Reg. No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

BCACACN 501

Fifth Semester B.C.A. Degree Examination, December 2023/January 2024
(NEP 2020) (2023 – 2024 Batch Onwards)
DESIGN AND ANALYSIS OF ALGORITHMS
(DSCC)

Time : 2 Hours

Max. Marks : 60

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

PART – A

1. a) What are double linked list and queue data structures ? (6×2=12)

   b) Define sets and dictionaries.

   c) List any two importance of Brute force approach.

   d) Define convex and convex hull.

   e) Define decrease and conquer technique and list any two of its variations.

   f) Write an algorithm to find height of Binary tree.

   g) What is Greedy problem ? List requirements of the solution at each step in Greedy approach.

   h) What is NP complete problem ? Write example.

PART – B
Unit – I

2. a) Explain Algorithm design and analysis process with flow diagram.

   b) Write an algorithm to find the factorial of a number using recursion and also perform mathematical analysis. (6+6)

3. a) Explain the following :
      i) Graph problem
      ii) Combinatorial problems
      iii) Geometrical problems.

   b) Explain asymptotic notations Big O and Big θ that are used to compare the order of growth of an algorithm with example. (6+6)

P.T.O.

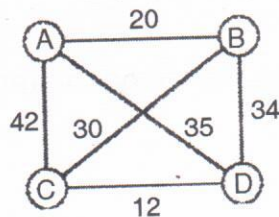## Unit – II

4. a) Write an algorithm to sort N numbers using selection sort. Derive the number of operations and time complexity.

   b) Write and explain the algorithm for Closest-Pair Problem. Derive its complexity.

   c) 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 = 15 kg.   **(4+4+4)**
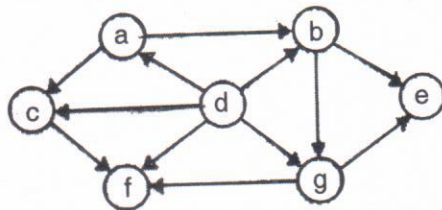
Items	A	B	C	D
Weight (kg)	3	5	4	6
Value	36	25	41	34

5. a) Write an algorithm to sort N numbers by applying Bubble sort. Derive the number of operations and time complexity.

   b) Write and describe Brute force String Matching Algorithm.

   c) Find the optimal solution for the Travelling Salesman problem using exhaustive search method by considering 'A' as the starting city.   **(4+4+4)**

Unit – III

6. a) Write and explain Depth-First Search Algorithm with its time complexity.

   b) Apply the source-removal (Decrease by one) algorithm to solve the topological sorting problem for the digraph given.
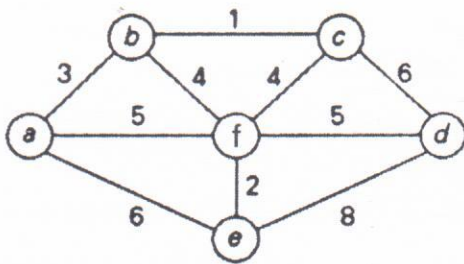

   c) Compute 34 × 26 using divide and conquer approach for the multiplication of two large numbers.   **(4+4+4)**

7. a) Write an algorithm to sort N numbers using merge sort. Derive the time complexity.

b) Explain the Strassen's algorithm of matrix multiplication and derive the time complexity. **(6+6)**
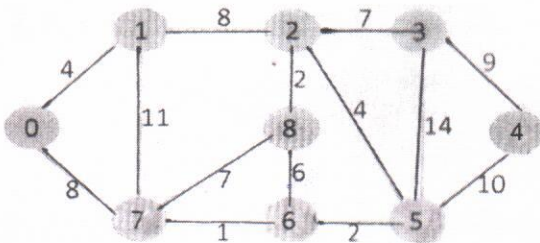
Unit – IV

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

b) Construct Huffman tree and write the Huffman code for given data. **(6+6)**

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

9. a) Write the Kruskal's algorithms and apply Kruskal's algorithm to find a minimum spanning tree of the given graph.

b) Draw the decision tree for the following :
   i) Minimum of three numbers.
   ii) Binary search in a four-element array. **(6+6)**