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)