

Course Syllabus

BCSC1012: DESIGN & ANALYSIS OF ALGORITHMS

Prerequisite: This course requires basic knowledge of Data structures and Algorithms.

Credits: 03

Semester V

L-T-P: 3-0-0

Module No.	Content	Teaching Hours
I	Introduction: Algorithms, analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Recurrence relation, Sorting and Order Statistics - Divide-Conquer approach with Quick sort, Merge sort, Heap sort, Shell sort, Comparison of sorting algorithms, Sorting in linear time. Advanced Data Structures: Red-Black Tree-Properties, Insertion, B Trees-Creation, Insertion, and Deletion. Introduction to Binomial Heaps-Merge, Union Operation, Fibonacci Heaps: Insertion, Finding Minimum Key, Union, Amortized Cost	20
II	Graph: Graph Traversal-Breadth First Search, Depth First Search, Greedy Methods: Fractional Knapsack, Activity Selection Problem. Minimum Spanning trees – Prim's and Kruskal's algorithms. Single source shortest paths - Dijkstra's and Bellman Ford algorithms. Dynamic programming: 0/1Knapsack, LCS, Matrix Chain Multiplication. All pair shortest paths – Warshal's and Floyd's algorithms Backtracking: Graph Coloring, n-Queen Problem, Hamiltonian Cycles, Sum of Subset Branch and Bound: Travelling Salesman Problem Introduction to P, NP, NP-complete, NP-Hard	20

Text Book:

- Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest(2022), *Introduction to Algorithms*, Fourth edition, Prentice Hall of India.

Reference Books:

- Gilles Brassard Paul Bratley (1996), " *Fundamentals of Algorithms*", Prentice Hall.
- Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran (2008), " *Fundamentals of Computer Algorithms*", Orient Longman Pvt. Ltd.
- Levitin (2008), " *An Introduction to Design and Analysis of Algorithms*", Pearson.

Outcome:

After completion of this course, students will be able to design and analyze the algorithms to solve any problem and proper use of the data structure to improve the efficiency of the algorithms.