

MATHEMATICS FOR COMPUTER SCIENCE

Subject Code : 18BS3CS02
Credits : 04

Total Hours: 60
L-T-P : 3-1-0

Prerequisite : Basic Mathematics

Course objectives:

- Perform set operations and also to solve logical reasoning to verify the correctness of the logical statements.
- Understand the properties of relations and apply to find the partially ordered sets and lattices.
- Highlight the concepts of graphs to understand Mathematical structures and techniques in computing applications.
- To provide the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and computer networks etc.
- Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.

PART A

UNIT I

10 hours

Fundamentals

Sets and subsets, Operations on sets, Sequences. Logic: Propositions and Logical Operations, Conditional statements, Methods of proof, Mathematical Induction.

UNIT II

12 hours

Counting

Pigeonhole Principle, Recurrence relations. Relations and Digraphs: Product sets and partitions, relations and digraphs, paths in relations and digraphs, properties of relations, equivalence relations, operations on relations, transitive closure and Warshall's algorithm. Partially ordered sets, lattices, Derangements, Rook polynomials.

UNIT III

13 hours

Graph Theory-I

Definitions and Examples, Sub graphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits, Hamilton Paths and Cycles, Graph Coloring, and Chromatic Polynomials, Bipartite graphs, Planar graphs, Euler's formula. Trees and their basic properties. Optimization and Matching

UNIT IV

Statistical methods and Probability

12 hours

Correlation-Karl Pearson's, Co-efficient of correlation-problems. Regression analysis- lines of regression-problem. Curve fitting by the method of least squares- fitting the curves of the form, $y = ax + b$, $y = ax^2 + bx + c$ and $y = ae^{bx}$. Basic concepts of probability, Axiomatic and frequency definition of probability, Addition and multiplication law of probability, conditional probability and Baye's Theorem (without proofs).

UNIT V

Random Variables

13 hours

Random variables, types of random variables, probability function and cumulative distribution function, discrete probability distributions (Binomial and Poisson) and Continuous probability distributions (Exponential and Normal). Concept of Joint Probability-Joint probability distribution, Discrete and Independent random variables. Expectation, Covariance, Correlation coefficient.

Text Books:

1. Discrete and Combinatorial Mathematics, Ralph P Grimaldi, 5th Edition. Pearson Education
2. Fundamentals of Mathematical Statistics by Kapoor & Gupta: Sultan Chand and Sons.

Reference Books

1. Discrete Mathematical Structures, Kolman, Busby & Ross : 5th Edition, 2006.
2. Discrete Mathematics for Computer Science, Gary Haggard & John Schlipf Cengage, Thomson 2006.
3. Higher Engineering Mathematics, B.V.Ramana, 26th Reprint Edition McGraw Hill Education (India) Private Limited, 2016