



**Department of Computer Science and Engineering**  
**International Institute of Information Technology, Naya Raipur**  
**Design and Analysis of Algorithms (Course Code: CSE201)**

Time: 6:00 hrs

Lab Experiments: Part-I

Maximum Marks: 200

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Note: Implement the following Algorithms in C and submit the same by Lab Record

1. DIVIDE—AND—CONQUER

1. Binary Search
2. Merge Sort
3. Quick Sort
4. Given a sorted array of non-repeated integers  $A[1...n]$ ,  $n > 1$  then check whether there is an index  $i$  for which  $A[i] = i$ . Give an algorithm that runs in  $O(\log n)$  time

[30]

2. DIVIDE—AND—CONQUER

1. Strassen's Matrix Multiplication

3. GREEDY METHOD

[10]

1. Knapsack Problem
2. Job sequencing with deadlines algorithm

[20]

4. GREEDY METHOD

1. Prim's Algorithm for finding the minimal spanning trees
2. Krushkal's Algorithm for finding the minimal spanning trees
3. Dijkstra's Algorithm

5. SORTING AND SEARCHING

[20]

1. Insertion Sort
2. Selection Sort
3. Heap Sort

6. SORTING AND SEARCHING

[20]

1. Shell Sort

7. PROBLEMS ON SORTING AND SEARCHING

[10]

1. Given an array of  $n$  elements. Find whether there are two elements in the array such that their sum is equal to given element  $K$  or not? in  $O(n \log n)$  time.

2. Given an array of  $n$  elements. Find whether there are three elements in the array such that their sum is equal to given element  $K$  or not? in  $O(n^2)$  time.
3. Let  $A$  and  $B$  be two arrays of  $n$  elements. Given a number  $K$ , draw an  $O(n \log n)$  time algorithm for determining whether there exists  $a \in A$ ,  $b \in B$  such that  $a + b = K$  or not?.
4. Given an array of  $n$  elements, give an algorithm for checking whether there are any duplicate elements in the array or not? in  $O(n \log n)$  time.
5. Given an array of  $n$  elements, give an algorithm for finding the element which appears maximum number of times in the array in  $O(n \log n)$  time.

[50]

#### 8. DYNAMIC PROGRAMMING

1. Finding the optimal order of multiplying  $n$  matrices

[15]

#### 9. DYNAMIC PROGRAMMING

1. Construction of OBST

[15]

#### 10. SORTING AND SEARCHING

1. Given an array of  $n$  elements, derive an algorithm for finding the first element in the array which is repeated.

[10]

*Note: Every one has to submit the record (Indentation in the program is must) with detailed solution and it's worst case time complexity.*

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