3RD SEMESTER

MCC 301 ANALYSIS AND DESIGN OF ALGORITHMS

Module-I (13 hours)
Introduction to analysis and design of algorithm, Growth of functions, Asymptotic notations, Recurrences, Solution of recurrences by substitution, Recurrence tree and the master method.
Divide and conquer algorithms (Worst case analysis of merge sort, quick sort and heap sort algorithms), Priority queue, Data structure for disjoint sets (Disjoint set operations, linked list representation, disjoint set forests)

Module-II (13 hours)
Dynamic programming approach: Matrix chain multiplication, longest common subsequence.
Greedy method: Activity solution problem, Greedy verses dynamic programming, Huffman codes. Concept of backtracking, branch & bound design techniques.
Graph algorithms: Minimal spanning tree (Kruskal and Prim's algorithms), Single source shortest paths (Bellman-Ford and Dijkstra's algorithm), Floyd's algorithm.

Module –III (14 hours)
Flow Network, Ford-Fulkerson method, Fast Fourier Transform, Rabin-Karp string matching algorithm.
NP-Completeness, Polynomial time solvability, Verification and Reducibility, NP complete problems (without proof), Approximation algorithm for the traveling salesman problem.

Text book:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and L.Stein, "*Introduction to Algorithms*" , Second Edition, PHI Learning, 2002
Chapters: 1, 2, 3, 4(excluding 4.4), 6, 7 (7.4.1), 15(15.2, 15.3. 15.4), 16(16.1, 16.2, 16.3), 21(21.1, 21.2, 21.3) 23, 24(24.1, 24.2, 24.3), 26(26.1, 26.2), 30(30.1, 30.2), 32(32.1, 32.2), 34, 35(35.2)

Reference books:

1. E. Horowitz, S. Sahani, S. Rajsekharan, "*Fundamentals of Computer Algorithms*", Second Edition, Universities Press, 2007
2. J. Kleinbers, E.Tardos, *Algorithm design*, Pearson Education Inc., New Delhi , 2006
3. R. Johnsonbaugh, M. Schaefer, "*Algorithms*", Pearson Education Inc., New Delhi , 2004
4. Kenneth A. **Berman** & Jerome L. **Paul**, "*Algorithms*", Revised Edition, 2005, CENGAGE Learning India Pvt. Ltd., New Delhi.
5. Anany V**. Levitin, "***Introduction to the Design and Analysis of Algorithms***",** Second Edition, 2007, Pearson Education Inc., New Delhi.
6. Michael T. **Goodrich** and Roberto **Tamassia**, "*Algorithm Design: Foundations, Analysis, and Internet Examples*", 2nd Edition, Wiley India Pvt. Ltd., New Delhi