0147077 **62462**

Reg. No. | | | | | | | | |

II Semester M.C.A. Degree Examination December - 2024
COMPUTER SCIENCE
The Design and Analysis of Algorithm
(CBCS Scheme Y2K20)
Paper : 2MCA5

Time : 3 Hours **Maximum Marks : 70**

Instruction to Candidates:

Answer any Five questions from Section A and any Four question from Section B.

SECTION - A

I. Answer any Five questions. Each question carries 6 marks. **(5×6=30)**

1. What is the time complexity of following function func(). Explain.

```
Int fun (int n)
{
For(int i=1;i<n;i++)
{
For (int j=1;j<=n;j+=i)
{
Sum =sum+i*j;
}}
Return (sum)
}
```

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2. Define Algorithm. List out the characteristics of an algorithm.

3. Trace the bubble sort algorithm for the following data 40, 50, 30, 20, 10 and write bubble sort algorithm.

4. Describe All-pairs shortest path algorithm and derive its time complexity.

5. Explain P, NP and NP complete problems.

6. Using backtracking technique solve the following instance for the subset problem.

S={1, 9, 7, 5, 18, 12, 20, 15} and d=35.

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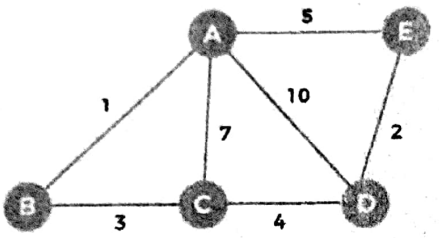
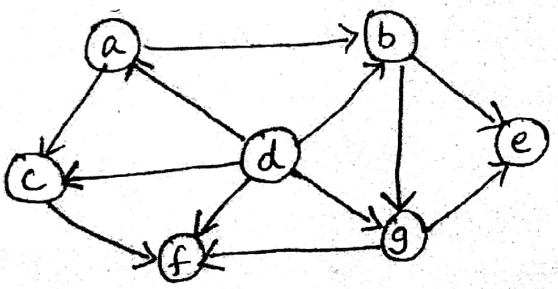
7. Find the minimum spanning tree using Kruskal's algorithm.



8. Using any method. Solve the topological sorting problem for the following graph .



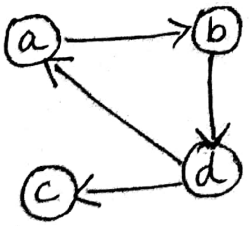
SECTION-B

II. Answer any Four of the following questions. Each question carries 10 marks. **(4×10=40)**

9. a) Write the steps for mathematical analysis of non-recursive algorithm. **(4)**

   b) Design an algorithm for performing sequential search and compute the best case, worst case and average case efficiency. **(6)**

10. a) Apply Warshall's algorithm to compute transitive closure for the graph. **(6)**



   b) Write brute-force string matching algorithm. **(4)**

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11. a) Sort the list of the elements 10, 5, 7, 6, 1, 4, 8, 3, 2, 9 using merge algorithm and find its time complexity. **(7)**

b) Give the differences between BFS and DFS. **(3)**

12. a) Solve the following Knapsack problem using dynamic programming if the capacity of the knapsack is 7. **(6)**

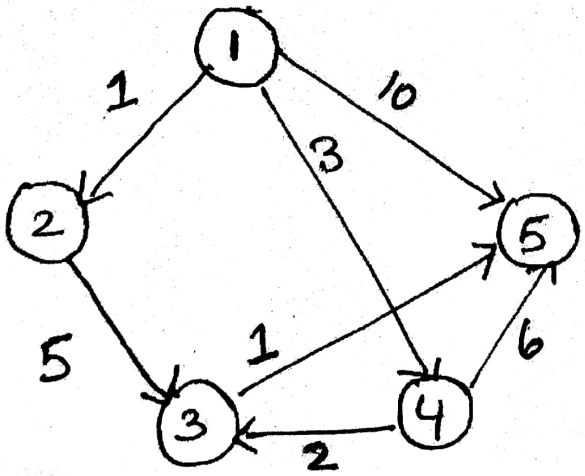
Item	Weight	Value
1	1	1
2	2	6
3	3	10
4	4	12

b) **Text:** e o v a d a b c d f t o y

Pattern: a b c d

Find the pattern a b c d in the given text using the horspool pattern matching Algorithm. **(4)**

13. a) Using Dijkstra's method find the single source shortest - paths of the following graph. Use vertex 1 as source. **(6)**



b) Explain principle of optimality. **(4)**

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