Course Title : Analysis & Design of Algorithms			
Course Code : P18CS43	**Semester : 4**	**L :T:P:H : 4:0:0:4**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit 1

Introduction: Notion of Algorithm, Fundamentals of algorithmic problem solving, Analysis Framework, Asymptotic Notations, Mathematical analysis of Non-Recursive algorithms, Mathematical analysis of recursive algorithms, and recursive Algorithms with Examples. Graph: Definition, Graph Representation, **Brute Force:** Selection sort, Bubble sort, Depth First Search and Breadth First Search

Self-Study Component: Important problem types,Fundamental Data structures.

11 Hours

Unit 2

Decrease and Conquer: Insertion Sort, Topological Sorting, Binary Search, Computing a median and Selection Problem.

Divide and Conquer: Merge sort, Quick sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer.

Self-Study Component: Finding max, min element using divide and conquer method

10 Hours

Unit 3

Transform and Conquer Approach: Presorting, AVL Trees, Heap Sort

Space and Time Trade-Offs: Sorting by Counting**,** Input Enhancement in String Matching, Hashing

Dynamic Programming: Knapsack problem and Memory Functions.

Self-Study Component: Balanced search trees

10 Hours

Unit 4

Dynamic Programming: Warshall's Algorithm, Floyd's Algorithm

Greedy Method: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes.

Limitations of Algorithm Power: Lower –Bound Arguments, Decision Trees

Self-Study Component: Optimal Binary search trees,Knapsack problem and memory functions

11 Hours

Unit 5

Limitations of Algorithm Power: P, NP, NP-Complete Problems

Backtracking: N-Queens problem, Sum of subsets problem, Hamiltonian circuit problem.

Branch and Bound: Assignment Problem, Knapsack Problem, Travelling Sales Person problem, Knapsack problem

Self-Study Component: Approximation algorithms for TSP problem.

10 hours

Text Book:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 3rd Edition, 2017.
   Pearson.

Reference Books:

1. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014,Universities Press
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest,Clifford Stein, 3rd Edition, PHI
3. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

Course Outcomes:

After studying this course, students will be able to

1. Analyse the computational complexity of different algorithms.
2. Develop the solution for given problems using divide and conquer and decrease and conquer methods.
3. Develop an algorithm using Greedy method and transform and conquer methods.
4. Develop the solution for given problems using Dynamic programming approach.
5. Develop the solution for given problems using Backtracking and Branch-and-Bound technique.

CO-PO Mapping

Semester : 4th		Course code: P18CS43					Title : Analysis and design of algorithms								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
1	Analyse the computational complexity of different algorithms.	2	2	3	2									2	2
2	Develop the solution for given problems using divide and conquer and decrease and conquer methods.	2	2	3	2									2	2
3	Devise an algorithm using Greedy method and transform and conquer methods.	2	2	3	2									2	2
4	Develop the solution for given problems using Dynamic programming approach.	2	2	3	2									2	2
5	Develop the solution for given problems using Backtracking and Branch-and-Bound technique.	2	2	3	2									2	2
		2	2	3	2									2	2