

### NDA Paper I Examination Syllabus 2017

#### PAPER-I | MATHEMATICS Syllabus

##### 1. ALGEBRA

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 decimal system to binary system and vice-versa. Arithmetic, Geometric and Harmonic progressions. Quadratic equations with real coefficients. Solution of linear inequations of two variables by graphs. Permutation and Combination. Binomial theorem and its applications. Logarithms and their applications.

##### 2. MATRICES AND DETERMINANTS :

Types of matrices, operations on matrices. Determinant of a matrix, basic properties of determinants. Adjoint and inverse of a square matrix, Applications- Solution of a system of linear equations in two or three unknowns by Cramer's rule and by Matrix Method.

##### 3. TRIGONOMETRY :

Angles and their measures in degrees and in radians. Trigonometrical ratios. Trigonometric identities Sum and difference formulae. Multiple and Sub-multiple angles. Inverse trigonometric functions. Applications-Height and distance, properties of triangles.

##### 4. ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS:

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

##### 5. DIFFERENTIAL CALCULUS :

Concept of a real valued function—domain, range and graph of a function. Composite functions, one to one, onto and inverse functions. Notion of limit,

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Standard limits – examples. Continuity of functions – examples, algebraic operations on continuous functions. Derivative of function at a point, geometrical and physical interpretation of a derivative – applications. Derivatives of sum, product and quotient of functions, derivative of a function with respect to another function, derivative of a composite function. Second order derivatives. Increasing and decreasing functions. Application of derivatives in problems of maxima and minima.

### 6. INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS :

Integration as inverse of differentiation, integration by 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.

Definition of order and degree of a differential equation, formation of a differential equation by examples. General and particular solution of a differential equations, solution of first order and first degree differential equations of various types – examples. Application in problems of growth and decay.

### 7. 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 – work done by a force and moment of a force and in geometrical problems.

### 8. STATISTICS AND 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.

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