27. a. Apply the bottom up dynamic programming algorithm to the following instance of Knapsack problem (Capacity W = 10) | 10 | 4 | 2 | 4

Item	Weight	Value
1	7	$42
2	3	$12
3	4	$40
4	5	$25

(OR)

b. Implementing Floyd's algorithm for all pair shortest path algorithm with example and analyse its efficiency. | 10 | 3 | 2 | 3

28. a. Explain Dijkstra's algorithm in detail with example and analyse its efficiency. | 10 | 3 | 3 | 3

(OR)

b. Correlate tree traversal with Graph traversal with examples. | 10 | 4 | 3 | 4

29. a. Explain P, NP and NP complete problem with example. | 10 | 3 | 4 | 3

(OR)

b. Distinguishing tractable and in-tractable problems with suitable examples. | 10 | 4 | 4 | 4

30. a. Illustrate with detailed steps of Randomized quick sort algorithm and also analyze its efficiency. | 10 | 4 | 5 | 3

(OR)

b. Explain quantum computing principles and discuss any three quantum algorithms. | 10 | 3 | 5 | 3

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2022
Fifth Semester

18CSC361J– DESIGN AND ANALYSIS OF ALGORITHMS
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

	Marks	BL	CO	PO

PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

1. Which of the following sorting algorithm is best suited if the elements are already sorted? | 1 | 1 | 1 | 1
(A) Heap Sort (B) Quick Sort
(C) Insertion Sort (D) Merge Sort

2. What is the result of the recurrences as $T(n) = aT(n/b) + f(n)$ and $f(n) = n^c$? | 1 | 1 | 1 | 1
(A) $T(n) = 0 (n \log_b a)$ (B) $T(n) = 0 (n^c \log n)$
(C) $T(n) = 0 (f(n))$ (D) $T(n) = 0 (n^2)$

3. Choose the correct option for master's theorem will the recurrence relation binary search | 1 | 1 | 1 | 1
(A) 1 (B) 2
(C) 3 (D) 3

4. Which of the following option is correct for lower bounding function? | 1 | 1 | 1 | 1
(A) Omega Notation (B) Recursion
(C) Big OH Notation (D) Small OH notation

5. Choose the solution for the following equation | 1 | 2 | 1 | 2
$T(n) = T(a\,n) + T((1-a)n) + bn$
(A) log n (B) O (n log n)
(C) O (1) (D) q (n)

6. Dijkstra's algorithm cannot be applied on | 1 | 1 | 2 | 1
(A) Directed and weighted Graphs (B) Graphs having Negative weighted Function
(C) Unweighted Graphics (D) Undirected and Unweighted Graph

7. Choose the correct option for Master's theorem | 1 | 1 | 2 | 1
(A) Solving Recurrences (B) Solving Iterative Relations
(C) Analyse Loops (D) Calculate time complexity of any code

8. How many passes does an insertion sort algorithm consist of? 1 2 2 2
   (A) N (B) N-1
   (C) N+1 (D) N^2

9. What is the average number of inversions in an array of N distinct numbers? 1 2 2 2
   (A) N (N-1) / 4 (B) N (N+1) / 2
   (C) N (N-1) /2 (D) N (N-1) / 3

10. Choose the relevant option for Knapsack Problem 1 1 2 1
    (A) Greedy Algorithm (B) 2D – Dynamic Programming
    (C) 1D Dynamic Programming (D) Divide and Conquer

11. In a Binary search tree, which of the following traversals would print numbers in a ascending order 1 1 3 1
    (A) Level – Order Transversal (B) Pre – order Transversal
    (C) Post – Order Transversal (D) In – order Transversal

12. Choose correct option for time complexity of DFS is? (V-vertices,E – Edges) 1 2 3 2
    (A) O (V+E) (B) O (V)
    (C) O (E) (D) O (V*E)

13. Which data structure used in standard implementation of breadth first search? 1 1 3 1
    (A) Stack (B) Queue
    (C) Linked List (D) Tree

14. Which of the following used for Floyd Warshall's Algorithm? 1 1 3 1
    (A) All pairs shortest path problems (B) Single source shortest path problems
    (C) Network flow problems (D) Sorting problems

15. Consider following data and specify which one is pre order traversal sequence, in order and post order sequences 1 2 3 2
    1: N, M, P, O, Q
    2: N, P, Q, O, M
    3: M, N, O, P, Q
    (A) S_1 is Pre-order, S_2 is In-order and S_3 is Post-order (B) S_1 is In-order, S_2 is Pre-order and S_3 is Post-order
    (C) S_1 is In-order, S_2 is post-order and S_3 is Pre-order (D) S_1 is Post-order, S_2 is In-order and S_3 is Pre-order

16. Which of the following class does a CNF – Satisfiability Problem? 1 1 4 1
    (A) NP Class (B) P Class
    (C) NP Complete (D) NP Hard

17. The choice of polynomial class has led to development of Extensive Theory called _____. 1 1 4 1
    (A) Computational Complexity (B) Time Complexity
    (C) Problem Complexity (D) Decision Complexity

18. What is a Rabin Karp algorithm? 1 1 4 1
    (A) String matching Algorithm (B) Shortest Path Algorithm
    (C) Minimum Spanning Tree Algorithm (D) Approximation Algorithm

19. How many conditions have to met if an NP – complete problem is Polynomially Reducible? 1 2 4 2
    (A) 1 (B) 3
    (C) 2 (D) 5

20. What happens when modulo value (q) is taken large? 1 1 4 1
    (A) Complexity Increases (B) Spurious hits occur frequently
    (C) Cost of extra checking is Low (D) Matching time increases

21. What is average running time of a quick sort algorithm? 1 1 5 1
    (A) O (N^2) (B) O (N)
    (C) O (N Log N) (D) O (Log N)

22. How many sub arrays does the quick sort algorithm divide the entire array into? 1 2 5 2
    (A) One (B) Two
    (C) Three (D) Four

23. Problems that can be solved in polynomial time are known as? 1 1 5 1
    (A) Interactable (B) Tractable
    (C) Decision (D) Complete

24. Which of the following methods can be used to solve the Knapsack problem? 1 1 5 1
    (A) Brute Force Algorithm (B) Recursion
    (C) Dynamic Programming (D) Brute Force, Recursion, Dynamic Program

25. Which among the following is the best cut-off range to perform insertion sort within quick sort? 1 1 5 2
    (A) N = 0-5 (B) N = 5 – 20
    (C) N = 20 – 30 (D) N > 30

PART – B (5 × 10 = 50 Marks) Marks BL CO PO
Answer **ALL** Questions

26. a. Explain the necessary steps for analyzing the efficiency of recursive algorithms. 10 3 1 3

(OR)

b. Implementing the method of solving recurrence equations with towers of Hanoi problem. 10 3 1 3