Annexure 2

DESIGN AND ANALYSIS OF ALGORITHMS

Course Code: CSE 303 **Credit Units: 03**
Total Hours: 45

Course Objective:
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

Course Contents:

Module I: Introduction: (9 Hours)
Algorithm Design paradigms - Motivation, Concept of algorithmic efficiency, Run Time Analysis of algorithms, Asymptotic Notations.
Recurrences- Substitution Method, Recursion Tree Method, Masters Method.

Module II: Divide and conquer: (9 Hours)
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

Greedy Method
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming: (9 Hours)
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal: (9 Hours)
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)

Back tracking
Overview, 8-queen problem, and Knapsack problem

Brach and bound
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity: (9 Hours)
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Course Outcomes:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Examination Scheme:

Components	A	CT	S/V/Q/HA	ESE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

Text & References:

Text:

- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms", Galgotia Publication.
- T. H. Cormen, Leiserson , Rivest and Stein, "Introduction of Computer algorithm", PHI.

References:

- Sara Basse, A. V. Gelder, " Computer Algorithms", Addison-Wesley.

- J.E Hopcroft, J.D Ullman, " Design and analysis of algorithms", Addison-Wesley.
- D. E. Knuth , " The art of Computer Program", Addison-Wesley.