



## NDA

### MATHS

- Concept of set, operations on sets, Venn diagrams.
- De Morgan laws, Cartesian product, relation, equivalence relation.
- Representation of real numbers on a line.
- Complex numbers—basic properties, modulus, argument, cube roots of unity.
- Binary system of numbers.
- Conversion of a number in a decimal system to a binary system and vice-versa.
- Arithmetic, geometric and harmonic progressions.
- Quadratic equations with real coefficients.
- The solution of linear inequations of two variables by graphs.
- Permutation and combination.
- Binomial theorem and its applications.
- Logarithms and their applications.

### MATRICES & DETERMINANTS

- Types of matrices
- Operations on matrices
- Determinant of a matrix
- Basic properties of determinants
- Adjoint and inverse of a square matrix
- Applications of matrices
- i. Solution of a system of linear equations in two or three unknowns using Cramer's rule
- ii. Solution of a system of linear equations in two or three unknowns using Matrix Method

### TRIGONOMETRY

- Angles and their measures in degrees and radians
- Trigonometric ratios
- Trigonometric identities including sum and difference formulae
- Multiple and sub-multiple angles
- Inverse trigonometric functions
- Applications such as height and distance and properties of triangles.

## **ANALYTICAL GEOMETRY OF 2 & 3 DIMENSIONS**

- Rectangular Cartesian Coordinate system
- Distance formula
- Equation of a line in various forms
- The angle between two lines
- The distance of a point from a line
- Equation of a circle in standard and general form
- Standard forms of parabola, ellipse, and hyperbola
- Eccentricity and axis of a conic
- A point in three-dimensional space and the distance between two points
- Direction cosines and direction ratios
- Equation of a plane and a line in various forms
- The angle between two lines and the angle between two planes
- Equation of a sphere

## **DIFFERENTIAL CALCULUS**

- Concept of a real-valued function including domain, range, and graph of a function.
- Composite functions and their properties including one-to-one, onto, and inverse functions.
- Understanding of the notion of limit and examples of standard limits.
- Continuity of functions and examples, including algebraic operations on continuous functions.
- Derivative of a function at a point, with geometrical and physical interpretation, and applications.
- Derivatives of sum, product, and quotient of functions, a derivative of a function with respect to another function, a derivative of a composite function, and second-order derivatives.
- Understanding increasing and decreasing functions.
- Application of derivatives in problems of maxima and minima.



## **INTEGRAL CALCULUS & DIFFERENTIAL EQUATIONS**

- Integration as the inverse of differentiation.
- Methods of integration: substitution and by parts.
- Standard integrals involving algebraic expressions, trigonometric, exponential, and hyperbolic functions.
- Evaluation of definite integrals.
- Determination of areas of plane regions bounded by curves.
- Applications of integrals.
- Definition of order and degree of a differential equation.
- Formation of a differential equation by examples.
- General and particular solutions of differential equations.
- Solutions of the first-order and first-degree differential equations of various types.
- Applications in problems of growth and decay.

## **VECTOR ALGEBRA**

- Vectors in two and three dimensions
- Magnitude and direction of a vector
- Unit and null vectors
- Addition of vectors
- Scalar multiplication of a vector
- Scalar product or dot product of two vectors
- Vector product or cross product of two vectors
- Applications in work done by a force and moment of a force and in geometrical problems

## **STATISTICS & PROBABILITY**

- Statistics
- Classification of data
- Frequency distribution
- Cumulative frequency distribution—examples
- Graphical representation—Histogram, Pie Chart, frequency polygon— examples
- Measures of Central tendency—Mean, median and mode
- Variance and standard deviation—determination and comparison
- Correlation and regression
- Probability:



- Random experiment, outcomes and associated sample space, events
- Mutually exclusive and exhaustive events, impossible and certain events
- Union and Intersection of events
- Complementary, elementary and composite events
- Definition of probability—classical and statistical—examples
- Elementary theorems on probability—simple problems
- Conditional probability, Bayes' theorem—simple problems
- Random variable as function on a sample space
- Binomial distribution, examples of random experiments giving rise to Binomial distribution.

## **ENGLISH**

- Grammar & usage
- Comprehension & cohesion
- Spotting errors
- Para Jumbling
- Fill in the blanks
- Synonyms & Antonyms
- Vocabulary
- Cloze Test
- Idioms & Proverbs
- Completion of Sentence & Para
- Sentence Correction & Improvement