**Design & Analysis of Algorithms**

**UNIT-I** Mathematical foundations, summation of arithmetic and geometric series, n, n2 , bounding summations using integration, Recursion and Induction: recurrence relations, solutions of recurrence relations using techniques of characteristic equation, generating functions, master method and substitution method.Complexity calculation of various standard functions, principles of designing algorithms.

**UNIT-II** Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, application of amortized analysis, Sorting networks, comparison networks, bio-tonic sorting network, advanced data structures like Fibonacci heap, disjoint set representation

**UNIT-III** Divide and conquer basic strategy, binary search, quick sort, merge sort, matrix operations, Multiplication Algorithm Greedy method – basic strategy, Knapsack Problem, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path, Optimal Search Patterns.

**UNIT-IV** Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem, Longest Common Subsequence problem, 0/1 Knapsack Problem, Chained Matrix Multiplication

**UNIT-V** Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen’s problem, graph coloring, Hamiltonian cycles etc, Introduction to Approximation algorithm.

**UNIT-VI** NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, graph based problems on NP Principle.

**Text Books:** 1. Introduction to Algorithms, Thomas H. Cormen et.al. Prentice Hall of India. 2. Design & Analysis of Algorithms, Horowitz Sahani, University Press. 3. The Design and Analysis of Algorithms Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman, Pearson Publication. BECSE305P: Design & Analysis of Algorithms lab: Practical will be based on above syllabus Load Credit Total marks Sessional University Total marks marks 2 hrs 1 50 25 25 50 (Practical) Practicals based on C, C++ or Java