Mathematics (Class XI – Punjab Board)

This document contains a **clean extraction of all chapters, topics, and sub-topics** from the official Class XI Mathematics textbook (Punjab Curriculum & Textbook Board), based directly on the textbook structure and headings.

Unit 1: Complex Numbers

1.1 Complex Numbers

- Definition of complex numbers
- Real and imaginary parts
- Representation of complex numbers

1.2 Operations on Complex Numbers

- Addition of complex numbers
- Subtraction of complex numbers
- Multiplication of complex numbers

1.3 Complex Numbers as Ordered Pairs of Real Numbers

- Ordered pair representation
- Equality of complex numbers
- Properties of ordered pair representation

1.4 Properties of Fundamental Operations on Complex Numbers

- Closure
- Associativity
- Commutativity
- Identity elements
- Inverses

1.5 Argand Diagram

- Representation on Argand plane
- Modulus of a complex number
- Argument of a complex number

1.6 Square Root of a Complex Number

- Definition
- Method to find square roots

1.7 Complex Polynomials as Product of Linear Factors

- Polynomial functions
- Fundamental theorem of algebra
- Factorization of polynomials

1.8 Solution of Quadratic Equation by Completing the Square Method

- Completing the square
- Complex roots of quadratic equations

1.9 Cube Roots of Unity

- Definition
- Properties of cube roots of unity

1.10 Fourth Roots of Unity

- Definition
- Properties of fourth roots of unity

1.11 Polar Coordinates System

- Polar representation of points
- Relation between rectangular and polar coordinates

1.12 Polar Form of a Complex Number

- Modulus–argument form
- Principal argument

1.13 Operations on Complex Numbers in Polar Form

- Multiplication in polar form
- Division in polar form

Unit 2: Functions and Graphs

- Concept of a function
- Domain and range
- Types of functions
- Graphs of functions
- Inverse functions

Unit 3: Theory of Quadratic Functions

- Quadratic functions
- Graphs of quadratic functions
- Nature of roots
- Maximum and minimum values

Unit 4: Matrices and Determinants

- Types of matrices
- Matrix operations
- Determinants
- Properties of determinants
- Inverse of a matrix

Unit 5: Partial Fractions

- Proper and improper fractions
- Decomposition of partial fractions
- Repeated and non-repeated factors

Unit 6: Sequences and Series

- Sequences
- Arithmetic sequence (A.P.)
- Geometric sequence (G.P.)
- Arithmetic series
- Geometric series

Unit 7: Permutations and Combinations

- Fundamental principle of counting
- Permutations
- Combinations
- Applications

Unit 8: Mathematical Induction and Binomial Theorem

Mathematical Induction

- Principle of mathematical induction
- Applications

Binomial Theorem

- Statement of binomial theorem
- Binomial expansion
- Properties of binomial coefficients

Unit 9: Division of Polynomials

- Division algorithm
- Remainder theorem
- Factor theorem

Unit 10: Trigonometric Identities

- Basic trigonometric identities
- Sum and difference formulas
- Product-to-sum formulas

Unit 11: Trigonometric Functions and Their Graphs

- Trigonometric functions
- Graphs of sin, cos, tan
- Amplitude and period

Unit 12: Limit and Continuity

- Concept of limits
- Algebra of limits
- Continuity of functions

Unit 13: Differentiation

- Concept of derivative
- Derivatives of algebraic functions
- Rules of differentiation

Unit 14: Vectors in Space

- Scalars and vectors
- Vector addition
- Scalar (dot) product
- Vector (cross) product

Source: Official Class XI Mathematics Textbook (Punjab Board) filecite turn0file0