

Mathematics-I Chapter (Sem -1)

Topics : [Computer engineering](#)

Written on [March 06, 2024](#)

1. [Sets and Functions:](#)

- [Introduction to sets](#)
- Types of sets (finite, infinite, empty, etc.)
- Operations on sets (union, intersection, complement, etc.)
- Functions: Definition, types of functions (one-to-one, onto), composition of functions

2. [Basics of Algebra:](#)

- Real numbers and their properties
- Algebraic expressions
- Laws of algebra (commutative, associative, distributive)
- Polynomials and polynomial operations (addition, subtraction, multiplication)

3. [Linear Equations and Matrices:](#)

- Linear equations and their solutions
- Matrix algebra: Basic operations (addition, scalar multiplication, matrix multiplication)
- Types of matrices (square, symmetric, identity, etc.)
- Determinants and their properties

4. [Quadratic Equations:](#)

- Quadratic equations and their solutions
- Nature of roots (real, complex, equal, distinct)
- Quadratic formula, discriminant

5. [Sequence and Series:](#)

- Arithmetic sequences and series
- Geometric sequences and series
- Summation notation (sigma notation)
- Arithmetic mean, geometric mean

6. [Limits and Continuity:](#)

- Introduction to limits
- Calculation of limits (algebraic methods, L'Hopital's rule)
- Continuity of functions

7. **Differentiation:**

- Definition of derivative
- Differentiation rules (power rule, product rule, quotient rule, chain rule)
- Higher-order derivatives
- Applications of derivatives (maxima and minima, rate of change)

8. **Integration:**

- Indefinite integrals and integration techniques (substitution, integration by parts)
- Definite integrals and their properties
- Fundamental theorem of calculus
- Applications of integration (area under curves, volumes of solids)

9. **Introduction to Differential Equations:**

- Definition and types of differential equations (ordinary, partial)
- Solution techniques for first-order differential equations (separation of variables, integrating factor)

10. **Complex Numbers:**

- Introduction to complex numbers
- Arithmetic operations with complex numbers
- Polar form and exponential form of complex numbers
- De Moivre's theorem

11. **Introduction to Probability:**

- Basic concepts of probability (sample space, events, probability axioms)
- Probability of events (addition rule, multiplication rule)
- Conditional probability and independence

12. **Statistics:**

- Measures of central tendency (mean, median, mode)
- Measures of dispersion (range, variance, standard deviation)
- Introduction to probability distributions (binomial, normal)