Syallabus for Recruitment Examination of PGT Mathematics

PAPER-I

UNIT -1: - SETS & FUNCTION

- **SETS:** - Sets and their representation, empty set, finite and infinite sets, equal sets. subsets of a set. subsets of the set of real numbers. Power set. Universal set. Union and intersection of sets. Difference of two sets. Complement of a set. De-Morgan's laws.
- **RELATION AND FUNCTION :**

  Ordered pair, Cartesian product of sets. Number of elements in the Cartesian product of two finite sets, Cartesian product of a set with itself. Definition of relation, pictorial diagram, domain, co- domain and range of a relation. Function as a special kind of relation from one set to another : Pictorial representation of a function, domain , co-domain and range of a function. Real valued function. Type of functions : constant function , identity function ,polynomial function, rational function, modulus function, signum function and greatest integer function with their graphs. Sum, difference , product and quotient of functions. Composite function and invertible function, binary operations.
- **Trigonometric Functions :-**

  Positive and negative angles: - Radian Measure and Degree measure and their conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Graph of Trigonometric functions. Expressing sin(x+y) and cos(x+y) in terms of sin x, sin y, cos x, and cos y. Identities related to sin2x, cos2x, tan2x, sin3x, cos3x and tan3x. Solutions of a trigonometric equation, solutions of triangles. Heights and distances, inverse trigonometric functions : definition, domain range,Principle value branches and its properties.

Unit-II : ALGEBRA

•Principle of Mathematical induction

Process of the proof by "The Principle of mathematical induction".

•Complex number and Quadratic Equations :-

Imaginary number, Complex numbers, Algebra of complex numbers, Argand plan and polar representation of complex number, statements of fundamental theorem of Algebra ,solution of quadratic equations. Modulus, conjugate and argument (amplitude) of a complex number, square root of a complex number. Cube roots of unity, triangle inequality.

•Linear Inequalities :-

Linear inequalities, Algebraic and graphical solutions of linear inequalities in one variable. Graphical solutions of linear inequalities in two variables. Absolute value, inequalities of means, Cauchy-Schwarz inequality.

•Permutation and Combination

Fundamental Principle of counting, factorial n, permutation and combination, derivation of formulae [P(n,r) , C(n,r)] and their simple applications.

•Binomial theorem :

Binomial theorem for positive integral index. Pascal's triangle, general and middle term in the binomial expansion, simple applications. Binomial theorem for any index. Properties of Binomial coefficients.

•Sequence and Series ;-

Sequence and series, Arithmetic Progression, Geometric Progression and Harmonic Progression, nth term and sum to n terms of A.P, G.P and H.P. Arithmetic mean (A.M), Geometric Mean (G.M) and Harmonic Mean (H.M), relation between A.M G.M and H.M. Special series.

Unit III :- Two dimensional and 3- dimensional Geometry

•Straight Lines :-

Slope of a line and angle between two lines, various forms of equation of a line. Parallel to axes, point-slope form, slope- intercept form, Two points form, intercept form and normal form, general equation of a line. Distance of a point from a line.

• Conic Section :-

Section of a cone:- Circle , ellipse, parabola and Hyperbola, equation of a circle, Standard equation of a circle, standard equation of parabola, ellipse and hyperbola and their simple properties.

• Three- dimensional Geometry

Coordinates of a point in space , distance between two points, section formula, direction cosines ,direction ratios, direction ratio of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, Angle between two lines . Shortest distance between two lines. Cartesian and Vector equations of a plane in different forms, angle between two planes and angle between a line and plane. Distance of a point from a plane.

Unit-IV Calculus:

•Limit and Derivatives :

Derivatives introduced as rate of change: both as that of distance function and geometrically, intuitive idea of limit. Definition of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions, derivative of composite functions, chain rule, derivative of inverse trigonometric functions, derivative of implicit function, exponential and logarithmic functions and derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's mean value theorem and their geometric interpretation.