**Exercise 5: Task Management System Theory**

1. **Explain the different types of linked lists (Singly Linked List, Doubly Linked List).**

**Ans-> Singly Linked List**: Consists of nodes where each node contains a data part and a reference to the next node in the sequence. The last node points to null.

**Doubly Linked List**: Each node contains a data part, a reference to the next node, and a reference to the previous node. This allows traversal in both forward and backward directions.

**Circular Linked List**: A**circular linked list** is a linked list where all nodes are connected to form a circle. In a circular linked list, the first node and the last node are connected to each other which forms a circle. There is no NULL at the end.

1. **Analyze the time complexity of each operation.**

**Ans-> Time Complexity**

**Add**: O(n) - Adding a task requires traversing to the end of the list.

**Search**: O(n) - Searching for a task involves traversing the list until the task is found.

**Traverse**: O(n) - Traversing involves visiting each node in the list.

**Delete**: O(n) - Deleting a task requires searching for the task first, then removing it.

1. **Discuss the advantages of linked lists over arrays for dynamic data.**

**Ans-> Dynamic Size**: Linked lists can grow or shrink dynamically, making them more flexible for handling dynamic data.

**Efficient Insertions/Deletions**: Insertions and deletions are more efficient compared to arrays, especially at the beginning or middle of the list, as they do not require shifting elements.

**Memory Utilization**: Linked lists do not require contiguous memory allocation, which can be advantageous for memory management.

**OUTPUT OF THE OPERATIONS ADD, SERACH, TRAVERSE, DELETE USING A SINGLE LINKED LIST ON THE TASKMANAGEMENT –**

