VIMSEN

ACADEMY

LEARN BEYOND LIMITS

JEE MAIN 2026

SYLLABUS

MATHEMATICS

14 Units

Paper 1 (B.E./B.Tech.) • Part I of Paper 2A (B.Arch.) & Paper 2B (B.Planning)

EMPOWERING MINDS.
BUILDING FUTURES.

© 2026 Vimsen Academy | www.vimsenacademy.com

MATHEMATICS

JEE (Main) Paper 1 • B.E./B.Tech.

14 UNITS

1 UNIT 1: SETS, RELATIONS AND FUNCTIONS

Sets and their representation; Union, intersection and complement of sets and their algebraic properties; Power set; Relations, type of relations, equivalence relations, functions; one-one, into and onto functions, the composition of functions.

2 UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Complex numbers as ordered pairs of reals, Representation of complex numbers in the form $a + ib$ and their representation in a plane, Argand diagram, algebra of complex numbers, modulus and argument (or amplitude) of a complex number, Quadratic equations in real and complex number systems and their solutions; Relations between roots and coefficients, nature of roots, the formation of quadratic equations with given roots.

3 UNIT 3: MATRICES AND DETERMINANTS

Matrices, algebra of matrices, type of matrices, determinants and matrices of order two and three, evaluation of determinants, area of triangles using determinants; Adjoint and inverse of a square matrix; Test of consistency and solution of simultaneous linear equations in two or three variables using matrices.

4 UNIT 4: PERMUTATIONS AND COMBINATIONS

The fundamental principle of counting, permutations and combinations; Meaning of P(n, r) and C(n, r). Simple applications.

5 UNIT 5: BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS

Binomial theorem for a positive integral index, general term and middle term and simple applications.

6 UNIT 6: SEQUENCE AND SERIES

Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers, Relation between A.M. and G.M.

© Vimsen Academy. All rights reserved.

7 UNIT 7: LIMIT, CONTINUITY AND DIFFERENTIABILITY

Real-valued functions, algebra of functions; polynomial, rational, trigonometric, logarithmic and exponential functions; inverse functions. Graphs of simple functions. Limits, continuity and differentiability.

Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order up to two. Applications of derivatives: Rate of change of quantities, monotonic increasing and decreasing functions, Maxima and minima of functions of one variable.

8 UNIT 8: INTEGRAL CALCULUS

Integral as an anti-derivative, Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities.

Evaluation of simple integrals of the type:

$$\int \frac{dx}{x^2+a^2} \quad \int \frac{dx}{\sqrt{x^2 \pm a^2}} \quad \int \frac{dx}{a^2-x^2} \quad \int \frac{dx}{\sqrt{a^2-x^2}}$$

$$\int \frac{dx}{ax^2+bx+c} \quad \int \frac{dx}{\sqrt{ax^2+bx+c}} \quad \int \frac{(px+q)\,dx}{ax^2+bx+c} \quad \int \frac{(px+q)\,dx}{\sqrt{ax^2+bx+c}}$$

$$\int \sqrt{a^2 \pm x^2}\,dx \int \sqrt{x^2-a^2}\,dx$$

The fundamental theorem of calculus, properties of definite integrals. Evaluation of definite integrals, determining areas of the regions bounded by simple curves in standard forms.

9 UNIT 9: DIFFERENTIAL EQUATIONS

Ordinary differential equations, their order and degree, the solution of differential equation by the method of separation of variables, solution of a homogeneous and linear differential equation of the type:

$$\frac{dy}{dx} + p(x)\,y = q(x)$$

© Vimsen Academy. All rights reserved.

10 UNIT 10: CO-ORDINATE GEOMETRY

Cartesian system of rectangular coordinates in a plane, distance formula, section formula, locus and its equation, the slope of a line, parallel and perpendicular lines, intercepts of a line on the co-ordinate axis.

Straight line: Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, the distance of a point from a line, co-ordinate of the centroid, orthocentre and circumcentre of a triangle.

Circle, conic sections: A standard form of equations of a circle, the general form of the equation of a circle, its radius and centre, equation of a circle when the endpoints of a diameter are given, points of intersection of a line and a circle with the centre at the origin and sections of conics, equations of conic sections (parabola, ellipse and hyperbola) in standard forms.

11 UNIT 11: THREE DIMENSIONAL GEOMETRY

Coordinates of a point in space, the distance between two points, section formula, direction ratios and direction cosines and the angle between two intersecting lines. Equation of a line; Skew lines, the shortest distance between them and its equation.

12 UNIT 12: VECTOR ALGEBRA

Vectors and scalars, the addition of vectors, components of a vector in two dimensions and three-dimensional spaces, scalar and vector products.

13 UNIT 13: STATISTICS AND PROBABILITY

Measures of dispersion; calculation of mean, median, mode of grouped and ungrouped data, calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.

Probability: Probability of an event, addition and multiplication theorems of probability, Bayes' theorem, probability distribution of a random variable.

14 UNIT 14: TRIGONOMETRY

Trigonometrical identities and trigonometrical functions, inverse trigonometrical functions and their properties.

© Vimsen Academy. All rights reserved.