Enrollment No.: _____

Darshan Institute of Engineering & Technology

B.Tech. | Sem-4 | Winter-2024

Course Code	:	2101CS401	**Date**	:	21-11-2024
Course Name	:	Design and Analysis of Algorithm	**Duration**	:	150 Minutes
			Total Marks	:	70

Instructions:
1. Attempt all the questions.
2. Figures to the right indicates maximum marks.
3. Make suitable assumptions wherever necessary.

Q.1 **(A)** What is asymptotic notation? Define big-oh, omega and theta notation with example. **4**

(B) Define (1) Finite set (2) Function (3) Relation. **3**

OR

Arrange the growth rate of 2^n, n^2, *1, logn, n logn,* 3^n in increasing order of growth.

(C) Write bubble sort algorithm and its time complexity. Demonstrate iterations for A={9, 5, 1, 11, 23, 3, 2, 6}. **7**

OR

Arrange the given data into ascending order using heap sort.
34, 12, 42, 96, 56, 11, 78

Q.2 **(A)** Solve following recurrence using Master's method **4**
(1) $T(n) = T(n/2) + \theta(1)$
(2) $T(n) = 2T(n/2) + \theta(n)$

(B) Demonstrate binary search method to search Key = 14, form the array A={2,4,7,8,10,13,14,60}. **3**

Demonstrate binary search method to search Key = 7, form the array A={1,3,7,9,11,32,52,74,90}.

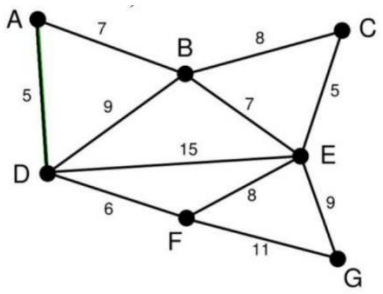
(C) Write quick sort algorithm and time complexity. Trace the quick sort for data A={9, 5, 1, 11, 23, 3, 2, 6} **7**

OR

Write merge sort algorithm and time complexity. Trace the merge sort for data A={9, 5, 1, 11, 23, 3, 2, 6}

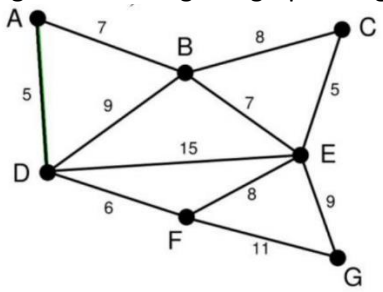
Q.3 **(A)** Consider Knapsack capacity W=15, w=(4,5,6,3) and v=(10, 15,12, 8) find the maximum profit using greedy method. **4**

(B) Find Minimum Spanning Tree for the given graph using Prim's Algorithm. **3**



OR

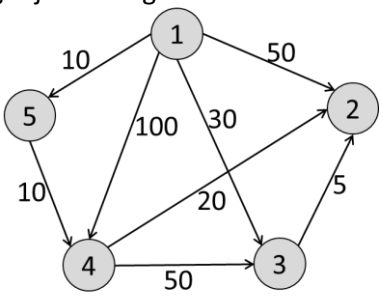
Find Minimum Spanning Tree for the given graph using Krushkal's Algorithm.



(C) Find an optimal huffman code for the following set of frequency. **7**
A : 50, B:20, C: 15, D: 30

OR

Find shortest path using Dijkastra algorithm for the following graph.



Q.4 **(A)** Compare greedy method with dynamic programming method. **4**

(B) Find optimal solution for making change using dynamic programming. (denominations: d1=1, d2=4, d3=6) for making change of Rs. 8. **3**

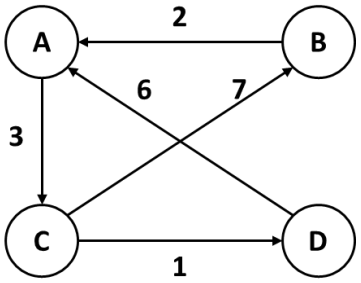
OR

Find optimal solution for 0/1 knapsack problem using dynamic programming, consider Knapsack Capacity W=9, w = (3,4,5,7) and v= (12,40,25,42).

(C) Find out longest common subsequence for A={A,C,A,B,A,C,A} and B={B,A,C,A,C} using dynamic programming. **7**

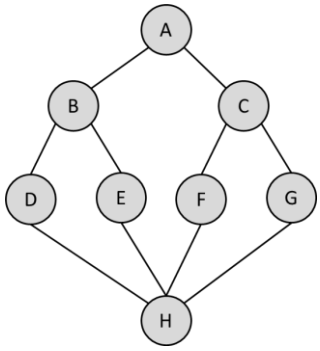
OR

Find the all pair shortest path using Floyd-Warshall Algorithm for directed graph shown below:



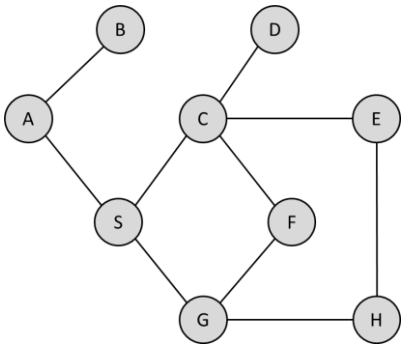
Q.5 **(A)** Explain the concept of P, NP and NP-complete problem **4**

(B) Traverse the following graph using depth first search algorithm. **3**



OR

Traverse the following graph using breadth first search algorithm.



(C) Working modulo q = 11. How many spurious hits does the Rabin-Karp matcher encounter in the text T = 3141592653589793 when looking for the pattern P =26? **7**

OR

What is N-Queens Problem? Write an algorithm to give solution of 4- Queens Problem using Backtracking Method.

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