VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester – CSE & IT	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CS03) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:

- To reinforce algorithms analysis methods
- To analyse running time of an algorithm
- To understand different algorithm design strategies
- To familiarity with an assortment of important algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply algorithm design techniques and concepts to solve given engineering problem
CO-2: Analyze running times of algorithms using asymptotic analysis
CO-3: Develop efficient algorithms for computational tasks
CO-4: Computing complexity measures of algorithms

UNIT – I:

Introduction: Characteristics of algorithm. Analysis of algorithms: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs.
Divide and conquer General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication. Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT – II:

Fundamental Algorithmic Strategies: Greedy method: General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem, Huffman Codes.

UNIT – III:

Dynamic Programming: General method, Principle of optimality, applications-Multistage graphs, Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT – IV:

Backtracking General method, applications- N-Queen problem, Sum of subsets problem, Graph coloring, 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

UNIT – V:

Graph and Pattern Matching Algorithms: Graph Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS), connected and biconnected components, Topological Sorting.

Pattern Matching Algorithms: Brute Force method, Knuth-Morris-Pratt algorithms

UNIT – VI:

NP Hard and NP-Complete problems: P, NP, NP-complete and NP-hard. Cook's theorem

Randomized Algorithm: Hiring Problem, Randomized Quick Sort

TEXT BOOKS:

1. Fundamentals of Computer Algorithms – E.Horowitz et al,Galgotia Publications
2. Introduction to Algorithms, 4th Edition, Thomas H.Cormen, Charles E.Lieserson, Ronald L.Rivest and Clifford Stein, MIT Press/McGraw-Hill

REFERENCES:

1. Algorithm Design, 1st Edition, Jon Kleinberg and EvaTardos, Pearson
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T. Goodrich and Roberto Tamassia, Wiley
3. Algorithms – A Creative Approach, 3rd Edition, UdiManber, Addison-Wesley, Reading, MA
4. Introduction to the Design and Analysis of Algorithms,Anany Levitin, 3rd Edition, Pearson Publications