MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering

Design and Analysis of Algorithm | CS 1501 | 4 Credits

Session: 2015-2016 | Faculty: Sandeep Chaurasia

Course Outcomes: At the end of the course, students will be able to

[1501.1] Analyse worst-case running times of algorithms using asymptotic analysis.

[1501.2] Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm.

[1501.3] Design dynamic-programming algorithms, and develop employability skills by analyse them.

[1501.4] Synthesize efficient greedy algorithms in common engineering design situations

[1501.5] Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyse them

A.   SYLLABUS

Algorithm Analysis: A priori and a posteriori Analysis, Time Space Tradeoff, Asymptotic Notations, Properties of asymptotic notations, Recurrence equations, Solving recurrence equations using Substitution method and Master's method; Trees: B-Tree Red Black Tree; Divide and Conquer: Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort, Matrix Multiplication; Greedy Algorithms: Knapsack Problem, Job Sequencing with deadline, Optimal Merge Pattern, Single Source Shortest Path, Minimum Cost Spanning tree; Dynamic Programming: Multistage Graphs, Matrix Chain Multiplication, All-Pair shortest paths, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem, Graph Traversals, Connected Components, Spanning Trees, Bi-connected

B.   TEXT BOOKS

i.   E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms", 2nd Edition, University Press, 2007.

ii. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", 3rd Edition, MIT press, 2009.

iii. A. V. Aho, J. E. Hopcroft and J. D. Ullman, "The Design and Analysis of Computer Algorithms", 1st Edition, Pearson Education, 1999.