IV Semester B.C.A. Examination, August/September 2023
(NEP)
COMPUTER SCIENCE
4.2 : Design and Analysis of Algorithm

Time : 2½ Hours   Max. Marks : 60

Instruction : *Answer **all** the Sections.*

SECTION – A

Answer **any four** questions. **Each** question carries **two** marks.   (4×2=8)

1. Define an algorithm and mention its characteristics.

2. List efficiency classes used in analysis of algorithm.

3. State the Brute-Force method.

4. Define topological sorting with example.

5. What is minimum cost spanning tree of a graph ? Give example.

6. What are NP and NP complete problems ?

SECTION – B

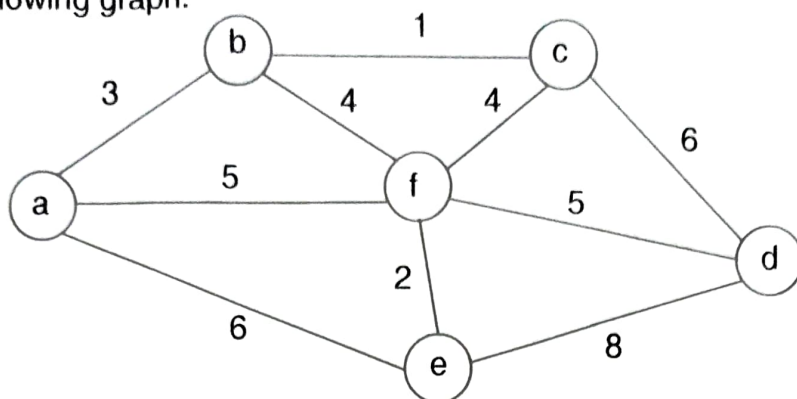Answer **any four** questions. **Each** question carries **five** marks.   (4×5=20)

7. Explain the mathematical analysis of non-recursive algorithm with example.

8. Write an algorithm to sort the array using bubble sort and obtain its time complexity.

9. Explain Breadth first search with suitable example.

10. Find the value of $8C_5$ using dynamic programming.

11. Apply Prim's algorithm to obtain the minimum cost spanning tree for the following graph.

12. Explain how 4-queen's problem can be solved using backtracking.

SECTION – C

Answer **any four** questions. **Each** question carries **eight** marks. (4×8=32)

13. Explain different asymptotic notations in detail.

14. a) Discuss important problem types.

    b) Explain empirical analysis of algorithm. (4+4)

15. a) Discuss the Brute-Force string matching algorithm.

    b) Explain how decrease and conquer method is applied to sort the elements of the array using insertion sort. (4+4)

16. Explain different tree traversal algorithm with example.

17. Write Warshall algorithm to compute transitive closure of a directed graph. Apply the same on the following graph.
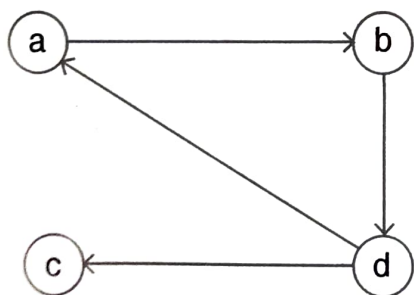
18. What is Knapsack problem ? Solve the following instance of Knapsack problem using Branch-and-Bound method where n = 4, m = 10, P = (40, 42, 25, 12) and W = (4, 7, 5, 3).