Reg. No. ☐☐☐☐☐☐☐☐☐☐

IV Semester B.C.A. Degree Examination, September - 2023
COMPUTER SCIENCE
Design and Analysis of Algorithms
(NEP Scheme)

Time : 2½ Hours   Maximum Marks : 60

Instructions to Candidates:
    Answer **all** sections.

SECTION - A

I.   Answer any **Four** questions. Each question carries **Two** marks.   (4×2=8)

1.   Define Algorithm. List the methods for specifying the algorithm.

2.   Define time complexity and space complexity.

3.   List two graph traversal algorithms and write one difference between them.

4.   Define binary tree. List three types of binary tree traversal.

5.   What is hashing? Define hash table.

6.   Define Backtracking and Branch - Bound Technique.

SECTION - B

II.   Answer any **Four** questions. Each question carries **Five** marks.   (4×5=20)

7.   Explain worst case, best case and average case efficiencies.

8.   Write general plan for analyzing the time efficiency of Recursive Algorithms. Analyze time efficiency for finding a factorial of a number.

9.   Write a program [using C or python] to implement binary search algorithm.

10.   What is topological sorting? Find the topological sort of a given graph using source removal method.
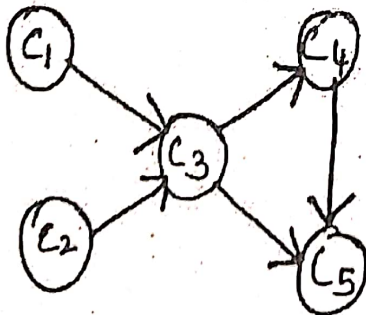
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11. Find the minimum weight spanning tree using prim's algorithm.
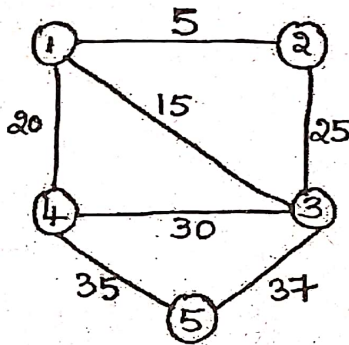
12. Solve sum of subsets using backtracking for S = {3,4,5,6}, M = 13 by constructing a solution space tree.

SECTION - C

III. Answer any **Four** questions. Each question carries **Eight** marks.   **(4×8=32)**

13. Explain fundamentals of Algorithm problem solving with a neat diagram (Sketch).

14. Explain Asymptotic notations used to describe the running time of an algorithm.

15. Trace the quick sort algorithm for the following numbers
    45, 36, 15, 92, 35, 71, 64, 39, 73, 37.

16. Solve 4-Queens problem by back tracking technique. Draw solution state - space tree.

17. Find the optimal solution for a Knapsack problem using Branch and bound method with M = 40, N = 4.

$$\{w_1, w_2, w_3, w_4\} = \{20, 25, 10, 15\}$$

$$\{p_1, p_2, p_3, p_4\} = \{20, 40, 35, 45\}$$

18. Write a short notes on :
    a. Travelling sales man problem.
    b. Decision tree.   **(4+4)**