



# Imperial TC

## JEE Mains Detailed Syllabus, Pattern, and Marks Scheme

### 1. JEE Mains Exam Pattern:

- **Mode of Exam:** Online (Computer-Based Test)
- **Duration:** 3 hours (180 minutes)
- **Sections:** Three sections - Physics, Chemistry, Mathematics
- **Question Types:** Multiple Choice Questions (MCQs) and Numerical Value-based Questions
- **Total Questions:** 90 (30 per subject)
- **Marks Scheme:**
  - MCQs: +4 for each correct answer, -1 for each incorrect answer.
  - Numerical Value Questions: +4 for each correct answer, no negative marking.
- **Total Marks:** 300 (100 marks per subject)

### 2. Detailed Syllabus:

#### Physics:

- **Section A: (Theory - 80% weightage)**
  1. **Physics and Measurement:** Units and dimensions, SI units, error analysis, vectors, etc.
  2. **Kinematics:** Motion in one and two dimensions, projectile motion, etc.
  3. **Laws of Motion:** Newton's laws, friction, dynamics of uniform circular motion, etc.
  4. **Work, Energy, and Power:** Work-energy theorem, potential energy, conservation of energy, etc.
  5. **Rotational Motion:** Torque, angular momentum, moment of inertia, etc.
  6. **Gravitation:** Universal law of gravitation, Kepler's laws, gravitational potential, etc.
  7. **Properties of Solids and Liquids:** Elasticity, surface tension, viscosity, fluid dynamics, etc.
  8. **Thermodynamics:** Laws of thermodynamics, Carnot engine, entropy, etc.
  9. **Kinetic Theory of Gases:** Ideal gas laws, kinetic theory, degrees of freedom, etc.
  10. **Oscillations and Waves:** Simple harmonic motion, wave motion, Doppler effect, etc.
  11. **Electrostatics:** Electric charges, fields, potential, capacitors, etc.



12. **Current Electricity:** Ohm's law, Kirchoff's laws, Wheatstone bridge, etc.
  13. **Magnetic Effects of Current and Magnetism:** Biot-Savart law, Ampere's law, electromagnets, etc.
  14. **Electromagnetic Induction and AC:** Faraday's law, Lenz's law, alternating currents, etc.
  15. **Optics:** Reflection, refraction, interference, diffraction, polarization, etc.
  16. **Dual Nature of Matter and Radiation:** Photoelectric effect, de Broglie hypothesis, etc.
  17. **Atoms and Nuclei:** Atomic models, radioactivity, nuclear reactions, etc.
  18. **Electronic Devices:** Semiconductors, diodes, transistors, logic gates, etc.
  19. **Communication Systems:** Bandwidth, modulation, demodulation, etc.
- **Section B: (Experimental Skills - 20% weightage)**
    - Experimental and practical skills are evaluated based on laboratory work.

## Chemistry:

- **Physical Chemistry:**
  1. **Some Basic Concepts in Chemistry:** Mole concept, stoichiometry, chemical reactions, etc.
  2. **States of Matter:** Gases and liquids, ideal gas equation, kinetic theory, etc.
  3. **Atomic Structure:** Bohr model, quantum numbers, electron configuration, etc.
  4. **Chemical Bonding and Molecular Structure:** Lewis structure, VSEPR theory, hybridization, etc.
  5. **Chemical Thermodynamics:** First law, enthalpy, entropy, Gibbs free energy, etc.
  6. **Solutions:** Types of solutions, Raoult's law, colligative properties, etc.
  7. **Equilibrium:** Chemical and ionic equilibrium, Le Chatelier's principle, etc.
  8. **Redox Reactions and Electrochemistry:** Oxidation numbers, electrolysis, Nernst equation, etc.
  9. **Chemical Kinetics:** Rate of reaction, order of reaction, Arrhenius equation, etc.
  10. **Surface Chemistry:** Adsorption, catalysis, colloids, etc.
- **Inorganic Chemistry:**
  1. **Classification of Elements and Periodicity:** Periodic table, trends in properties, etc.



2. **General Principles and Processes of Isolation of Metals:** Metallurgy, extraction of metals, etc.
  3. **Hydrogen:** Isotopes, properties, preparation, uses, etc.
  4. **S-Block Elements:** Alkali and alkaline earth metals, properties, etc.
  5. **P-Block Elements:** Groups 13 to 18, properties, compounds, etc.
  6. **D- and F-Block Elements:** Transition elements, lanthanides, actinides, etc.
  7. **Coordination Compounds:** Ligands, coordination number, nomenclature, etc.
  8. **Environmental Chemistry:** Pollution, ozone depletion, green chemistry, etc.
- **Organic Chemistry:**
    1. **Some Basic Principles of Organic Chemistry:** Hybridization, IUPAC naming, resonance, etc.
    2. **Hydrocarbons:** Alkanes, alkenes, alkynes, aromatic hydrocarbons, etc.
    3. **Haloalkanes and Haloarenes:** Properties, reactions, uses, etc.
    4. **Alcohols, Phenols, and Ethers:** Structures, properties, reactions, etc.
    5. **Aldehydes, Ketones, and Carboxylic Acids:** Structures, properties, reactions, etc.
    6. **Organic Compounds Containing Nitrogen:** Amines, nitro compounds, cyanides, etc.
    7. **Biomolecules:** Carbohydrates, proteins, vitamins, nucleic acids, etc.
    8. **Polymers:** Types, properties, uses, etc.
    9. **Chemistry in Everyday Life:** Drugs, detergents, food additives, etc.

#### Mathematics:

1. **Sets, Relations, and Functions:** Basics, types of relations and functions, etc.
2. **Complex Numbers and Quadratic Equations:** Properties, solutions, etc.
3. **Matrices and Determinants:** Operations, types of matrices, etc.
4. **Permutations and Combinations:** Counting principles, arrangements, etc.
5. **Mathematical Induction:** Principle of induction and its applications.
6. **Binomial Theorem:** Expansion, properties, and applications.
7. **Sequences and Series:** Arithmetic and geometric progressions, etc.
8. **Limit, Continuity, and Differentiability:** Limits, continuity, differentiation, etc.
9. **Integral Calculus:** Definite and indefinite integrals, application of integrals, etc.



10. **Differential Equations:** Formation, order, degree, solutions, etc.
11. **Coordinate Geometry:** Lines, circles, conics, etc.
12. **Three-Dimensional Geometry:** Planes, lines, spheres, etc.
13. **Vector Algebra:** Vectors, dot product, cross product, etc.
14. **Statistics and Probability:** Measures of central tendency, probability, etc.
15. **Trigonometry:** Identities, equations, inverse trigonometric functions, etc.
16. **Mathematical Reasoning:** Logical reasoning, statements, and conclusions.

### 3. Marks Distribution:

- **Physics:**
  - 30 questions, 100 marks
  - MCQs: 20 questions
  - Numerical Value: 10 questions
- **Chemistry:**
  - 30 questions, 100 marks
  - MCQs: 20 questions
  - Numerical Value: 10 questions
- **Mathematics:**
  - 30 questions, 100 marks
  - MCQs: 20 questions
  - Numerical Value: 10 questions

P.S Please cross-check the syllabus on the official JEE website to ensure accuracy and stay updated with any changes.

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