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)