

<b>COURSE TITLE</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>
<b>COURSE CODE</b>	<b>05DS0304</b>
<b>COURSE CREDITS</b>	<b>5</b>

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Learn and understand how to analyze algorithms.
- 2 Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- 3 Design optimal solutions by greedy algorithms.
- 4 To understand the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- 5 Design optimal solution by applying backtracking and branch and bound technique.

**Pre-requisite of course:** Knowledge of C and Data Structures.

#### Teaching and Examination Scheme

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	4	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Introduction</b> Algorithms, Analysis of Algorithms, Growth of function, Asymptotic notations, Analyzing control statement,, Analysis of Loop Statement,, Sorting Algorithms and Analysis, Bubble Sort, Selection Sort,, Insertion Sort	10
2	<b>Divide and Conquer Algorithm</b> Working of Divide and Conquer, Working of Binary Search and Merge Sort, Working of Binary Search and Merge Sort, Finding the maximum and minimum number, Finding the maximum and minimum number, advantages, disadvantages of Divide and Conquer technique, disadvantages of Divide and Conquer technique, disadvantages of Divide and Conquer technique	10
3	<b>Greedy Algorithm</b> Characteristics of Greedy Algorithm, Characteristics of Greedy Algorithm, Element of greedy technique, Element of greedy technique, Element of greedy technique, working of activity selection problem, working of activity selection problem, Knapsack Problem. , Knapsack Problem. , Knapsack Problem.	10

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
4	<b>Dynamic Programming</b> Introduction, Introduction, Elements of Dynamic Programming,, The Principle of Optimality, The Principle of Optimality, Apply Dynamic programming technique to solve longest common sub-sequence, Apply Dynamic programming technique to solve longest common sub-sequence, Apply Dynamic programming technique to solve longest common sub-sequence, Road cutting problem, Road cutting problem	10
5	<b>Backtracking, Branch and Bound Algorithms</b> Introduction, Introduction, Difference between Backtracking and Branch and bound algorithms, Difference between Backtracking and Branch and bound algorithms, Breadth First Search (BFS), Breadth First Search (BFS), Depth First Search (DFS), Depth First Search (DFS), Limitations of Branch-and-Bound., Limitations of Branch-and-Bound.	10
<b>Total Hours</b>		<b>50</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Practicals based</b> Find Factorial, Find prime no, Add two matrix, Multiply two matrix, Find power of n, Find sum of digit, Find GCD, Factorial using recursion, Print reverse number	8
2	<b>Practical based</b> Find square root of a number, Search a number using D&C, Find maximum number, Merge sort, Add all odd numbers using recursion, Add all even numbers using recursion, Linear search, Binary search	8
3	<b>Practical based</b> Greedy algorithm, Knapsack problem	3
4	<b>Practical based</b> Rod-cutting problem, LCS	3
5	<b>Practical based</b> BFS, DFS	3
<b>Total Hours</b>		<b>25</b>

#### Textbook :

- 1 Introduction to Algorithms, Cormen, Thomas, Charles Leiserson, MIT Press, 2009
- 2 Design and Analysis of Algorithms, Parag H Dave, Himanshu B Dave, Pearson, 2014

#### References:

- 1 Fundamentals of Computer Algorithms, Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press, 2008

**References:**

- 2 Introduction to Design and Analysis of Algorithms, Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson , 2014
- 3 Fundamental of Algorithms, Fundamental of Algorithms, Gills Brassard, Paul Bratley, PHI, .
- 4 Foundations of Algorithms, Foundations of Algorithms, Shailesh R Sathe, Penram, .

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
20.00	30.00	25.00	15.00	10.00	

**Instructional Method:**

- 1 DEMO
- 2 PPT
- 3 VIDEO

**Supplementary Resources:**

- 1 <https://www.javatpoint.com/daa-tutorial>
- 2 <https://www.coursera.org/specializations/data-structures-algorithms>
- 3 [https://swayam.gov.in/nd1\\_noc19\\_cs47/preview](https://swayam.gov.in/nd1_noc19_cs47/preview)
- 4 <https://www.geeksforgeeks.org/openmp-introduction-with-installation-guide/>
- 5 <http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html>
- 6 <http://nptel.ac.in/courses/106101060/>
- 7 <http://www.comp.nus.edu.sg/~cs5234/Links/Course-Links.htm>
- 8 <https://www.coursera.org/learn/algorithm-design-analysis>
- 9 <http://www.codingunit.com>