

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET - A

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester IV - 2021

Course Code : CSE2007

Course Name : Sem IV - CSE2007 - Design and Analysis of Algorithms

Program : B.Tech - All Programs

Date : 19-JUN-2023

Time : 9.30AM - 12.30PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Define Master's Theorem. (CO1) [Knowledge]
2. Define P and NP Problem. (CO5) [Knowledge]
3. Write the formula for strassen's matrix multiplication. (CO2) [Knowledge]
4. Define Optimal Binary Search Tree. (CO4) [Knowledge]
5. Mention the different mathematical definitions of Asymptotic Notations to represent different cases. (CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

6. Apply Warshall's algorithm to compute transitive closure for the graph below.

	0	1	2	3
0	0	1	1	0
1	0	0	0	1
2	0	1	0	0
3	0	0	1	0

(CO4) [Comprehension]

7. Write the insertion sort algorithm and apply the same to sort the given elements 4,3,2,10,12,1,5,6. Also find the time complexity.
(CO2) [Comprehension]
8. What is Backtracking. Construct the state space tree for solving four queens' problem using backtracking.
(CO5) [Comprehension]
9. Apply Quick sort algorithm to sort the given array elements 56, 47, 98, 3, 6, 7, 11.
(CO2) [Comprehension]
10. Use Huffman coding to encode the following symbols with the frequencies listed as a:10 e:15 i:12 o:3 u:4 s:13 t:1. Draw the resulting Huffman Tree and write the binary code word for each character
(CO3) [Comprehension]

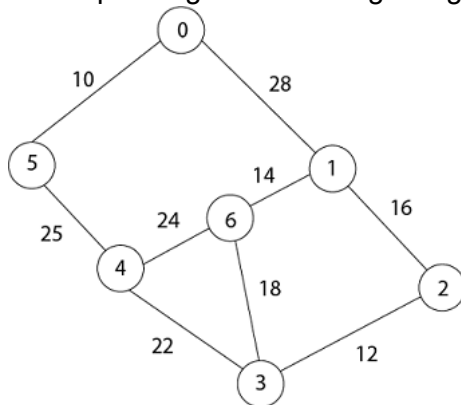
PART C

ANSWER ALL THE QUESTIONS

(2 X 20 = 40M)

11. a. A thief enters a house for robbing it. He can carry a maximal weight of 60 kg into his bag. There are 5 items in the house with the following weights and values. What items should thief take if he can even take the fraction of any item with him?
 $(w_1, w_2, w_3, w_4, w_5) = (5, 10, 15, 22, 25)$
 $(b_1, b_2, b_3, b_4, b_5) = (30, 40, 45, 77, 90)$
 b. Find an optimal solution for following 0/1 Knapsack problem using dynamic programming:
 Number of objects $n = 4$, Knapsack Capacity $M = 5$, Weights $(W_1, W_2, W_3, W_4) = (2, 3, 4, 5)$ and profits $(P_1, P_2, P_3, P_4) = (3, 4, 5, 6)$.
(CO4) [Application]

12. a. Find the Minimum Spanning Tree for the given graph using Kruskal's Algorithm



- b. Write Prim's Algorithm for Minimum Spanning Tree

(CO3) [Application]