DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY
WITH MINI PROJECT

Course code: 18IS4DLADA
L: T: P: S 0:2:1:0
Exam Hours: 03

Credits: 02
CIE Marks: 50
SEE Marks: 50

Course objective

1. Identify the problem and design an algorithmic stratergy to solve it.
2. Analyze the problem statement and implement different programmatic approach to

CO1	Acquire Programming Knowledge about different algorithm paradigms
CO2	Interpret the searching, sorting algorithmic techniques.
CO3	Apply an algorithm for the problem statement and prove its correctness.
CO4	Solve a problem by making use of techniques like Greedy method, Divide and Conquer approach, Dynamic Programming and Backtracking.
CO5	Develop efficient algorithms in common engineering design practice.
CO6	Analyze time complexity of the algorithms by providing different inputs and monitoring its behavior.

solve the same.

3. Compare the efficiencies by developing different algorithms for the given problem statement with various inputs.
4. Develop an algorithm for the problem statement and prove its correctness

Course Outcomes:

Mapping of Course outcomes to Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	-	-	-	-	-	-	2	3	-	-
CO2	3	2	1	-	2	-	-	-	2	2	2	2	3	-	-
CO3	3	2	2	-	2	-	-	-	2	2	2	2	3	1	-
CO4	3	2	2	-	2	-	-	-	2	2	2	2	3	1	-
CO5	3	2	-	-	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	1	-	2	-	-	-	2	2	2	2	3	1	-
MV	3	2	1	-	2	-	-	-	2	2	2	2	3	1	-

Experiment No.	Contents of the Experiment	Hours	COs
1	Design, develop, and execute a program called QUICK_SORT to sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements should be read from a file and also be generated using the random number generator.	03	CO1,CO2, CO3 & CO5
2	Design, develop, and execute a program called MERGE_SORT to sort a given set of elements using the merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements should be read from a file and also be generated using the random number generator.	03	CO1,CO2, CO3 & CO5
3	3a. Design, develop, and execute a program called BFS. Print all the nodes reachable from a given starting node in a digraph using BFS method.	03	CO1,CO3, CO4 & CO5
	b. Design, develop, and execute a program called DFS. Print all the nodes reachable from a given starting node in a digraph using DFS method.		
4	a.Design, develop, and execute a program to create a class called FLOYDS that represents the cost adjacency matrix and member functions to Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. b. Design, develop, and execute a program called WARSHALL to compute the transitive closure of a given directed graph using Warshall's algorithm. Print all the matrices of transitive closure.	03	CO1,CO3, CO4& CO5
5	Design, develop, and execute a program called KNAPSACK to Implement 0/1 Knapsack problem using Dynamic Programming.	03	CO1,CO3, CO4& CO6
6	Design, develop, and execute a program called KRUSKAL. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.	03	CO1,CO3, CO5& CO6
7	Design, develop, and execute a program called PRIMS to find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.	03	CO1,CO3, CO4 & CO6
8	Design, develop, and execute a program called DIJKSTRA'S. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	03	CO1,CO3, CO4 & CO6
9	Design, develop, and execute a program called SUMOFSUBSET to find a subset of a given set S = {sl, s2,.....,sn} of n positive integers whose sum is equal to a	03	CO1,CO3, CO4 & CO6

	given positive integer d. For example, if S={1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}. A suitable message is to be displayed if the given problem instance doesn't have a solution.		
10	Design, develop, and execute a program called N QUEENS to Implement N Queen's problem using Back Tracking.	03	CO1,CO3, CO4 & CO6

Text Books:

1. AnanyLevitin: Introduction to the Design & Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, Universities Press.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 3rd Edition, PHI, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

Assessment Pattern:

CIE –Continuous Internal Evaluation Lab (50 Marks)

Continual Internal Evaluation Marks (25)	IA Test Marks (25)	Final Marks (50)

SEE –Semester End Examination Lab (50 Marks)

Program write-up, Execution & Viva (40)	Project execution (10)	Final Marks (50)