MATHEMATICS
CLASS-XI
SEMESTER-I

Units-1: SETS AND FUNCTIONS

1 **Sets**:

Sets and their representations. Empty & Infinite sets. Equal sets , Subsets ,subsets of the set of real numbers especially intervals (with notations). Power sets, Universal set, Venn diagrams, Union and Intersection of sets, Difference of sets , Complement of a set.

2 **Relations & Function** :

Ordered pairs, Cartesians product of sets, Numbers of elements in the Cartesian product of two finite sets. Cartesian product of the reals with itself (up to R x R x R) . Definition of relation, pictorial diagrams, 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 and range of a function. Real valued function of the real variable, domain and range of these function. Constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.

3 **Trigonometric Functions**

Positive and negative angles. Measuring angles in radians & in degrees and conversions from one measure to another. Definition of trigonometric functions with the help of unit circle . Truth of the identity $\sin^2 x + \cos^2 x = 1$, for all x. Signs of trigonometric functions and sketch of their graphs . Expressing $\sin(x+y)$ and $\cos(x+y)$ in terms of sinx,siny, cos x & cos y.

Deducing the identities like following.

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y} \qquad \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2} \qquad \cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2} \qquad \cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

indentities related to sin2x, cos2x, tan2x , sin3x, cos3x and tan3x .General solution of trigonometric equations of the type $\sin\theta = \sin\alpha$, $\cos\theta$ and $\tan\theta = \tan\alpha$.Proofs and simple applications of sine and cosine formulae.

Unit-II ALGEBRA

1 **Principle of Mathematical Induction** :

Processes of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers . The principle of mathematical induction and simple applications.

2 **Complex Numbers and Quadratic Equations** :

Need for complex numbers , especially $\sqrt{-1}$ to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system.

3 **Liner Inequalities** :

Liner inequalities, Algebraic solutions of liner inequalities in one variable and their representation on the number line . Graphical solution of linear inequalities in two variables. Solution of system of liner inequalities in two variables-graphically.

Unit II ALEGBRA
1   **Sequence of series** :

Sequence and Series , Arithmetic progression (A.P), arithmetic mean (A.M) , Geometric progression (G.P), general term of a G.P, sum of n terms of a G.P . Geometric mean (G.M), relation between A.M and G.M . Sum to n term of the special series $\sum n$,. $\sum n^2, \sum n^3$.

2   **Permutations & Combinations** :

Fundamental principal of counting, Factorial n. Permutations and combinations, derivation of formulae and their connections, simple applications.

3   **Binomial Theorem** :

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle , general and middle term in binomial expansion, simple applications.

Unit III Co-ordinate Geometry

1   **Straight Lines** :

Brief recall of 2D from earlier classes , slope of a line and angle between two lines . Various forms of equations of a line : parallel to axes , point – slope form , slop – intercept form, two –point form , intercepts form and normal form ,General equation of a line , Distance of a point from a line.

2   **Conic Sections** :

Sections of a cone ; circles , ellipse , parabola, hyperbola ,a point , a straight line and a pair of intersecting lines as a degenerated case of a conic section . Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle .

3   **Introduction to Three-dimensional Geometry**

Coordinate axes and coordinate planes in three dimensions . Coordinates of a point .Distance between two points and section formula.

Unit-IV : CALCULUS

1   **Limits 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. Derivatives of polynomial   and trigonometric functions.

Unit- V: MATHEMATICAL REASONING

1   **Mathematical Reasoning**

Mathematically acceptable statements .Connecting words / phrases – consolidating the understanding of "if and only if (necessary and sufficient) condition", " implies "   " and/or" ,   "implied by",   "and", "or", "there exists"   and their use through variety of examples related to real life and Mathematics , Validating the statements involving the connecting words- difference between contradiction, converse and contapositive.

Unit- VI: STATISTICS & PROBABILITY

1. Statistics:

Measure of dispersion: mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2.Probaility:

Random experiments: outcomes, sample spaces(set representation).Events: occurrence of events , 'not', and 'or' events, exhaustive events, mutually exclusive events. Axiomatic (set theoretic) probability, connection with the theories of earlier classes. Probability of an event , probability of 'not', 'and' & 'or' events.