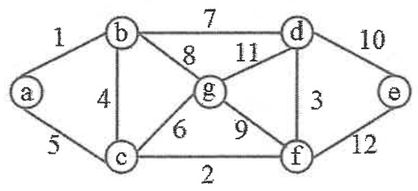
Items	Pizza	Noodles	Burger	Rice	Chopsuey	Cuban sandwich	Chimchnga	Fajitas
Data	65	20	10	55	32	12	50	99

25. a. Using prims algorithm, find the cost of Minimum Spanning Tree (MST) of the given graph. — 8 3 3 1



(OR)

b. Yazhini wants to visit all the nodes in a tree in post order manner. But instead of tree to traverse, she has the list of nodes in preorder traversal. From the pre order traversal list, construct the tree and perform post order traversal. Pre order traversal: 30, 20, 10, 15, 25, 23, 39, 35, 42. — 8 3 3 1

PART – C (1 × 15 = 15 Marks) — Marks BL CO PO

Answer **ANY ONE** Question

26. The following algorithm using count variable method and table method — 15 3 1 1

```
Algorithm sum (a, n)
{
    s: = 0.0;
    for (i = 1 to n do),
    s: = s + a[i];
return s;
}
```

27. Apply the backtracking sequence for the 4-queen problem and solve it. — 15 3 3 1

* * * * *

Reg. No.														

B.Tech/ M.Tech (Integrated) DEGREE EXAMINATION, MAY 2023

Fourth Semester

21CSC204J – DESIGN AND ANALYSIS OF ALGORITHMS

(For the candidates admitted from the academic year 2022-2023 onwards)

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** and **Part - C** should be answered in answer booklet.

Time: 3 Hours — Max. Marks: 75

PART – A (20 × 1 = 20Marks) — Marks BL CO PO

Answer **ALL** Questions

1. The main measures of the efficiency of an algorithm are — 1 1 1 2
   (A) Time and space complexity (B) Data and space
   (C) Processor and memory (D) Complexity and capacity

2. What is the time complexity of the binary search algorithm? — 1 1 1 2
   (A) O (n) (B) O (1)
   (C) O ($\log_2$ n) (D) O (n^2)

3. Identify the sorting technique which compares adjacent elements in a list and switches whenever necessary? — 1 1 1 2
   (A) Merge sort (B) Quick sort
   (C) Bubble sort (D) Selection sort

4. Which of the following is incorrect? Algorithms can be represented: — 1 1 1 2
   (A) As programs (B) As flow charts
   (C) As syntax (D) As pseudo codes

5. The measure of the longest amount of time possibly taken to complete an algorithm is expressed as _____. — 1 1 2 2
   (A) Little – o (B) Little – omega
   (C) Big – omega (D) Big – O

6. How many comparisons are needed for linear search array when elements are in order in best case? — 1 1 2 2
   (A) 1 (B) n
   (C) n + 1 (D) n – 1

7. Identify the best-case time complexity of selection sort? — 1 1 2 2
   (A) O (n log n) (B) O (n^2)
   (C) O (n) (D) O (1)

8. How many number of comparisons is required in insertion sort to sort a file if the file is sorted in reverse order? — 1 1 2 2
   (A) N^2 (B) N
   (C) N – 1 (D) N/2

9. What approach is being followed in Floyd Warshall algorithm? 1 1 2 2
   (A) Dynamic programming (B) Greedy technique
   (C) Linear programming (D) Back tracking

10. Which of the following algorithm can be used to solve the Hamiltonian path problem efficiently? 1 1 3 2
   (A) Iterative improvement (B) Branch and bound
   (C) Divide and conquer (D) Greedy algorithm

11. What is the objective of the knapsack problem? 1 1 3 2
   (A) To get maximum weight in the knapsack (B) To get minimum total value in the knapsack
   (C) To get maximum total value in the knapsack (D) To get minimum weight in the knapsack

12. Which of the following is false about the kruskal's algorithm? 1 1 3 2
   (A) It is a greedy algorithm (B) It constructs MST by selecting edges in the increasing order of their weights
   (C) It can accept cycles in the MST (D) It uses union-find data structure

13. The problem of finding a subset of positive integers whose sum is equal to a given positive integer is called as 1 1 4 2
   (A) n-queen problem (B) Subset sum problem
   (C) Knapsack problem (D) Hamiltonian circuit problem

14. Back tracking algorithm is implemented by constructing a tree of choices called as? 1 1 4 2
   (A) State-space tree (B) State-chart tree
   (C) Node tree (D) Back tracking tree

15. In how many directions do queens attack each other 1 1 4 2
   (A) 1 (B) 2
   (C) 3 (D) 4

16. Where is the N-queens problem implemented? 1 1 4 2
   (A) Carom (B) Chess
   (C) Ludo (D) Cards

17. _____ is the class of decision problems that can be solved by non-deterministic polynomial algorithms 1 1 4 2
   (A) NP (B) P
   (C) Hard (D) Complete

18. Which of the following is incorrect about randomized quicksort? 1 1 5 2
   (A) It has the same time complexity as standard quicksort (B) It has the same space complexity as standard quick sort
   (C) It is an in-place sorting algorithm (D) It cannot have a time complexity of O (n^2) in any case

19. Minimum number of unique colors required for vertex coloring of a graph is called? 1 1 5 2
   (A) Vertex matching (B) Chromatic index
   (C) Chromatic number (D) Color number

20. Hamiltonian path problem is _____. 1 1 5 2
   (A) NP problem (B) N class problem
   (C) P class problem (D) NP complete problem

PART – B (5 × 8 = 40 Marks) Marks BL CO PO
Answer **ALL** Questions

21. a. Discuss the ways of selecting the design paradigms for the problem. 8 3 1 1

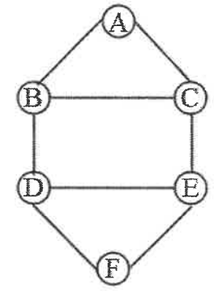
(OR)

   b. Ram has six different sets of pencils. He arranges pencils by comparing its length with the next immediate pencil. Suggest the suitable comparison sorting algorithm to Ram. A list of unsorted pencils are: 5 14 2 8. Also find the best and worst case of the scenario. 8 3 1 1

22. a. Compare back tracking with branch and bound algorithm with example. 8 2 4 2

(OR)

   b. Apply breadth first and depth first search for the given graph with necessary steps start from 'A'. 8 3 4 2



23. a. Explain the approximation algorithm for the Travelling Salesman Problem (TSP). 8 3 5 2

(OR)

   b. State NP hard and NP complete and differentiate both. 8 3 5 2

24. a. Apply quick sort algorithm and arrange the following with correct order. Also find the time complexity analysis. 8 3 2 1

24	9	29	14	19	27

(OR)

   b. In a restaurant one of the customer wants to search the item called "Cuban sandwich" in the list. Prescribe a suitable sequential search algorithm for the customer to select their choice and also give the best and worst case analysis of the algorithm. The food items are 8 3 3 1