

MATHEMATICS

Algebra: Complex number as an ordered pair of real numbers; real and imaginary parts, absolute value, graphical representation of complex numbers, triangle inequality, complex conjugate co-ordinates, roots of a complex number.

Theory of quadratic equations and expressions; relation between roots and coefficients.

Arithmetic, geometric and harmonic progressions. Permutations and combinations. Elementary applications of mathematical induction. Binomial theorem. Determinants of order two and three and their elementary properties.

Matrices: definition, addition, subtraction and multiplication, transpose and adjoint of a matrix, inverse of a matrix.

Trigonometry: De Moivre's theorem and its applications; hyperbolic and inverse hyperbolic functions, separation of real and imaginary parts of a complex quantity.

Co-ordinate Geometry: Rectangular cartesian co-ordinates, distance between two points, area of a triangle. Straight lines, angle between two lines, parallel and perpendicular lines. Circle, equation of tangent and normal to a circle. Pole, polar, radical axis. Parametric representation. Parabola, tangent and normal, its properties.

Coordinate axes and planes in three-dimensional space, coordinates of point in space, distance between two points, section formula, direction cosines & direction ratios of a line joining two points, projection of the join of two points on a line, angle between two lines, whose direction ratios are given.

Calculus : Functions; into, onto and one-one function, polynomial, rational, trigonometric, logarithmic and exponential functions.

Notion of limit and continuity of a function, derivative of a function at a point; derivatives of sum, difference, product and quotient of functions, derivatives of composite functions, implicit functions and inverse trigonometrical, logarithmic and exponential functions. Logarithmic differentiations. Geometrical interpretation of derivative; successive differentiation, tangents and normals. Sign of the derivative and monotonicity. Maximum and minimum values of a function.

Integration as the inverse process of differentiation; integration by parts and by substitutions; definite integral and its application for the determination of areas (simple cases), properties of definite integrals.

Vectors: Addition of vectors, multiplication by a scalar; scalar product, cross product and scalar triple product with geometrical applications.

Probability: Probability; sum and product laws; conditional probability.