

New Scheme Based On AICTE Flexible Curricula

**CSE-Artificial Intelligence and Machine Learning/ Artificial Intelligence and Machine Learning
IV-Semester**

AL402 Analysis & Design of Algorithms

Unit I : Definitions of algorithms and complexity, Time and Space Complexity; Time space tradeoff, various bounds on complexity, Asymptotic notation, Recurrences and Recurrences solving techniques, Introduction to divide and conquer technique, example: binary search, merge sort, quick sort, heap sort, strassen's matrix multiplication etc, Code tuning techniques: Loop Optimization, Data Transfer Optimization, Logic Optimization, etc.

Unit II : Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm etc. Correctness proof of Greedy algorithms.

Unit III : Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm etc.

Unit IV : Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph colouring problem etc. Introduction to branch & bound method, examples of branch and bound method like travelling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms.

Unit V : Advanced tree and graph algorithms, NP-hard and NP-complete problems, Approximations Algorithms, Data Stream Algorithms, Introduction to design and complexity of Parallel Algorithms.

References:

1. Cormen Thomas, Leiserson CE, Rivest RL, Introduction to Algorithms, Third edition, PHI.
2. Horowitz & Sahani, Analysis & Design of Algorithm, Fourth Edition Computer Science Press.
3. Dasgupta, algorithms, Fifth Edition, TMH
4. Ullmann; Analysis & Design of Algorithm, Addison-wesley publishing company,
5. Michael T Goodrich, Roberto Tamassia, Algorithm Design, Wiley India
6. Rajesh K Shukla: Analysis and Design of Algorithms: A Beginner's Approach; Wiley

List of Experiments :

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm.
10. Write a program for Floyd-Warshall algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.