

OSMANIA UNIVERSITY

COURSE MCA II/III

DESIGN AND ANALYSIS OF ALGORITHMS

<i>Instruction</i>	4	<i>Periods per week</i>
<i>Duration of University Examination</i>	3	<i>Hours</i>
<i>University Examination</i>	80	<i>Marks</i>
<i>Sessional</i>	20	<i>Marks</i>

UNIT – I

Introduction & Elementary data structures: [Order notation](#), Analysis of algorithms, review of elementary data structures-[Heaps and Heap sort](#), Hashing, Sets representation, [UNION-FIND](#).

UNIT-II

Divide and Conquer: The general method, binary search, finding maximum and minimum, [Merge sort](#) , [quick sort](#) and [selection](#).

Greedy method: Knapsack problem, [Optimal storage on tapes](#), [Job sequencing with deadlines](#), [Optimal merge patterns](#), [Minimum spanning trees](#) and [Single source shortest paths](#).

UNIT-III

Dynamic programming and traversal techniques: [Multistage graphs](#), [All pairs shortest paths](#), [Optimal binary search trees](#), 0/1 knapsack, [Reliability design](#), [Traveling salesman problem](#), [Biconnected components and depth first search](#).

UNIT-IV

Backtracking and branch and bound: 8-Queens problem, Graph coloring, Hamiltonian cycles, Knapsack problem, 0/1 Knapsack problem, Traveling salesman problem, Lower bound theory.

UNIT-V

NP-hard and NP-completeness: Basic concepts, Cook’s theorem, NP-hard graph problems and scheduling problems, NP-hard code generation problems. Decision problem. Node covering problem.

Suggested reading:

1. Horowitz E., Sahni S: “Fundamentals of Computer Algorithms”, Galgotia publications, 1984.

References:

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, 2003, Pearson Education.
2. Aho, Hopcroft and Ullman: “The Design and Analysis of Computer Algorithms”, Pearson Education, 2000.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rives, C. Stein: “Introduction to Algorithms:”, 2nd edition, Prentice Hall of India.