LTPC: 2-1-2-4

Advanced Data Structures and Algorithms (ADSA)

Syllabus

- **Unit – 1 [9 Hours]:** Basic Data Structures and Algorithms - Overview of stacks, queues, searching and sorting, divide and conquer, asymptotic analysis, recurrence relations, randomized quick sort, linear time sorting, binary search tree, height balanced tree, AVL tree;

- **Unit – 2 [10 Hours]:** Advanced Tree Data Structures - 2-4 Tree, searching, insertion, deletion, Red Black Tree, searching, insertion, deletion, B+ Tree, Tries; Hashing - Hashing, Universal Hashing;

- **Unit – 3 [8 Hours]:** Graph Data Structures - Basics of Graph, Data Structures for Graph; Graph Traversal - Breadth First Search, Depth First Search, Applications of DFS and BFS;

- **Unit – 4 [7 Hours]**: Minimum Spanning Trees - Kruskal's and Prim's Algorithm; Single Source Shortest Paths - Dijkstra and Bellman Ford;

- **Unit – 5[8 Hours]:**: Dynamic Programming - Fibonacci Number, Floyd Warshall for All Pairs Shortest Paths, Longest Common Subsequences, Knapsack;

- **Unit – 6 [6 Hours]:** Advanced Topics - Network Flows, Randomized Algorithms, etc.; Computational Complexity - NP-completeness and Polytime reductions;

Text Books:

a) Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Third Edition, The MIT Press

b) Weiss, Mark Allen. Data Structures and Algorithm Analysis in C. Second Edition. Pearson Education India. (DSAC)

c) Algorithms Design by Jon Kleinberg and Eva Tardos

5. Reference Books:

a) Knapsack Problems - Algorithms and Computer Implementations, Silvano Martello and Paolo Toth, John Wiley & Sons, West Sussex, UK, 1990, ISBN: 0471924202

Assessment Plan

- Mid-Semester-Exam:20%
- End-Semester-Exam:30%
- Lab Assignment:20%
- Class Participation:10%
- Scheduled Quiz:10%
- Lab-Exam:10%

Instructions for submission of lab assignments. :

- Every 5 minutes delay: 1 mark will be deducted
- More than 1 hour delay : Will be awarded zero marks

If your assignment contains plagiarism, the mask's deduction is as follows:

- Plagiarism>75%=100% deduction
- Plagiarism between 50-75=50% deduction
- Plagiarism between 30-50=20% deduction
- Plagiarism<30=No deduction