelerating shift away from isolated, single-concept recall toward integrated, multi-concept problems spanning multiple domains within a single question. Furthermore, recent structural revisions to the examination blueprint have placed heightened importance on foundational mechanics, functional calculus, spatial coordinate geometry, reaction mechanisms, coordination chemistry, and empirical laboratory techniques.

To address these requirements, this curriculum organizes the 26-week duration into three synchronized pedagogical phases designed to prevent compartmentalization and build progressive cognitive stamina.

Phase I, covering Weeks 1 through 18, establishes core theoretical frameworks and foundational problem-solving capabilities across the primary domains of classical mechanics, thermodynamic systems, chemical bonding, reaction kinetics, foundational algebra, and differential-integral calculus.

Phase II, spanning Weeks 19 through 22, synthesizes these fundamentals into advanced applications, cross-linking coordinate geometry with calculus, electrodynamics with vector analysis, and thermodynamic concepts across both Physics and Physical Chemistry.

Phase III, encompassing Weeks 23 through 26, shifts the operational focus toward multi-variable synthesis, laboratory experimental principles, full-syllabus proctored test simulations, and precision error analysis.

A sustained workload of 10 to 12 hours of focused daily academic engagement underpins this structure. This time is divided into three 2.5-hour core blocks for each subject, where theoretical derivation is immediately reinforced through guided problem sets. An additional two-hour daily block is dedicated to independent past-year question (PYQ) solving under timed conditions, ensuring familiarity with testing patterns. The remaining hour is allocated to an active mistake-log deconstruction and spaced retrieval, preventing the decay of previously learned material. By coordinating the academic pacing across all three disciplines—such as aligning spatial vectors in Mathematics with electrostatics and kinematics in Physics—the curriculum maximizes conceptual reinforcement and optimizes study efficiency.

Physics Longitudinal Curriculum

Physics in the IIT JEE evaluates an aspirant's capacity to translate physical phenomena into

rigorous mathematical formulations. Historical exam distributions indicate that while classical mechanics establishes the fundamental analytical reasoning required for the discipline, modern physics, electrodynamics, optics, and thermodynamics account for over 50% of the aggregate scoring potential. Modern physics and wave optics offer a notably high return on preparation time due to their structured problem typologies and predictable frequency across both examination sessions. In accordance with updated examination specifications, experimental physics skills—ranging from screw gauges and vernier calipers to resonance tubes and meter bridges—are integrated directly into their corresponding theoretical units rather than treated as isolated topics.

Week-wise Number	Topics for that Week	Daily Work to be Done	Assignment for that Week	Milestone of the Topics Covered for that Week
Week 01	Units and Measurements , SI Units, Dimensional Analysis and Applications, Errors in Measurement, Least Count, Significant Figures, Vernier Calipers, Screw Gauge	Master formulas and tools	Units, dimensions, instruments	Error analysis mastered
Week 02	Kinematics in One and Two Dimensions: Rectilinear Motion, Graphs (x-t, v-t, a-t), Relative Velocity in 1D, Projectile Motion	Sketch graphs, solve vectors	Kinematics in two dimensions	Motion concepts clarified

	(Horizontal and Inclined Planes)			
Week 03	Laws of Motion: Newton's Laws, Inertia, Momentum, Impulse, Free Body Diagrams, Constraint Relations (Strings, Pulleys, Wedges), Static and Kinetic Friction, Rolling Friction	Draw clean force diagrams	Newton laws and friction	Force balances mastered
Week 04	Dynamics of Uniform and Non-Uniform Circular Motion, Centripetal and Centrifugal Forces, Banking of Roads, Work, Energy, and Power: Work-Energy Theorem, Conservative Forces	Apply work energy theorem	Work, energy, circular dynamics	Energy conservation mastered
Week 05	Vertical Circular Motion,	Calculate center of mass	Momentum, vertical circles	Momentum conservation understood

	Conservation of Mechanical Energy, System of Particles and Center of Mass: Discrete and Continuous Systems, Conservation of Linear Momentum			
Week 06	Elastic and Inelastic Collisions in One and Two Dimensions, Coefficient of Restitution (e), Impulse-Momentum Principle, Loss of Kinetic Energy in Impacts	Practice impulse and collisions	Collisions and restitution	Impact dynamics mastered
Week 07	Rotational Motion I: Kinematics of Rigid Body Rotation, Moment of Inertia, Radius of Gyration, Parallel and Perpendicular Axes Theorems, Torque, Rotational Equilibrium	Calculate moments of inertia	Rotational inertia and torque	Rotational statics mastered

Week 08	Rotational Motion II: Angular Momentum, Conservation of Angular Momentum, Rigid Body Dynamics ($\tau =$), Rolling Motion with and without Slipping	Solve rolling motion problems	Angular momentum and rolling	Pure rolling grasped
Week 09	Gravitation: Universal Law, Gravitational Field and Potential, Shell Theorem, Acceleration due to Gravity (g) Variations, Kepler's Laws, Escape Velocity, Satellites	Derive fields and potentials	Gravitation and orbital mechanics	Planetary laws mastered
Week 10	Mechanical Properties of Solids: Stress, Strain, Hooke's Law, Moduli of Elasticity, Thermal Stress; Mechanical Properties of Fluids I: Fluid Statics, Pascal's Law,	Analyze stress and pressures	Elasticity and fluid statics	Fluid pressure mastered

	Buoyancy			
Week 11	Fluid Dynamics: Continuity Equation, Bernoulli's Principle and Applications (Torricelli's Law, Venturimeter), Viscosity, Poiseuille's Flow, Stokes' Law, Terminal Velocity	Track streamlines and viscosity	Bernoulli and Stokes law	Fluid flow mastered
Week 12	Surface Tension and Surface Energy, Angle of Contact, Capillary Rise (Jurin's Law), Excess Pressure in Drops and Bubbles; Thermal Expansion, Calorimetry, Latent Heat	Solve surface tension problems	Surface tension and calorimetry	Thermal mixtures understood
Week 13	Heat Transfer: Thermal Conduction (Thermal Resistance, Series/Parallel Combinations), Convection,	Map heat flow paths	Conduction and radiation laws	Heat transfer mastered

	Radiation: Blackbody, Stefan-Boltzmann Law, Wien's Law, Newton's Law of Cooling			
Week 14	Kinetic Theory of Gases: Assumptions, Gas Laws, Pressure Equation, Molecular Speeds (v_{rms}, v_{avg}, v_{m}), Degrees of Freedom, Equipartition; Thermodynamics: First Law	Trace cyclic indicator diagrams	Gas kinetics and thermodynamics	First law mastered
Week 15	Second Law of Thermodynamics, Heat Engines, Refrigerators, Carnot Cycle, Entropy Basics; Simple Harmonic Motion I: Kinematics, Dynamics, Spring-Mass Systems, Energy in SHM	Solve harmonic oscillator equations	Simple harmonic motion basics	Oscillation dynamics grasped
Week 16	Simple Harmonic Motion II:	Analyze pendulums and waves	Angular oscillations, string waves	Wave speeds mastered

	Angular SHM, Simple Pendulum, Compound Pendulum, Torsional Pendulum; Wave Motion: Progressive Waves, Speed of Transverse Waves in Strings, Wave Energy			
Week 17	Sound Waves: Longitudinal Displacement and Pressure Waves, Speed of Sound (Laplace Correction), Standing Waves in Strings and Pipes, End Corrections, Beats, Doppler Effect	Work on organ pipes	Sound waves and Doppler	Doppler effect mastered
Week 18	Electrostatics I: Coulomb's Law, Principle of Superposition, Electric Field, Electric Field of Continuous Charge Distributions (Ring, Disc,	Integrate continuous charge fields	Coulomb law and fields	Electric fields mastered

	Infinite Wire, Finite Wire, Sheet)			
Week 19	Electrostatics II: Gauss's Law and Applications, Electric Potential, Potential Gradient ($E =$), Electrostatic Potential Energy, Conductors in Electrostatic Fields, Cavities	Apply Gauss law surfaces	Gauss law and conductors	Conductor shielding mastered
Week 20	Capacitors: Capacitance, Parallel Plate, Spherical, Cylindrical, Dielectric Slab Insertion, Energy Stored, Redistribution of Charges, Transient Direct Current RC Circuits	Solve capacitor circuit transients	Capacitance and RC circuits	RC transients mastered
Week 21	Current Electricity: Drift Velocity, Mobility, Ohm's Law, Temperature Dependence, Series/Parallel	Solve multiloop DC circuits	Current electricity, bridge circuits	Kirchhoff rules mastered

	Networks, Kirchhoff's Laws, Heating Effects, Metre Bridge, Resistance Measuring			
Week 22	Magnetic Effects of Current: Biot-Savart Law, Ampere's Circuital Law, Magnetic Field of Long Wire, Solenoid, Toroid, Circular Loop, Lorentz Force, Motion in Crossed Fields	Calculate magnetic field vectors	Biot-Savart, Ampere laws	Lorentz force mastered
Week 23	Magnetic Dipole Moment, Torque on Current Loops, Moving Coil Galvanometer (Ammeter and Voltmeter Conversion), Magnetism of Matter: Dia-, Para-, Ferromagnetism; Faraday's Law, Lenz's Law	Work through induced EMFs	Induction and moving coils	Faraday law mastered
Week 24	Inductance:	Draw AC	Inductance	LCR resonance

	Self and Mutual Inductance, Inductors in Circuits, LR Transient Circuits; Alternating Current: Peak, RMS Values, Phasors, Pure Elements, Series LCR Circuit, Resonance, Power Factor	phasor diagrams	and AC circuits	mastered
Week 25	Electromagnetic Waves: Displacement Current, Spectrum; Ray Optics: Reflection, Spherical Mirrors, Refraction, Snell's Law, TIR, Prisms, Lens Maker's Formula, Optical Instruments	Trace ray optics paths	Geometric optics and instruments	Optical instruments mastered
Week 26	Wave Optics: Huygens' Principle, Interference, Young's Double Slit Experiment, Diffraction at	Practice modern physics formulas	Wave optics, atomic physics	Modern physics completed

	Single Slit, Polarization, Brewster's Law; Modern Physics: Dual Nature, Atoms, Nuclei, Semiconductors			

Chemistry Longitudinal Curriculum

JEE Chemistry offers the highest scoring velocity relative to examination time, rewarding candidates who balance physical numerical precision, structural inorganic facts, and mechanistic organic pathways. Physical Chemistry demands quantitative accuracy in thermodynamic equations, ionic dissociation thresholds, and electrochemistry. Inorganic Chemistry is strongly anchored in the NCERT framework, requiring consistent review of periodic trends, crystal field structures, and transition-metal reaction pathways. Organic Chemistry relies on foundational electronic displacement concepts, stereochemical geometries, and functional group mechanisms (S_N1, S_N2, $E1$, $E2$, nucleophilic addition, and electrophilic aromatic substitution). Principles of practical chemistry—including qualitative salt analysis for cations and anions, volumetric titrimetry, and functional group testing—are embedded alongside their theoretical units to address modern exam patterns.

Week-wise Number	Topics for that Week	Daily Work to be Done	Assignment for that Week	Milestone of the Topics Covered for that Week
Week 01	Some Basic Concepts in Chemistry: Matter, Dalton's Atomic Theory, Mole Concept, Atomic and Molecular Masses, Empirical and Molecular Formula,	Practice basic mole calculations	Mole concept and stoichiometry	Stoichiometry fundamentals mastered

	Stoichiometry, Limiting Reagent, Concentration Terms			
Week 02	Atomic Structure: Electromagnetic Radiation, Photoelectric Effect, Bohr Model of Hydrogen Atom, Rydberg Formula, Dual Nature of Matter, de Broglie, Heisenberg Uncertainty, Quantum Mechanical Model, Quantum Numbers	Review quantum model rules	Bohr model, quantum numbers	Electronic structures clarified
Week 03	Classification of Elements and Periodicity in Properties: Modern Periodic Table, Shielding Effect, Effective Nuclear Charge, Periodic Trends: Atomic/Ionic Radii,	Memorize key periodic trends	Periodic trends and anomalies	Periodic variations understood

	Ionization Enthalpy, Electron Gain Enthalpy, Electronegativity			
Week 04	Chemical Bonding and Molecular Structure I: Kossel-Lewis Approach, Ionic Bonding, Lattice Enthalpy, Born-Haber Cycle, Covalent Bonding, Electronegativity, Fajan's Rules, Dipole Moments, Formal Charge	Analyze bond polarity trends	Ionic bonding, Fajan rules	Dipole moments mastered
Week 05	Chemical Bonding and Molecular Structure II: VSEPR Theory, Valence Bond Theory, Hybridization (sp, sp^2, sp^3, sp), Resonance, Molecular Orbital Theory (MOT), Hydrogen Bonding, Metallic	Draw shapes and orbitals	VSEPR, molecular orbital theory	Molecular geometries mastered

	Bonding			
Week 06	Chemical Thermodynamics: Fundamentals, Intensive and Extensive Properties, State Functions, First Law of Thermodynamics: Internal Energy (U), Heat (q), Work (w), Enthalpy (H), Heat Capacities (C_p, C_v)	Calculate expansion work values	First law of thermodynamics	Internal energy mastered
Week 07	Thermochemistry: Hess's Law, Standard Enthalpies of Formation, Combustion, Neutralization, Bond Dissociation, Atomization; Second Law of Thermodynamics: Spontaneity, Entropy (S), Gibbs Free Energy (G)	Solve thermochemical Hess cycles	Thermochemistry, Gibbs free energy	Spontaneity criteria grasped

Week 08	Chemical Equilibrium: Dynamic Nature, Physical and Chemical Equilibria, Law of Mass Action, Equilibrium Constants (K_c, K_p, K_a), Reaction Quotient (Q), Le Chatelier's Principle and Industrial Applications	Solve dynamic equilibrium equations	Chemical equilibrium, Le Chatelier	Equilibrium shifts mastered
Week 09	Ionic Equilibrium I: Strong and Weak Electrolytes, Degree of Ionization, Ostwald's Dilution Law, Arrhenius, Brønsted-Lowry, and Lewis Acids/Bases, Ionization of Water, pH Scale, Common Ion Effect, Weak Acid/Base Mixtures	Calculate aqueous pH values	Weak acids and bases	pH calculations mastered
Week 10	Ionic	Solve buffer	Buffers and	Salt hydrolysis

	Equilibrium II: Hydrolysis of Salts (All Types), Buffer Solutions (Acidic, Basic, Buffer Capacity, Henderson-Hasselbalch), Solubility Product (K_{sp}), Common Ion Effect on Solubility, Precipitation Conditions	mixture problems	solubility products	mastered
Week 11	Redox Reactions: Oxidation Number Rules, Balancing Redox Reactions (Ion-Electron and Oxidation State Methods); Electrochemistry I: Conductance in Electrolytic Solutions, Molar Conductivity, Kohlrausch's Law	Balance complex redox equations	Redox reactions, Kohlrausch law	Molar conductivity mastered
Week 12	Electrochemistry II: Galvanic Cells, Standard	Apply Nernst cell equations	Galvanic cells and	Cell potentials mastered

	Electrode Potentials, Electrochemical Series, Nernst Equation, Cell EMF, Concentration Cells, Gibbs Energy of Cell Reaction, Electrolysis, Faraday's Laws, Batteries and Fuel Cells		electrolysis	
Week 13	Chemical Kinetics I: Rate of Reaction, Factors Affecting Rate, Rate Law, Order and Molecularity, Integrated Rate Equations (Zero, First, Pseudo-First Order), Half-Life, Methods of Determining Reaction Order	Plot reaction rate graphs	Integrated rates and half-life	Reaction orders mastered
Week 14	Chemical Kinetics II: Arrhenius Equation, Activation Energy, Temperature Coefficient,	Calculate Arrhenius activation energies	Arrhenius theory, Raoult law	Vapor pressure mastered

	Collision Theory, Catalysis; Solutions I: Types, Vapour Pressure of Liquid Solutions, Raoult's Law, Ideal and Non-Ideal Solutions			
Week 15	Solutions II: Colligative Properties (RLVP, Elevation of Boiling Point, Depression of Freezing Point, Osmotic Pressure), Abnormal Molar Masses, Van't Hoff Factor (i); Purification and Characterisation of Organic Compounds	Solve colligative property problems	Colligative properties and purification	Van't Hoff factor mastered
Week 16	General Organic Chemistry (GOC) I: Hybridization, IUPAC Nomenclature, Structural Representation	Practice electron displacement effects	Resonance and hyperconjugation basics	Resonance stability grasped

	s, Inductive Effect, Electromeric Effect, Resonance, Mesomeric Effect, Hyperconjugation, Bond Fission			
Week 17	General Organic Chemistry (GOC) II: Reactive Intermediates (Carbocations, Carbanions, Free Radicals: Stability, Structure, Rearrangements), Aromaticity (Hückel's Rule, Anti-aromaticity), Relative Acidic and Basic Strengths	Rank intermediate stability trends	Reactive intermediates, organic acidity	Aromaticity rules mastered
Week 18	Stereochemistry: Isomerism (Structural: Chain, Position, Functional, Metamerism, Tautomerism) and Stereoisomerism: Geometrical (	Draw stereochemical projections carefully	Geometrical and optical isomerism	Stereoisomer identification mastered

	$cis/trans, E/$), Optical (Chirality, Enantiomers, Diastereomers, Meso, R/S System)			
Week 19	Hydrocarbons I: Alkanes (Free Radical Halogenation, Reactivity vs Selectivity, Wurtz Reaction) and Alkenes (Preparation, Electrophilic Additions: Markovnikov, Anti-Markovnikov, Hydroboration-Oxidation, Ozonolysis)	Trace electrophilic addition pathways	Alkane, alkene reaction mechanisms	Alkene additions mastered
Week 20	Hydrocarbons II: Alkynes (Acidity, Addition Reactions, Hydration, Polymerization) and Aromatic Hydrocarbons (Benzene: Structure, Resonance, Electrophilic Aromatic	Map aromatic substitution routes	Alkynes, electrophilic aromatic substitution	Directing groups understood

	Substitution: Nitration, Sulphonation, Friedel-Crafts)			
Week 21	Organic Compounds Containing Halogens: Haloalkanes and Haloarenes: General Methods, Nature of C-X Bond, Nucleophilic Substitution (S_N1, S_N2 Mechanisms, Kinetics, Stereochemistry), Elimination ($E1, E2$), S_NAr [cite:]	Compare substitution elimination pathways	Haloalkanes, nucleophilic substitutions	Substitution mechanisms mastered
Week 22	Alcohols, Phenols, and Ethers: Preparation, Properties, Reactions, Lucas Test, Mechanism of Dehydration, Acidity of Phenols, Reimer-Tiemann, Kolbe, Williamson	Review alcohol phenol reactions	Phenols and ether cleavage	Ether cleavage mastered

	Ether Synthesis, Acidic Cleavage of Ethers with HI [cite:]			
Week 23	Aldehydes and Ketones: Structure of Carbonyl Group, Nucleophilic Addition Reactions, Addition of HCN, Grignard, Ammonia Derivatives, Aldol Condensation, Cannizzaro, Haloform, Clemmensen, Wolff-Kishner	Write out carbonyl mechanisms	Aldehydes, ketones, aldol condensations	Carbonyl additions mastered
Week 24	Carboxylic Acids and Derivatives (Esters, Acid Chlorides, Amides, Anhydrides), Acidic Strength, HVZ Reaction; Organic Compounds Containing	Practice nitrogen derivative pathways	Carboxylic acids and amines	Diazonium chemistry mastered

	Nitrogen: Amines (Basicity, Carbylamine, Hinsberg, Diazotization), Diazonium Salts			
Week 25	Biomolecules: Carbohydrates (Classification, Glucose, Fructose, Mutarotation, Disaccharides, Glycosidic Bond), Proteins (Amino Acids, Zwitterion, Peptide Bond, Structure), Nucleic Acids; p-Block Elements Overview	Review biomolecules and structures	Carbohydrates, proteins, p-block trends	Biomolecule structures mastered
Week 26	Coordination Compounds: Werner's Theory, Ligands, IUPAC, Isomerism, Valence Bond Theory, Crystal Field Theory (d-orbital splitting, Δ_o, Δ_t, CFSE, Magnetic	Solve crystal field problems	Coordination complexes, salt analysis	Coordination chemistry completed

	Properties); d-and f-Block; Practical Qualitative Analysis			

Mathematics Longitudinal Curriculum

Mathematics serves as the primary differentiator in the IIT JEE rank distribution due to its multi-step algebraic complexity and demanding problem lengths. Analysis of recent question papers shows that single-concept problems have largely been replaced by questions that integrate multiple areas of the syllabus. Differential and Integral Calculus, together with Coordinate Geometry, account for roughly 55% to 60% of the entire paper. Within Algebra, Matrices, Determinants, Vectors, Three-Dimensional Geometry, Sequences, and Probability represent high-yield areas where systematic practice produces reliable scoring. Trigonometry forms the operational foundation of the entire curriculum, providing the analytical identities and transformations required throughout Calculus, Coordinate Geometry, and Vector Algebra.

Week-wise Number	Topics for that Week	Daily Work to be Done	Assignment for that Week	Milestone of the Topics Covered for that Week
Week 01	Sets: Representations, Operations, Algebraic Properties, Power Sets; Relations: Types (Reflexive, Symmetric, Transitive, Equivalence); Functions I: Domain, Range, Codomain, Injective, Surjective,	Find valid function domains	Sets, relations, and functions	Domain evaluation mastered

	Bijective			
Week 02	Trigonometric Functions: Identities, Compound Angles, Multiple and Submultiple Angles, Transformation Formulae, General and Principal Solutions of Trigonometric Equations	Memorize and apply identities	Trigonometric equations and identities	Trigonometric reductions mastered
Week 03	Inverse Trigonometric Functions: Principal Value Branches, Graphs, Domain and Range, Core Properties, Sum and Difference Formulas; Functions II: Composite Functions, Inverse Functions, Functional Equations	Solve inverse trigonometric equations	Inverse trigonometry, composite functions	Function inversion mastered
Week 04	Quadratic Equations: Relations Between Roots	Apply location of roots	Quadratic equations, root locations	Quadratic signs mastered

	and Coefficients, Nature of Roots, Sign of Quadratic Expressions, Transformation of Roots, Common Roots, Location of Roots Under Constraints			
Week 05	Complex Numbers I: Ordered Pairs of Reals, Representation ($a +$), Argand Plane, Modulus and Argument, Conjugate Properties, Polar and Euler Forms, Triangle Inequalities, Complex Loci	Plot complex Argand loci	Complex numbers, Euler form	Complex geometry mastered
Week 06	Complex Numbers II: De Moivre's Theorem, Cube Roots and n-th Roots of Unity, Geometric Applications of Complex Numbers	Rotate complex plane vectors	Roots of unity, rotations	Complex rotations mastered

	(Collinearity, Concyclicity, Rotation Theorem)			
Week 07	Sequences and Series: Arithmetic Progressions (AP), Geometric Progressions (GP), Arithmetic-Geometric Progressions (AGP), Sum to n Terms, Infinite Sums, AM, GM, HM, Telescoping Series	Sum telescoping arithmetic series	Progressions and telescoping series	Series summation mastered
Week 08	Binomial Theorem: Binomial Expansion for Positive Integral Index, General Term, Middle Term, Numerically Greatest Term, Properties of Binomial Coefficients, Double Sums, Multinomial Basics	Expand binomial coefficient expressions	Binomial expansions and coefficients	Binomial series mastered
Week 09	Permutations and	Practice arrangement	Permutations and	Combinatorial counting

	Combinations I: Fundamental Principles of Counting, Factorials, Permutations under Restrictions, Combinations, Gap Method, Tie (Block) Method, Circular Permutations	counting methods	combination constraints	mastered
Week 10	Permutations and Combinations II: Division and Distribution of Distinct/Identical Objects, Multinomial Theorem, Derangements, Principle of Inclusion-Exclusion, Integer Solutions to Equations	Solve integer distribution equations	Beggar method and derangements	Partition techniques mastered
Week 11	Matrices and Determinants: Types of Matrices, Operations, Properties of Determinants, Adjoint, Inverse of Square Matrix, System of Linear	Solve linear equation systems	Matrices, determinants, Cramer rule	Matrix consistency mastered

	Equations, Cramer's Rule, Matrix Inversion Method			
Week 12	Limits: Concept of Limit, Left/Right Hand Limits, Indeterminate Forms ($\frac{0}{0}, \frac{\infty}{\infty}, 0 \cdot$), Factorization, Rationalization, Standard Trigonometric Limits, L'Hôpital's Rule, Series Expansions	Evaluate indeterminate limit forms	Limits and series expansions	Indeterminate forms mastered
Week 13	Continuity and Differentiability : Continuity at a Point and in an Interval, Intermediate Value Theorem, Differentiability Concept, Geometric Meaning, Left/Right Derivatives, Continuity vs Differentiability	Test piecewise point continuity	Continuity and differentiability checks	Differentiability testing mastered
Week 14	Methods of Differentiation:	Compute parametric	Chain rule, implicit	Higher derivatives

	Differentiation of Sum, Difference, Product, Quotient, Composite Functions (Chain Rule), Trigonometric, Inverse Trigonometric, Logarithmic, Implicit, Parametric, Higher Order Derivatives	derivative chains	differentiation	mastered
Week 15	Applications of Derivatives I: Rate of Change of Quantities, Tangents and Normals (Equations, Length of Tangent, Subtangent, Subnormal), Angle of Intersection of Curves, Monotonicity	Find tangent normal lines	Tangents, normals, and monotonicity	Curve monotonicity mastered
Week 16	Applications of Derivatives II: Maxima and Minima (First and Second Derivative Tests), Point of Inflection,	Optimize geometric objective functions	Maxima, minima, mean value	Optimization problems mastered

	Global Extrema on Closed Intervals, Optimization, Rolle's Theorem, Lagrange's Mean Value Theorem (LMVT)			
Week 17	Indefinite Integration I: Primitives, Fundamental Integrals (Algebraic, Trigonometric, Exponential, Logarithmic), Integration by Substitution, Integration Using Trigonometric Identities	Recognize standard algebraic substitutions	Indefinite integrals, trigonometric substitutions	Integration substitutions mastered
Week 18	Indefinite Integration II: Integration by Parts, Integration by Partial Fractions, Standard Forms: $\int \frac{dx}{ax^2+bx+c}$, $\int \frac{dx}{\sqrt{ax^2+bx+c}}$, $\int \frac{(px+q)dx}{ax^2+bx+c}$, $\int \sqrt{a^2 \pm x^2}dx$ [cite:]	Integrate using partial fractions	Integration by parts, fractions	Partial fractions mastered

Week 19	Definite Integration I: Fundamental Theorem of Calculus, Definite Integral as Limit of a Sum, Properties of Definite Integrals (King's Property, Queen's Property, Periodic Function Integrals)	Apply definite integral properties	King property, Riemann sums	Definite integrals mastered
Week 20	Definite Integration II: Leibniz Rule of Differentiation Under Integral Sign; Differential Equations I: Order, Degree, Formation of Differential Equations, Separation of Variables, Homogeneous Equations	Differentiate under integral signs	Leibniz rule, separable equations	Homogeneous equations mastered
Week 21	Differential Equations II: Linear Differential Equations of First Order (	Calculate enclosed curve areas	First order ODEs, areas	Bounded areas mastered

	$\frac{dy}{}+Pu=$), Integrating Factors; Area Under Curves: Area Bounded by Curves, Lines, Parabolas, Absolute Functions			
Week 22	Coordinate Geometry (Straight Lines): Cartesian Coordinates, Distance, Section Formula, Slope, Line Equations (Point-Slope, Intercept, Normal), Angle Between Lines, Distance to a Line, Concurrence, Centroid, Orthocentre, Circumcentre	Find triangle center coordinates	Straight lines, line families	Line families mastered
Week 23	Circles: Standard and General Equations, Intercepts, Tangents (Point, Slope, Parametric Forms), Condition of	Solve circle tangency systems	Circle equations, common tangents	Common tangents mastered

	Tangency, Normals, Chord of Contact, Midpoint Chord, Family of Circles, Common Tangents, Orthogonality			
Week 24	Conic Sections: Parabola, Ellipse, Hyperbola: Standard Forms, Eccentricity, Foci, Directrix, Latus Rectum, Tangents, Normals, Parametric Coordinates, Conic Reflections, Asymptotes of Hyperbola	Work with conic parameters	Parabola, ellipse, hyperbola conics	Conic sections mastered
Week 25	Vector Algebra: Vectors and Scalars, Addition, Components, Scalar (Dot) Product, Vector (Cross) Product, Scalar Triple Product, Vector Triple	Compute spatial vector products	Vector algebra, spatial lines	Vector geometry mastered

	Product; Three-Dimensional Geometry I: Coordinates, Distance, Section Formula, Direction Ratios and Cosines			
Week 26	Three-Dimensional Geometry II: Line Equations in Space, Angle Between Lines, Skew Lines, Shortest Distance and Equations; Probability: Conditional, Multiplication Theorem, Bayes' Theorem, Distributions; Statistics: Variance, Standard Deviation	Solve spatial skew lines	Three-dimensional geometry, Bayes probability	Probability distributions completed

Diagnostic Metrics and Operational Execution Protocol

A six-month curriculum requires a disciplined diagnostic feedback mechanism to ensure that passive study translates into reliable exam-day performance. Working through problem sets without systematic error tracking can reinforce faulty heuristics and create blind spots. To ensure steady progress across all three subjects, candidates must maintain a structured operational routine centered on error classification, continuous review, and realistic testing conditions.

Error tracking relies on an active mistake log across Physics, Chemistry, and Mathematics,

dividing mistakes into three primary categories:

- Conceptual deficits, where the underlying physical principle, chemical mechanism, or mathematical theorem was misunderstood or misidentified.
- Execution lapses, which encompass arithmetic miscalculations, sign errors, incorrect unit conversions, or algebraic slips during intermediate steps.
- Comprehension misalignments, which occur when boundary conditions, geometric constraints, or specific problem requirements are misread under time pressure.

Every question that yields an incorrect answer or is skipped during practice must be documented alongside its root cause and the required corrective step. Spaced retrieval must be conducted systematically, using the daily one-hour review block to revisit previously logged problems at expanding intervals—one day, seven days, and thirty days after the initial error.

Full-length testing begins in Week 12 with bi-weekly exams, transitioning to weekly proctored tests by Week 20, and advancing to two full-length proctored tests per week from Week 23 through 26. Every three-hour test must be paired with at least two hours of post-exam analysis, requiring students to work through all incorrect and skipped questions under untimed conditions to confirm their conceptual clarity.

During full-length tests, time management should follow a structured three-phase protocol. During the first 60 minutes, students complete an initial triage to identify and answer straightforward, single-step questions—primarily in Chemistry (such as coordination isomers, periodic trends, and direct thermodynamic evaluations) and formula-based Physics. The goal of this opening phase is to solve 25 to 30 accessible questions, securing base marks and establishing positive cognitive momentum.

The second phase, covering minutes 60 through 140, focuses on computationally demanding problems, including multi-body mechanics, physical equilibrium calculations, coordinate geometry loci, and differential calculus applications.

The final 40 minutes are reserved for reviewing marked-for-review questions, executing multi-step algebraic integrals, checking numerical entries for unit consistency, and verifying that negative marks have been minimized.

This structured testing rhythm develops the analytical precision and cognitive endurance necessary to succeed on the IIT JEE.

Works cited