Course No.: MCA – 3T5
Course Title: Design and Analysis of Algorithms

Unit I

Algorithms, Pseudo-code Conventions , Analysis of Algorithms, Designing Algorithms , Growth of Functions , Asymptotic notations , Some operations on O-notation. Maximum Rule , Data Analysis and Visualization , Summations , Recurrences , Substitution method , Iteration method , Recursion trees , The Master Method . Time and Space Complexity, Trade off, , Review of stack, Queues, trees , dictionaries Heap , Property and Heapsort, Hashing, graphs.

Unit II

Randomized Algorithms : Description ,Identifying the repeated element , primality testing ,Advantages and Disadvantages. Divide and Conquer, General method, Binary search, Max and Min, Merge sort, Quick sort. Greedy Method, General method, Optimal storage on tapes, Knapsack problem, Job sequencing, Optimal merge pattern, Single source shortest paths.

Unit III

Dynamic programming, General methods, Multistage graphs, All pair shortest paths, Traveling salesman problems. Backtracking, General method, 8-Queen problem, Generalized Algorithm for N-Queen Problem, Sum of subsets, Knapsack problem. Branch and Bound, General method, Basic Concepts of BFS and DFS, Least Cost Branch and Bound, 8_Queen Problem, Traveling salesperson problem.

Unit IV

Lower boundary theory , comparison trees for sorting and searching. Oracles and adversary arguments , Lower bound theory through reductions , P and NP problems. NP hard and NP complete problems _ basic concepts. Need for developing approximate algorithms. Approximate Algorithms , The vertex cover Problem , The traveling salesman problem , The set veering problem , The subset sumproblem.Parallel Algorithms.Parallel Computation Model.Parallelism_ PRAM and other Models.Effect on Parallelism on Efficiency.Illustrations of problems suitable for Parallel Implementation.

Reference Books:

1. Brassard and Bratley, "Fundamentals of Algorithms", Pearson Education .
2. Sedgewick, " Algorithms in C", Pearson Education.
3. Baase "Computer Algorithms", Introduction to Design and Analysis", 3rd Ed, Pearson Horowitz, Sahni, " Fundamentals of Computer Algorithms", Galgotia Publications
4. Coremen, Leiserson, Rivest,Stein, "Introduction to Algorithms", Second Edition, PHI.
5. Aho, Hopcroft and Ullman, " The Design and Analysis of Computer Algorithms", Pearson.