Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B. Tech. Fifth Semester CT
Design and Analysis of Algorithms

Total Credits: 3	Subject Code: BTCT501T
Teaching Scheme : Lectures: 3 Hours/Week Tutorials: 0 Hours/Week Practical: 2 Hours/Week	Examination Scheme : Duration of University Exam: 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:
1. Analyze the time complexity of recursive function
2. Analyze the asymptotic performance of algorithms.
3. Apply important algorithmic design paradigms and methods of analysis.

Course Outcomes:(Please follow Bloom's Taxonomy words in Course outcome)

After completing the course, students will be able to

CO1. Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis

CO2. Explain and apply Divide-and-Conquer and Greedy algorithmic design paradigms

CO3. Explain and apply Dynamic-Programming algorithmic design paradigms

CO4. Explain and apply Backtracking Database Management System(PR)algorithmic design paradigms

CO5. Describe the classes P, NP, and NP Complete and prove NP-Completeness of certain problem.

Unit I (8 Hrs)

Algorithm, Properties of Algorithm, Summation of arithmetic and geometric series, Recurrence relations, Solutions of recurrence relations using following techniques: Characteristic equation, Recursion tree method and Master method. Asymptotic notations of analysis of algorithms, Time complexity of program segments, Best case and worst case analysis of Insertion sort.

Unit II (8 Hrs)

Divide and Conquer strategy: Binary search, Merge sort, Quick sort, Strassen's matrix multiplication.

Greedy Approach: Fractional Knapsack Problem, Huffman coding algorithm, Traveling Salesman Problem, Activity Selection Problem, Job sequencing with deadlines problem, Minimum cost spanning trees, Single source shortest path.

Unit III (9 Hrs)

Dynamic Programming strategy: Longest Common Subsequence, Single source shortest paths, Traveling salesman problem, All pairs shortest path, Matrix Chain Multiplication, Multistage graphs, Optimal binary search trees, 0/1 Knapsack problem.

Unit IV (6 Hrs)

Backtracking strategy: n-Queen's problem, Sum of subsets, Graph coloring, Hamiltonian cycles.

Unit V (5 Hrs)

NP-hard and NP-complete problems: Non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, Clique, Polynomial Reduction, Cook's theorem, graph based problems on NP Principle.

Text Books:

1. Introduction to Algorithms By Thomas H. Cormen et.al. Prentice Hall of India.

Reference Books:

1. Design & Analysis of Algorithms By Parag Himanshu Dave, HimanshuBhalchandra Dave, second Edition, Pearson Publication.

2. Computer Algorithms- Inroduction to Design and Analysis By Sara Baase, Allen Van Gelder, Third Edition, Pearson Publication.

3. The Design and Analysis of Algorithms By Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman, Pearson Publication.

4. Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Pubs.

Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B. Tech. Fifth Semester CT
Design and Analysis of Algorithms (PR)

Total Credits: 1	Subject Code: BTCT501P
Teaching Scheme : Lectures: 0 Hours/Week Tutorials: 0 Hours/Week Practical: 2 Hours/Week	Examination Scheme : Duration of University Exam: College Assessment : 25 Marks University Assessment: 25 Marks

Minimum ten experiments should be conducted based on the Theory Syllabus