**CONTENTS**

**UNIT I**

**Design and Analysis of Algorithms Asymptotic notations and their significance, introduction to RAM model of computation, complexity analysis of algorithms, worst case and average case. Basic introduction to algorithmic paradigms like divide and conquer, recursion, greedy, etc.**

**UNIT II**

**Searching: binary search trees, balanced binary search trees, AVL trees and red-black trees, B-trees, skip lists, hashing Priority queues, heaps, Interval trees, tries. Order statistics. Sorting: comparison based sorting - quick sort, heap sort, merge sort: worst and average case analysis. Decision tree model and (worst case) lower bound on sorting. Sorting in linear time - radix sort, bucket sort, counting sort, etc. String matching.**

**UNIT III**

**Graph Algorithms: BFS, DFS, connected components, topological sort, minimum spanning trees, shortest paths - single source and all pairs.Models of computation: RAM model and its logarithmic cost. Formal introduction to algorithmic paradigms: divide and conquer, recursion, dynamic programming, greedy, branch and bound, etc. Advanced data structures: Fibonacci heap, union-find, splay trees. Amortized complexity analysis**

**UNIT IV**

**Randomized algorithms: Randomized algorithms to be introduced a bit early, i.e., before NP-completeness to highlight randomization as an algorithmic technique. Application areas: Geometric algorithms: convex hulls, nearest neighbor, Voronoi diagram, etc. Algebraic and number-theoretic algorithms: FFT, primality testing, etc.**

**UNIT V**

**Graph algorithms: network flows, matching, etc. Optimization techniques: linear programming Reducibility between problems and NP-completeness: discussion of different NP-complete problems like satisfiability, clique, vertex cover, independent set, Hamiltonian cycle, TSP, knapsack, set cover, bin packing, etc. Backtracking, branch and bound, Approximation algorithms: Constant ratio approximation algorithms.**

**REFERENCE BOOKS**


1. **E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galotia Publication**
2. **T .H . Cormen, C .E .Leiserson, R .L .Rivest "Introduction to Algorithms", PHI.**
3. **Sedgewich, Algorithms in C, Galgotia**
4. **Berman. Paul, "Algorithms, Cengage Learning".**
5. **Richard Neopolitan, Kumar SS Naimipour, "Foundations of Algorithms"**