IIT-JAM - 2024

Mathematics

Sequence and Series of Real Number : -

Sequences and Series of real numbers, Convergent and Divergent Sequences, Bounded and monotone sequences , Convergence criteria for sequences of real numbers , Cauchy sequences , Absolute and conditional convergence , Tests of convergence for series of positive terms – comparison test , Ratio test , Root test , Leibnitz test for convergence of alternating series .

Functions of One Variable :-

Limit , Continuity , Intermediate value property , Differentiation , Rolle's Theorem , Mean value theorem , Maxima and Minima , Riemann integration and Its Properties.

Functions of Two Real Variables :-

Limit, Continuity , Partial derivatives , Differentiability , Maxima and Minima , Method of Lagrange multipliers , Homogeneous functions including Euler's theorem.

Integral Calculus :-

Integration as the inverse process of differentiation , Definite integrals and their properties , Fundamental theorem of integral calculus , Double and triple integrals , Change of order of integration , Calculating surface areas and volumes using triple integrals and applications.

Differential Equation :-

Ordinary differential equations of the first order of the form y' = f (x , y) , Bernoulli's equation , Exact differential equations , Integrating factor , Orthogonal trajectories , Homogeneous differential equations – separable solutions , Linear differential equations of second and higher order with constant coefficients , Method of variation of parameters , Cauchy – Euler equation.

Group Theory :-

Groups , Subgroups , Abelian Groups , Non – abelian groups , Cyclic groups , Permutation groups , Normal subgroups , Lagrange's theorem for finite groups , Group homomorphism and basic concepts of quotient groups.

Linear Algebra :-

Vector spaces , Linear dependence of vectors , Basis Dimension , Linear transformations , Matrix representation with respect to an ordered basis , Range space and null space , Rank – nullity theorem , Rank and inverse of a matrix , Determinant , Solutions of systems of linear equations , Consistency conditions , Eigenvalues and eigenvectors , Cayley -Hamilton theorem , Symmetric , Skew – symmetric , Hermitian , Skew – Hermitian , Orthogonal and unitary matrices.

Real Analysis :-

Interior points , Limit points , Open sets , Closed sets , Bounded sets , Connected sets , Compact sets , Completeness of R , Power series of real variable ,Taylor's and Maclaurin's , Domain of convergence , Term – wise differentiation and integration of power series.