

**COURSE STRUCTURE**  
**CLASS XI (2021-22)**  
**TERM - I**

One Paper

**90 Minutes**

**Max Marks: 40**

| No.          | Units                      | Marks     |
|--------------|----------------------------|-----------|
| I.           | Sets and Functions         | 11        |
| II.          | Algebra                    | 13        |
| III.         | Coordinate Geometry        | 6         |
| IV.          | Calculus                   | 4         |
| V.           | Statistics and Probability | 6         |
|              | Total                      | 40        |
|              | Internal Assessment        | 10        |
| <b>Total</b> |                            | <b>50</b> |

\*No chapter-wise weightage. Care to be taken to cover all the chapters.

**Unit-I: Sets and Functions**

**1. Sets**

Sets and their representations. Empty set. Finite and Infinite sets. Equal sets. Subsets. Subsets of a set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets.

**2. Relations & Functions**

Ordered pairs. Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the set of reals with itself ( $\mathbb{R} \times \mathbb{R}$  only). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions, with their graphs.

## Unit-II: Algebra

### 1. Complex Numbers and Quadratic Equations

Need for complex numbers, especially  $\sqrt{-1}$ , to be motivated by inability to solve some of the quadratic equations. Algebraic properties of complex numbers. Argand plane. Statement of Fundamental Theorem of Algebra, solution of quadratic equations (with real coefficients) in the complex number system.

### 2. Sequence and 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., infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M.

## Unit-III: Coordinate Geometry

### 1. Straight Lines

Brief recall of two dimensional geometry from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axis, point -slope form, slope-intercept form, two-point form, intercept form and normal form. General equation of a line. Distance of a point from a line.

## Unit-IV: Calculus

### 1. Limits

Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions

## Unit-V: Statistics and Probability

### 1. Statistics

Measures of Dispersion: Range, mean deviation, variance and standard deviation of ungrouped/grouped data.

| INTERNAL ASSESSMENT                                                                      | 10 MARKS |
|------------------------------------------------------------------------------------------|----------|
| Periodic Test                                                                            | 5 Marks  |
| Mathematics Activities: Activity file record +Term end assessment of one activity & Viva | 5 Marks  |

**Note:** For activities NCERT Lab Manual may be referred

## TERM - II

One Paper

Max Marks: 40

| No.   | Units                              | Marks |
|-------|------------------------------------|-------|
| I.    | Sets and Functions (Cont.)         | 8     |
| II.   | Algebra (Cont.)                    | 11    |
| III.  | Coordinate Geometry (Cont.)        | 9     |
| IV.   | Calculus (Cont.)                   | 6     |
| V.    | Statistics and Probability (Cont.) | 6     |
|       | Total                              | 40    |
|       | Internal Assessment                | 10    |
| Total |                                    | 50    |

### Unit-I: Sets and Functions

#### 1. Trigonometric Functions

Positive and negative angles. Measuring angles in radians and in degrees and conversion 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. Domain and range of trigonometric functions and their graphs. Expressing  $\sin(x \pm y)$  and  $\cos(x \pm y)$  in terms of  $\sin x$ ,  $\sin y$ ,  $\cos x$  &  $\cos y$  and their simple applications. Deducing identities like the following:

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

$$\sin \alpha \pm \sin \beta = 2 \sin \frac{1}{2}(\alpha \pm \beta) \cos \frac{1}{2}(\alpha \mp \beta)$$

$$\cos \alpha + \cos \beta = 2 \cos \frac{1}{2}(\alpha + \beta) \cos \frac{1}{2}(\alpha - \beta)$$

$$\cos \alpha - \cos \beta = -2 \sin \frac{1}{2}(\alpha + \beta) \sin \frac{1}{2}(\alpha - \beta)$$

Identities related to  $\sin 2x$ ,  $\cos 2x$ ,  $\tan 2x$ ,  $\sin 3x$ ,  $\cos 3x$  and  $\tan 3x$ .

## Unit-II: Algebra

### 1. Linear Inequalities

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Graphical method of finding a solution of system of linear inequalities in two variables.

### 2. Permutations and Combinations

Fundamental principle of counting. Factorial  $n$ .  $(n!)$  Permutations and combinations, formula for  ${}^n P_r$  and  ${}^n C_r$ , simple applications.

## Unit-III: Coordinate Geometry

### 1. Conic Sections

Sections of a cone: circles, ellipse, parabola, hyperbola. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

### 2. 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. Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically. 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: Statistics and Probability

### 1. Probability

Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Probability of an event, probability of 'not', 'and' and 'or' events.

| INTERNAL ASSESSMENT                                                                      | 10 MARKS |
|------------------------------------------------------------------------------------------|----------|
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**Note:** For activities NCERT Lab Manual may be referred