DESIGN AND ANALYSIS OF ALGORITHMS

Course Code: KG21CS617

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B. Tech. III Year II - Semester

Prerequisites:

Course Objectives: The objectives of this course for the student are to:

1. Introduces the notations for analysis of the performance of algorithms
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide – and - conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best case analysis.
5. Explains the difference between tractable and intractable problems, andintroduces the problems that are P, NP and NP complete.

Course Outcomes: After completion of this course, the students will be able to

CO1: Analyze the complexity of algorithms by applying the knowledge ofasymptotic notations and recurrence methods.

CO2: Examine the performance of the Unions and Backtracking algorithms

CO3: Implement the given problem and identify appropriate algorithm design technique for problem solving.

CO4: Perceive and apply different algorithm design paradigms to findsolutions for computing problems.

CO5: Apply the knowledge of NP - hard and NP - Complete complexity classesto classify decision problems

UNIT-I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT-II

Disjoint Sets: Disjoint set operations, union and find algorithms Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT-III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT-IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-V

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