CLASS XI

TOTAL PERIODS – 240

Unit I: Sets and Functions

1. Sets   20 Periods
Sets and their representations, Empty set, Finite and Infinite sets, Equal sets, Subsets, Subsets of a set of real numbers especially intervals (with notations). Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement.

2. Relations and Functions   20 Periods
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 (upto R x R x R). 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. Sum, difference, product and quotients of functions.

3. Trigonometric Functions   20 Periods
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 $sin2x + cos2x = 1$, for all x. Signs of trigonometric functions. Domain and range of trigonometric functions and their graphs. Expressing sin (x±y) and cos (x±y) in terms of sinx, siny, cosx & cosy 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 sin2x, cos2x, tan2 x, sin3x, cos3x and tan3x.

Unit II: Algebra

1. Complex Numbers and Quadratic Equations   10 Periods
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

2. Linear Inequalities   10 Periods
Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the

number line.

3. Permutations and Combinations   10 Periods
Fundamental principle of counting. Factorial n. (n!) Permutations and combinations, derivation of Formulae for ^nP_r and ^nC_r and their connections, simple applications.

4. Binomial Theorem   10 Periods
Historical perspective, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, simple applications.

5. Sequence and Series   10 Periods
Sequence and Series. 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   15 Periods
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, Distance of a point from a line.

2. Conic Sections   25 Periods
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   10 Periods
Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points.

Unit IV: Calculus

1. Limits and Derivatives   40 Periods
Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. Definition of derivative relate it to scope 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. Statistics   20 Periods
Measures of Dispersion: Range, Mean deviation, variance and standard deviation of ungrouped/grouped data.

2. Probability   20 Periods
Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories of earlier classes. Probability of an event, probability of 'not', 'and' and 'or' events.

Disclaimer
Dropped Topics/ Chapter

Chapter 1 - Sets
1.7 Power Set, Exercise 1.3 Ques. 5
1.12 Practical Problems on Union and Intersection of Two Sets
Exercise 1.6
Examples 31–34 and Ques. 6–7 (Miscellaneous Exercise)
Ques. 13–16 (Miscellaneous Exercise), Last Point in the Summary on the Page
Last Point in the Summary

Chapter 3 - Trigonometric Functions
3.5 Trigonometric Equations (up to Exercise 3.4)
Last five points in the Summary
3.6 Proofs and Simple Applications of Sine and Cosine Formulae

Chapter 4 - Principle of Mathematical Induction
Full Chapter

Chapter 5 - Complex Numbers
5.5.1 Polar Representation of a Complex Number
5.6 Quadratic Equation
Example 11 and Exercise 5.3
Examples 13, 15, 16
Ques. 5–8, 9 and 13 (Miscellaneous Exercise)
Last three points in the Summary
5.7 Square-root of a Complex Number

Chapter 6 - Linear Inequalities
6.4 Graphical Solution of Linear Inequalities in Two Variables
6.5 Solution of System of Linear Inequalities in Two Variables
Last three points in the Summary

Chapter 8 - Binomial Theorem
8.3 General Middle Terms
Example 17 and Ques. 1–3, and 8 (Miscellaneous Exercise)
Last two points in the Summary

Chapter 9 - Sequences and Series
9.4 Arithmetic Progression (A.P.) (up to Exercise 9.2)
9.7 Sum to n terms of Special Series
Examples 21, 22 and 24
Ques. 1–6, 12, 15, 16, 20, 23–26 (Miscellaneous Exercise)
Point 3 and 4 in the Summary

Chapter 10 - Straight Lines

10.2.4 Collinearity of Three Points (Examples 4–5 and Ques. 8, 13–14 in Exercise 10.1)

10.3.6 Normal Forms

Ques. 8 in Exercise 10.2

10.4 General Equation of a Line

Ques. 3 in Exercise 10.3

Ques. 2 (Miscellaneous Exercise)

Fourth Last Point in the Summary

10.6 Equation of Family of Lines Passing Through the Points of Intersection of Two Lines

10.7 Shifting of Origin

Chapter 11 - Conic Sections

11.5.2 Special Cases of an Ellipse

Chapter 12 - Introduction to Three Dimensional Geometry

12.5 Section Formula

Exercise 12.3

Ques. 4 and 5 (Miscellaneous Exercise)

Last Three Points in the Summary

Chapter 14 - Mathematical Reasoning

Full Chapter

Chapter 15 - Statistics

15.6 Analysis of Frequency Distribution

Ques. 6 (Miscellaneous Exercise) and last point in the Summary

Chapter 16 - Probability

16.1 Introduction

16.2 Random Experiment

First Two Points in the Summary