

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SET - B**

**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 Greedy method and give Time complexity for strassen's matrix multiplication.  
(CO2) [Knowledge]
2. Name the algorithm design techniques to solve the following problem.  
(i) Insertion Sort  
(ii) Mergesort  
(CO1) [Knowledge]
3. Calculate the time complexity for the given recurrence relation using Master's theorem.  
 $T(n)=8T(n/2)+n^3$   
(CO1) [Knowledge]
4. Define Dynamic Programming. List the different applications of the same.  
(CO4) [Knowledge]
5. Discuss NP Hard and NP complete classes.  
(CO5) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS**

**(5 X 10 = 50M)**

6. Design Floyd's algorithm to find shortest distances from all nodes to all other nodes and give its time complexity.  
(CO4) [Comprehension]

7. Apply Dijkstra's Algorithm to find the shortest path from node 0 to all other vertices in the graph, Where \$ represents no edge between two vertices(infinity).

	0	1	2	3	4
0	0	3	\$	8	7
1	3	0	1	4	\$
2	\$	1	0	2	\$
3	8	4	2	0	3
4	7	\$	\$	3	0

(CO3) [Comprehension]

8. Write the algorithm for Quick sort. Analyse the time complexity of all the three cases.  
(CO2) [Comprehension]
9. Given quick sort, merge sort, insertion sort which one would be best to sort the n elements depending on the time complexity. Also illustrate how the given elements 54,26,93,17,77,31,44,55,20 are sorted using insertion sort. Depict the algorithm of insertion sort.  
(CO2) [Comprehension]

10. What is N-Queens problem. Diagrammatically show the possible solutions for four queens' problem.  
(CO5) [Comprehension]

### PART C

#### ANSWER ALL THE QUESTIONS

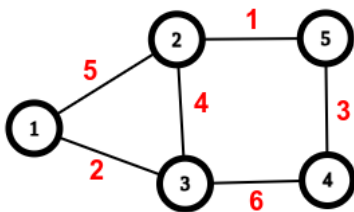
(2 X 20 = 40M)

11. a. Write the algorithm for 0/1 knapsack problem.  
b. For the given set of items and the knapsack capacity of 10 kg, find the subset of the items to be added in the knapsack such that the profit is maximum.

Items	1	2	3	4	5
Weights (in kg)	3	3	2	5	1
Profits	10	15	10	12	8

(CO4) [Application]

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



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

(CO3) [Application]