

## Design and Analysis of Algorithms

### Assignment 2

1. Write linear search pseudocode to search an element in a sorted array with minimum comparisons.
2. Write pseudo code for iterative and recursive insertion sort. Insertion sort is called online sorting. Why? What about other sorting algorithms that has been discussed in lectures?
3. Complexity of all the sorting algorithms that has been discussed in lectures.
4. Divide all the sorting algorithms into inplace/stable/online sorting.
5. Write recursive/iterative pseudo code for binary search. What is the Time and Space complexity of Linear and Binary Search (Recursive and Iterative)
6. Write recurrence relation for binary recursive search.
7. Find two indexes such that  $A[i] + A[j] = K$  in minimum time complexity.
8. Which sorting is best for practical uses? Explain.
9. What do you mean by number of inversions in an array? Count the number of inversions in Array  $arr[] = \{7, 21, 31, 8, 10, 1, 20, 6, 4, 5\}$  using merge sort.
10. In which cases Quick sort will give the best and the worst case time complexity?
11. Write Recurrence Relation of Merge and Quick sort in best and worst case? What are the similarities and differences between complexities of two algorithms and why?
12. Selection sort is not stable by default but can you write a version of stable selection sort.
13. Bubble sort scans whole array even when array is sorted. Can you modify the bubble sort so that it doesn't scan the whole array once it is sorted.
13. Your computer has a RAM (Physical memory) of 2 GB and you are given an array of 4 GB for sorting. Which algorithm you are going to use for this purpose and Why ? Also explain the concept of External and Internal Sorting.