

BA / BSc 2nd SEMESTER
DISCIPLINE SPECIFIC COURSE (CORE)

BCA121C2: COMPUTER APPLICATIONS: COMPUTING MATHEMATICS

CREDITS: THEORY: 4; TUTORIAL: 2
MAX. MARKS: THEORY: 60; TUTORIAL: 30
MIN. MARKS: THEORY: 24; TUTORIAL: 12

Course Objectives: The course will introduce students to various aspects of Mathematics used in Computer Science. The course will fulfill the eligibility requirements of Mathematics for the BCA program and will also make students eligible for the MCA program even if they do not have Mathematics at 10+2 level.

Theory (4 Credits)

Unit 1:

Set Theory: Sets, Types, Operations, Properties and Identities. Relations, Domain & Range, Types and Properties of Relations. Introduction to Functions & Relations, Domain, Co-Domain, Range, Types of functions, Compositions, Operations on functions, Pictorial Representations,

Probability: Random Experiments, Sample Spaces, Events, Algebra of Events, Definitions of Probability, Conditional Probability, Independent Events,

Unit 2:

Limits and Continuity: Limit of a Function, Algebra of Limits, Simplification and Evaluation of Limits. Standard Limits, Continuity, Geometric Meaning, Continuity in Open and Closed Intervals. Differentiability, Properties of Differentiability.

Differentiation: Derivatives of some Common Functions, Rules to Find Derivatives, Second Order Derivatives, Geometric Interpretation of Derivative.

Unit 3:

Theory of Equations: Complex Numbers, Quadratic, Cubic Equations with complex coefficients and roots.

Counting: Sum Rule, Product Rule, Subtraction Rule, Division Rule, Pigeonhole Principle. Permutations, Combinations, Binomial Theorem. Permutations and Combinations with Repetition.

Sequences & Series, AP, GP, HP. Introduction to statistics.

Unit 4:

Matrices & Determinants: Matrix, Types of Matrices, Matrix Operations, Add, Sub, Multiply, Divide, Transpose. Determinants, Minors and Cofactors, Properties of Determinants. Elementary Transformations. Solution of Linear Equations by Matrix Method & Determinants

Tutorials (2 Credits)

Credit 1: Constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphics. Sum, difference product and quotients of functions, Application of Binary Operations, Bayes Theorem, Random Variables and Probability Distributions., l'Hospital Rule, Ab-initio method

Credit 2:

Maxima and Minima of Functions, Monotonicity, Mean Value Theorems, Application of Binomial Theorem, Different Types of Means. Exponent & Exponential Series, Measure of dispersion: mean deviation, variance and standard deviation of ungrouped/ grouped data. Cramer's Rule, Adjoint and Inverse of Matrix.

Textbook:

1. *Mathematics Textbook for Class XI, NCERT*
2. *Mathematics Textbook for Class XII, NCERT*
3. *Problems in Mathematics for JEE with Summarized Concepts, Vol I + II (Wiley, 2018)*

Recommended Books:

1. *A text book of Mathematics by R.S. Agarwal*
2. *Integral calculus by Shanti Narayan*
3. *Differential Calculus by Shanti Narayan*
4. *Engineering Mathematics by Grewal*
5. *Engineering Mathematics by Erwin Kreyzing*