**Exercise 6: Library Management System Theory**

1. **Explain linear search and binary search algorithms.**

**Ans-> Linear Search**

* **Description**: Sequentially checks each element of the list until the desired element is found or the list ends.
* **Time Complexity**: O(n) in the worst and average cases, where n is the number of elements in the list.

**Binary Search**

* **Description**: Works on a sorted list by repeatedly dividing the search interval in half. If the value of the search key is less than the middle item, the search continues in the lower half, otherwise, it continues in the upper half.
* **Time Complexity**: O(log n) in the worst and average cases.

1. **Compare the time complexity of linear and binary search.**

**Ans-> Linear Search**: O(n) - Each element is checked until the desired element is found or the list ends.

**Binary Search**: O(log n) - The list is repeatedly divided in half, significantly reducing the number of comparisons.

1. **Discuss when to use each algorithm based on the data set size and order.**

**Ans-> Linear Search**: Suitable for small datasets or unsorted lists. Simple to implement and requires no preprocessing of the data.

**Binary Search**: Suitable for large, sorted datasets. More efficient than linear search, but requires the list to be sorted beforehand, which may involve additional overhead.

**OUTPUT OF PERFORMING LINEAR AND BINARY SERACH TO FIND BOOKS BY TITLE –**

