Department of Computational Sciences

Brainware University

BCA (2023), 2nd Year, 4th Semester, 2025

Design and Analysis of Algorithm (BCA47111)

1. Write a program in C to search an element from n numbers of an array using an algorithm whose time complexity is O(n).
2. Write a program in C to search an element from a sorted array having n elements using an algorithm whose complexity is O(log(n)).
3. Write a program in C to search an element from a sorted array having n elements using an algorithm whose complexity is O(log(log(n))).
4. Write programs in C to solve the following problems using recursion:
   1. Calculate the factorial of a given number.
   2. Calculate the sum of digits of a number.
   3. Convert a given decimal number to binary.
5. Write a program in C for sorting an array of n numbers of elements using any algorithm having best case time complexity of O(n^2).
6. Write a program in C for sorting an array of n numbers of elements using the following algorithms:
   1. Merge Sort.
   2. Quick Sort.
   3. Heap Sort.
7. Write a program in C to implement the Strassen’s Algorithm for matrix multiplication.
8. Write a program in C to solve the fractional knapsack problem using the greedy approach.
9. Write a program in C for solving the Job Sequencing problem.
10. Write programs in C to calculate the Nth fibonacci number recursively using naive approach and the dynamic programming approach. Demonstrate the performance improvement of the DP approach.
11. Given a sequence of matrix dimensions as input, write a program in C to calculate the minimum number of scalar multiplications required to multiply those matrices.
12. Write a program in C to solve the 0/1 knapsack problem using the dynamic programming approach.
13. Write a program in C to implement BFS and DFS algorithms for traversing through a graph.
14. Write a program in C to construct the minimum spanning tree from any directed or undirected graph using Prim’s algorithm.
15. Write a program in C to construct the minimum spanning tree from any directed or undirected graph using Kruskal’s algorithm.
16. Write a program in C to find the shortest path between two given nodes in a graph using Dijkstra’s algorithm.
17. Write a program in C to find the shortest path from a given node to all other nodes in a graph using the Bellman Ford algorithm and demonstrate how it performs for a graph having negative edges.
18. Write a program in C to find the shortest path between all nodes in a graph using the Floyd-Warshall algorithm.
19. Write a program in C to implement the n-queens problem.
20. Write programs in C to compare string matching using the naive algorithm and KMP algorithm.

Link of code <https://chatgpt.com/share/68113917-1224-8010-ba3a-5d4a8e69131a>

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