JEE Main 2024: The Syllabus Overview

The syllabus for JEE Main is developed by the National Testing Agency (NTA), and it maintains consistent with prior years unless otherwise revised. The curriculum for Classes 11 and 12 is taken on the CBSE curriculum, ensuring a smooth transition from school to competitive test preparation.

Physics, Chemistry, and Mathematics

Physics, Chemistry, and Mathematics are part of the JEE Main Paper 1 for B.Tech/B.E. candidates. Each subject covers a wide range of topics:

Physics	Chemistry	Mathematics
Mechanics	Physical Chemistry	Algebra
Thermodynamics	Inorganic Chemistry	Calculus

Physics	Chemistry	Mathematics
Electromagnetism	Organic Chemistry	Geometry
Optics	–	Vectors
Modern Physics	–	Trigonometry

JEE Main Detailed Syllabus Physics, Chemistry and Mathematics for JEE (MAIN) 2024 PAPER 1 for B.E./B.Tech.

Physics

Physics Basics and Measuring Stuff

First, we study about measuring things in physics. This includes comprehending the many units we use, such as meters for length or seconds for time, as well as how to measure precisely. We'll also look at how dimensions are used in physics to see if our formulas make sense.

Moving Around

Following that, we'll look into kinematics, which is all about movement. We'll look at how things travel in straight lines and plot their positions over time. We'll discuss speed and velocity, as well as what happens when objects accelerate up or slow down. We'll also learn about vectors, which are similar to arrows in that they indicate how objects travel in different directions.

Motion and Forces

In the third unit, we'll look at how forces create motion, using Newton's three laws as a guide. We'll learn about motion and how things react to one another. We'll also look at friction and how objects move in circles, such as cars turning corners or planets orbiting the sun.

Work and Energy

We'll look at how putting labor on items, such as pushing a swing to make it move, can change their energy. We'll study about different types of energy and how energy may change forms without being lost.

Spinning Things

This section is all about spinning items. We'll learn how to compute 'twistiness' or torque, as well as how mass is distributed in rotating objects. We'll also contrast straight-line motion with rotating motion.

Gravity

We'll look at how gravity pulls apples to the ground and maintains planets in orbit. We'll also study about the laws that govern how planets travel and how gravity varies as you ascend a mountain or descend deep beneath.

Liquids and solids

We'll investigate how solid objects and liquids respond to tension, such as stretching a rubber band. We'll also study about fluid flow and how things like airplanes fly by using air flow.

Temperature and Heat

We'll learn about heat, temperature, and how energy travels between objects in thermodynamics. We'll also go over the laws that explain why an egg can't be unscrambled and how refrigerators function.

Gas Regulations

We'll look at the ideal gas law, which describes how gases behave in various environments and how heat impacts gas molecules.

Oscillations & Waves

We'll study about things that move back and forth or up and down in a regular pattern, such as a pendulum or a guitar string, in this section. We'll also look at how waves move and interact with one another.

Magnetism and electricity

We'll begin with static electricity, the kind that causes your hair to stand up when you touch it against a balloon. Then we'll come to current electricity, which powers our homes and electronics. We'll also look at magnetism and its relationship to electricity, such as how magnets may generate electricity and vice versa.

Getting Electricity Moving

We'll discover how shifting magnetic fields can generate electricity and how alternating current differs from direct current generated by a battery.

Waves and Light

We'll look at how light reflects and bends, as well as how lenses in glasses or telescopes can alter light's course. We'll also look at light's wave nature, which explains colors and patterns.

Big Ideas and Tiny Particles

We'll examine at how light can behave like both waves and particles, as well as how this concept applies to matter, giving rise to the concept of matter waves.

Atomic Structures

We'll take a look into the microscopic world of atoms and nuclei, learning about the forces that hold them together and what happens when they break apart or combine.

Electronics

We'll look at semiconductors, which are the building blocks of everything modern electronics, from cellphones to computers.

Practical Physics

Finally, we'll conduct experiments to demonstrate how to measure, observe, and comprehend all of the principles we've learnt.

Chemistry

Understanding the Fundamentals of Chemistry

Immerse yourself in the world of chemistry, where everything is made up of small particles known as atoms and molecules. Discover how tiny particles interact to create everything around us, from the air we breathe to the water we drink. Learn about the laws that control how things combine and change, as well as how we can predict the outcomes of these chemical interactions.

Atoms and Molecules: Matter's Building Blocks

Investigate the amazing structure of atoms, the microscopic particles that make up everything. Learn how light interacts with atoms and how scientists utilize this information to investigate the chemicals that comprise our universe. Learn about the dual nature of matter and the groundbreaking ideas that explain particle behavior at the atomic level.

Molecules are held together by bonds.

Learn how atoms create molecules through bonding, same as magnets can attract or repel each other. These connections can be strong, transferring electrons between atoms, or charge-based, like when salt dissolves in water. Discover how molecules' forms and architectures are predicted by theories that sound like they're right out of a science fiction novel.

Chemical Reactions' Energy

Chemistry is about more than simply substances; it is also about energy. Discover how energy is stored and released during chemical processes, as well as how it can be measured and predicted. This knowledge is essential for everything from cooking to driving a car.

Putting Things Together: Solutions and Their Properties

Learn how various substances dissolve, mix, and interact to generate solutions. Learn about the various methods for measuring a solution's concentration and how this impacts qualities such as boiling and freezing points.

Chemical Equilibrium Balancing Act

Learn about the delicate balance of chemical reactions that can go either way, and how temperature and pressure can affect this balance. This concept is essential for everything from preparing the perfect cup of coffee to comprehending how our bodies work.

Electron Transfer: Redox Reactions and Electrochemistry

Electrons can move from one substance to another, causing reactions that can either power batteries or produce rust. Learn about the flow of electrons in chemical reactions and how it is used to generate energy.

Chemical Kinetics: Reaction Speed

Not all reactions occur at the same rate. Some are over in a blink of an eye, while others take years. Learn what influences the rate of a reaction and how this information can be applied to everything from making a cake to generating life-saving drugs.

Elements Organization: Periodic Table and Trends

The periodic table is a library of elements grouped according to their properties. Learn how this arrangement aids in the prediction of the behavior of elements ranging from the metals used to construct skyscrapers to the gasses that fill the air.

Coordination Compounds: Complex Structures

Dive into the realm of complicated molecules, where metals and other elements are arranged in sophisticated ways. These chemicals are not just intriguing riddles; they are also essential in many industrial and biological activities.

Biomolecules and the Chemistry of Life

Complex molecules such as carbohydrates, proteins, and DNA are the foundations of life. Understand the fundamental structure of these molecules and how they interact to make life possible.

Practical Chemistry: From the Laboratory to the Real World

Finally, apply everything you've learned in the textbook to the lab. Learn how to identify various compounds and the ideas underlying standard laboratory techniques. This practical experience is what transforms theory into practice, allowing us to make sense of the chemical world around us.

Mathematics

Chapter 1: Understanding Groups and Functions

Learn the fundamentals of grouping numbers and objects (sets) and how they can interact through union, intersection, and other means. Learn about the power of sets and the intricate relationships and functions that connect them, such as one-to-one and onto functions, as well as how they can be combined.

Chapter 2: Exploring Complex Numbers and Quadratic Equations

Explore the universe of complex numbers by picturing them as pairs and understanding how they behave in the mathematical plane. Learn about quadratic equations, their solutions in both real and complex number systems, and their relationships to their coefficients.

Chapter 3: Matrices and Determinants – The Foundation

Discover the structure of matrices, their various varieties, and how to manipulate them. Understand determinants, their properties, and their applications in solving linear equations and calculating geometric areas.

Chapter 4: Permutations and Combinations for Counting and Choosing

Learn how to count alternatives and make choices using permutations and combinations. Understand the meaning of $P(n,r)$ and $C(n,r)$, as well as their practical applicability in real-world circumstances.

Chapter 5: The Binomial Theorem's Power

Learn about the binomial theorem, a fundamental concept in mathematics, and its applications. Learn how to identify general and intermediate terms and how to use the theorem to solve issues.

Chapter 6: Sequences and Series – Number Patterns

Investigate the patterns seen in sequences and series, such as mathematical and geometric progressions. Understand the relationship and applications of the arithmetic mean (A.M.) and geometric mean (G.M.).

Chapter 7: Calculus' Essence – Limits, Continuity, and Differentiability

In calculus, become acquainted with the ideas of limits, continuity, and differentiability. Learn about the various functions and the rules of differentiation, as well as applications that help us grasp rate of change and function behavior.

Chapter 8: Integral Calculus – The Art of Summing Up

Integral calculus teaches you about anti-derivatives and fundamental integrals. Learn about various integration techniques and how they may be used to calculate areas and solve problems.

Chapter 9: Solving Differential Equations

Understand ordinary differential equations, their classification, and solutions methods, such as variable separation and linear differential equations.

Chapter 10: Coordinate Geometry – Plane Mapping

Navigate the plane using the Cartesian coordinate system, learning about distance, slope, and line and circle equations. Investigate the properties of conic sections.

Chapter 11: Three-Dimensional Geometry – Space Navigation

Learn how to identify points, compute distances, and grasp lines and planes in three dimensions, including the shortest distance between skew lines.

Chapter 12: Vector Algebra – Direction and Magnitude

Vectors are quantities that have both a direction and a magnitude. Learn how to add them, decompose them, and grasp their scalar and vector products.

Chapter 13: Statistics and Probability – Predicting and Analyzing

Learn about data analysis methods such as mean, median, mode, and measures of variability. Dive into the fundamentals of probability, including theorems and distributions that aid in the prediction of events.

Chapter 14: Trigonometry – Angle Analysis

Using trigonometric functions, identities, and equations, investigate the relationships between angles and sides in triangles. Recognize the characteristics of inverse trigonometric functions.