

KEC Advanced Courses – Maths for Physics (Class 9)

Why Maths for Physics course?

Mathematics is the language of physics. Sound maths skills are essential for subtle understanding of concepts and solving numerical problems in Physics. Physics can be learnt effectively only to the extent of prior knowledge of maths. Maths can be learnt without Physics. But Physics cannot be learnt without maths.

In class 11, 12, the essential maths is learnt but not as a pre-requisite for Physics. Often, it is learnt after learning Physics topics. This affects conceptual clarity and skills of solving Physics problems.

‘Maths for Physics’ course covers the complete spectrum of maths skills required for effectively doing Physics of JEE advance, NEET. Half of the course material and teaching time is spent on maths explanations and pure maths problems, primarily for acquiring working skills. The other half is meant for applying maths rigorously to several situations in Physics. This includes challenging numerical problems in various topics of Physics.

Topics Covered

Algebra

Algebra is the backbone of calculations in numerical problems in science. Also, it is the essential background for several other branches of Maths and Science.

Trigonometry

Trigonometry is based mainly on Pythagoras theorem. Almost all branches of Physics make use of trigonometric ratios. They are extensively used especially in Vectors, Statics, Dynamics, Geometric optics.

Coordinate geometry

Coordinate geometry forms the basis of learning other Maths topics such as Vectors, Functions. It is common in science to communicate in the form of curves drawn on coordinate plane. Graph based question in Physics are often asked in competitive exams.

Vectors

Physics is about studying physical quantities and many of them are vector quantities. Knowledge of Vector maths is so essential that it is regarded as a topic of Physics and included in Physics textbooks.

Relations and Functions

Physics is about studying physical quantities which are related to each other. Mathematics of Relations and Functions provides a sound perspective for studying interdependence of quantities. Also, it is the genesis of Calculus which further analyses the variation of quantities with respect to each other.

Shapes of standard curves

Laws of Physics and variations of physical quantities can be effectively explained in terms of a limited number of standard relations, functions, shape and properties of their curves. Graph based questions in Physics can be solved swiftly using mathematical properties of standard curves.

Calculus

In Physics, many a quantity such as velocity, acceleration are most appropriately defined essentially in the language of Calculus. Also, many a concept such as work, potential, flux in their most general form are properly understood essentially through Calculus. Learning them without Calculus is incomplete. Method of Calculus is often faster than other methods of solving a problem of Physics.

There is a vast difference between ability of solving problems before and after learning Algebra. Similarly, there is a vast difference between understanding of Physics before and after learning Vectors and Calculus.

Previous students of the course

Previous students could swiftly learn Physics topics to the depth required for JEE advance, NEET and confidently solve exercises of the same difficulty level. Most of them joined JEE advance lectures at KEC while they were half-way through this course. This course opens the option of completing several Physics topics of JEE advance, NEET while still in school. Every previous student explored this option to more or less extent.

Previous students reported that their challenge and pressure of JEE advance, NEET preparation in class 11, 12 was greatly reduced essentially due to completing 'Maths for Physics' course while they were in school.

Reference and contact details of previous students will be provided on request. Contact on 9821005500.

Venue

From June to February at KEC classroom Goregaon East. Online during lockdown.

Part A -: ESSENTIAL MATHS**(Maths background for effective learning of Physics for JEE advance, NEET)****Trigonometry:**Trigonometry of acute angles
Trigonometry of all angles
Solution of triangle**Coordinate geometry:**System of coordinates in 2D and in 3D
Distance formula in 2D and in 3D
Equation of straight line in 2D, Slope**Vectors in 1D, 2D and 3D space:**Scalar quantities & Vector quantities
Magnitude, Zero vector, unit vector
Geometric representation of vector
Addition and subtraction of vectors
Concept of position vector
Resolution of vectors
Unit vector along coordinate axes
Algebraic notation of vectors
Matrix notation of vectors
Convenience of algebraic & matrix notation
Scalar product and vector product of 2 vectors
Scalar product of 3 vectors
Geometric perspective of vector products**Algebra:**Solution of simultaneous equations,
Solution of quadratic equation, Nature of roots
Value of determinant**Relations and functions:**Relations, Functions as sets & as curves
Secant, Tangent, Normal, Asymptote
System of equations & its solution set**Standard curves:**Shapes & properties of standard curves
Scaling & translation of curves**Calculus :**Functions, Continuity, Differentiability
Infinite & infinitesimal, Limiting cases
Derivative and its various perspectives
Differentiation formulae, Chain rule
Differentiation of implicit functions
Application of derivatives, Maxima Minima
Integration and its various perspectives
Integration formulae
Indefinite and Definite integrals**Part B -: APPLICATION TO PHYSICS****(emphasis on concept questions & numericals similar to pattern of Engineering/Medical entrance exams)**

Units, dimensions & basics

Study of motion, Rectilinear motion

Force, momentum, work, energy

Circular motion, SHM

Gravitation

Electrostatics, Magnetism

Current electricity

Optics