KTU BTECH S6 SYLLABUS CST 306 ALGORITHM ANALYSIS AND DESIGN (2019 SCHEME)

Syllabus

Module-1 (Introduction to Algorithm Analysis) Characteristics of Algorithms, Criteria for Analysing Algorithms, Time and Space Complexity - Best, Worst and Average Case Complexities, Asymptotic Notations Big-Oh (O), Big- Omega (Ω), Big-Theta (Θ), Little-oh (o) and Little- Omega (ω) and their properties. Classifying functions by their asymptotic growth rate, Time and Space Complexity Calculation of simple algorithms. Analysis of Recursive Algorithms: Recurrence Equations, Solving Recurrence Equations – Iteration Method, Recursion Tree Method, Substitution method and Master's Theorem (Proof not required).

Module–2 (Advanced Data Structures and Graph Algorithms) Self Balancing Tree - AVL Trees (Insertion and deletion operations with all rotations in detail, algorithms not expected); Disjoint Sets- Disjoint set operations, Union and find algorithms. DFS and BFS traversals - Analysis, Strongly Connected Components of a Directed graph, Topological Sorting.

Module–3 (Divide & Conquer and Greedy Strategy) incering Success Story The Control Abstraction of Divide and Conquer- 2-way Merge sort, Strassen's Algorithm for Matrix Multiplication-Analysis. The Control Abstraction of Greedy Strategy- Fractional Knapsack Problem, Minimum Cost Spanning Tree Computation- Kruskal's Algorithms - Analysis, Single Source Shortest Path Algorithm - Dijkstra's Algorithm-Analysis.

Module-4 (Dynamic Programming, Back Tracking and Branch & Bound)) The Control Abstraction- The Optimality Principle- Matrix Chain MultiplicationAnalysis, All Pairs Shortest Path Algorithm - Floyd-Warshall Algorithm-Analysis. The Control Abstraction of Back Tracking – The N Queen's Problem.Branch and Bound Algorithm for Travelling Salesman Problem.



Module-5 (Introduction to Complexity Theory) Tractable and Intractable Problems, Complexity Classes – P, NP, NP- Hard and NP-Complete Classes- NP Completeness proof of Clique Problem and Vertex Cover Problem- Approximation algorithms- Bin Packing, Graph Coloring. Randomized Algorithms (Definitions of Monte Carlo and Las Vegas algorithms), Randomized version of Quick Sort algorithm with analysis.

Text Books

1. T.H.Cormen, C.E.Leiserson, R.L.Rivest, C. Stein, Introduction to Algorithms, 2nd Edition,

Prentice-Hall India (2001)

2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer

Algorithms", 2nd Edition, Orient Longman Universities Press (2008)

3. Sara Baase and Allen Van Gelder —Computer Algorithms, Introduction to Design andAnalysis, 3rd Edition, Pearson Education (2009)

Reference Books

I. Jon Kleinberg, Eva Tardos, "Algorithm Design", First Edition, Pearson (2005)

2. Robert Sedgewick, Kevin Wayne, "Algorithms",4th Edition Pearson (2011)

3. Gilles Brassard, Paul Brately, "Fundamentals of Algorithmics", Pearson (1996)

4. Steven S. Skiena, "The Algorithm Design Manual", 2nd Edition, Springer(2008)