



**Fifth Semester B.C.A. Degree Examination, Dec. 2024/Jan. 2025
(NEP 2020) (2023-2024 Batch Onwards)
DESIGN AND ANALYSIS OF ALGORITHMS**

Time : 2 Hours

Max. Marks : 60

Note : Answer **any six** questions from Part – A and **one full** question from each Unit in Part – B.

PART – A



1. a) Write the Euclid algorithm to find the GCD of 2 numbers.
- b) Define set and dictionaries.
- c) What is Brute force approach of problem solving ? Give an example.
- d) Define Convex and Convex hull.
- e) What is a decrease by a constant technique and give an example ?
- f) Write the steps followed in divide and conquer approach.
- g) What is Greedy problem ? List requirements of the solution at each step in greedy approach.
- h) Define spanning tree and minimum spanning tree.

(6×2=12)

PART – B

Unit – I

2. a) Explain Algorithm design and analysis process with flow diagram.
- b) Write an algorithm to find the largest element in an array and also perform mathematical analysis.

(6+6)

3. a) Explain any six Problem types.
- b) Explain the fundamentals of data structure.

(6+6)**P.T.O.**



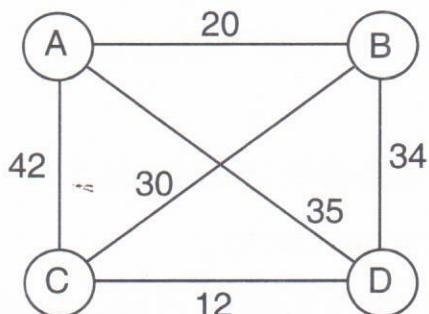
Unit – II

4. a) Consider the Knapsack problem with the following inputs. Solve the problem using exhaustive search. Enumerate all possibilities and indicate unfeasible solutions and optimal solution. Knapsack total capacity $W = 20\text{kg}$.

Items	Item 1	Item 2	Item 3	Item 4
Weight	8	10	7	4
Value	40	45	65	30

- b) Write an algorithm to sort N numbers by applying Bubble sort. Derive the number of operations and time complexity. (6+6)

5. a) Find the optimal solution for the Traveling Salesman problem using exhaustive search method by considering 'A' as the starting city.



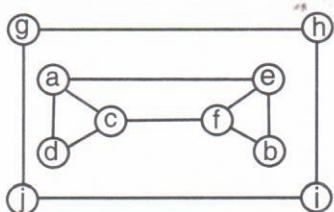
- b) Write an algorithm to sort N numbers using Selection sort. Derive the number of operations and time complexity. (6+6)

Unit – III

6. a) Consider the following graph and perform following traversal and also draw the TREE.

i) BFS

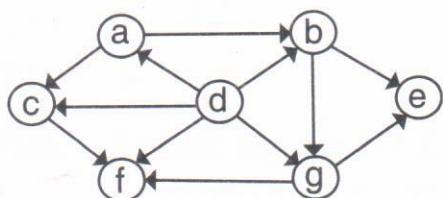
ii) DFS



- b) Write an algorithm to sort N numbers using Quick sort. Derive the time complexity. (6+6)

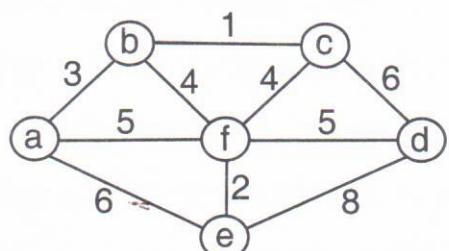


7. a) Explain the Strassen's algorithm of matrix multiplication and derive the time complexity.
b) Explain DFS-based algorithm to solve the topological sorting problem and also write topological order for the following graphs and also write the topological order. (6+6)



Unit - IV

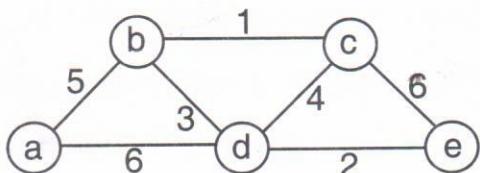
8. a) Write and explain the Prim's algorithm and find Minimum Spanning tree for the given graph.



- b) Write and explain the Huffman algorithm and construct Huffman coding tree. Consider the five character alphabet [A, B, C, D, -] with the following occurrence probabilities. (6+6)

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

9. a) Apply Kruskal's algorithm to find a minimum spanning tree of the following graphs.



- b) Explain Decision Tree and draw the Decision tree for minimum of three numbers. (6+6)