

MCA207: Design and Analysis of Algorithm

Teaching Scheme

Lectures: 4 hrs/Week

Tutorial: 1 hr/Week

Credits: 4

Examination Scheme

Class Test -12Marks

Teachers Assessment - 6Marks

Attendance - 12 Marks

End Semester Exam - 70 marks

Prerequisite: - C Programming Concepts, Data Structure Concepts, Discrete Mathematics concepts.

Course Objectives:

1. To analyze the asymptotic performance of algorithms.
2. To analyze of Advanced Data Structure Concepts.
3. To analyze Greedy and Dynamic Programming Concepts and its application
4. To analyze concepts of Graphs.
5. To analyze Branch and Bound and Backtracking Concepts and its applications.
6. To analyze Deterministic and Non deterministic Problem.

UNIT I (10 Hours)

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis Of algorithm-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Recurrences and their solutions, Amortized analysis.

Divide and Conquer: General method, applications-Binary search, Quick sort, Merge sort, Heap Sort, Strassen's matrix multiplication.

UNIT II (9 Hours)

Advanced Data Structure: Red Black Tree, Binomial Heap, B tree, Fibonacci Heap. **Disjoint Sets:** disjoint set operations, union and find algorithms, spanning trees, connected components and biconnected components.

UNIT III (10 Hours)

Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees.

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, Travelling sales person problem.

UNIT IV (10 Hours)

Graph Algorithm: Graph Algorithms, BFS, DFS, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow.

UNIT V (9 Hours)

Backtracking: General method, applications-n-queen problem, graph colouring, Hamiltonian cycles.

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.


Head


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UNIT VI (8 Hours)

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

Text and Reference Books:

Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson et al, PHI, 2nd Edition 2001
Computer Algorithms: Introduction to Design and Analysis, Sara Baase and Allen Van Gelder, Pearson Education, 3rd Edition 2000
Algorithm Design, Jon Kleinberg and Eva Tardos, Pearson Education, 1st Edition 2005
The Design and analysis of Algorithms, A V Aho et al, Pearson Education, 3rd Edition 2007
Fundamentals of computer Algorithm, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia Publication 2009

Course Outcomes:

After completing the course, students will be able to:

1. Understand Asymptotic Notation.
2. Understand Advanced Data Structure Concepts and searching concepts.
3. Understand the Concepts of Greedy Methods and Dynamic Programming methods and solve problem related with its.
4. Understand the concepts of Graph.
5. Understand the concepts of Backtracking and Branch and bound Concepts and solve problem related with its.
6. Understand the Concepts of NP hard and NFA DFA Concepts.



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