Name: Devesh Nayan Venguekar
Class: TE COMPS A
Roll No: 9766

AI Experiment 3.

Post Lab:

Q.1] What is the time complexity of the Water Jug Problem?

Ans: The time complexity of the water jug problem depends on the algorithm used to solve it. The most common approach is using breadth-first search (BFS) or depth-first search (DFS) which typically have a time complexity of $O(V + E)$, where V is the number of states (nodes) and E is the number of edges in the search tree. In water jug problem, the number of states can be bounded by the product of the capacities of the jugs, so the time complexity is $O(M * N)$, where M and N are the capacities of the jugs. However, this can vary depending on the specific details of the implementation and the constraints of the problem.

Q.2] What is DFS not used for solving a water jug problem?

Ans: DFS (Depth-first search) is not commonly used for solving the water jug problem because it can get stuck exploring a deep branch of the search tree before finding a solution. In worst case, DFS may traverse deeply down one branch of the search tree before backtracking, which can be inefficient and may not find the optimal solution efficiently. Additionally DFS can get stuck in infinite loops if cycles exist in the state space. While DFS is suitable for

certain types of problems, such as searching for a path in a maze or graph traversal, its lack of optimality and potential for infinite loops make it less suitable for finding the shortest path or sequence of steps in the water jug problem. Therefore, BFS is preferred over the problem as it guarantees finding the shortest path if one exists.