**Siliguri Institute of Technology**
**Department of CSE**
**Internal Exam I Year 2020**
**Design & Analysis of Algorithm PCC- CS 404**

**Full Marks: 30** **Time: 60Mins**

---

## Group-A:

**1. Answer the following. [5 x 1 =5]**

I) Which of the following method used in Marge Sort algorithm:
a)backtracking b)Divide-and-conquer c)Greedy Method d)Dynamic programming

II) Time complexity of Quick Sort in worst case is
a) O(n) b) O(n log n) c) $O(n^2)$ d) O(log n)

III) Time complexity of binary search algorithm:
a) O(n) b) O(n log n) c) $O(n^2)$ d) O(log n)

IV) O -Notation provides an asymptotic
a) upper bound b) lower bound c) tight bound d) none of these

V) Time complexity of linear search algorithm in worst case is:
a) O(n) b) O(n log n) c) $O(n^2)$ d) O(log n)

## Group-B

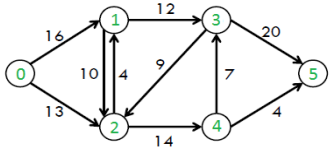
**Answer any two. [2 x 5= 10]**

2. Solve the following recurrence using **Master Theorem**.
   $T(n) = 2T\left(\frac{n}{2}\right) + O(n)$
3. What is the recurrence relation of **Binary search** and derive the **time complexity** of **Binary search.**
4. Derive the Time complexity of **Merge sort algorithm**.

## Group-C

**Answer any one. [1 x15= 15]**

5. a) Find the shortest path between vertex '0' to vertex '5' using Dijkstra's Algorithm for the following graph**.**




[8+7]

b) Create a **Max Heap** for the following key elements. $A = \{25, 20, 45, 58, 70, 86\}$

6. a) Find an **optimal parenthesization** of a **matrix-chain product** whose sequence of dimensions is⟨10,20,50,1,100⟩.

   b) Perform the **partition** operation once (one time) on the following array as per the requirement of the **quicksort algorithm**, assuming the last element is the pivot of the array. Clearly mention the steps. $A[] = \{7,8,2,1,6,5,4,3,9\}$
   [8+7]


**Siliguri Institute of Technology**
**Department of CSE**
**Internal Exam I Year 2020**
**Design & Analysis of Algorithm PCC- CS 404**

**Full Marks: 30** **Time: 60Mins**

---

## Group-A

**1. Answer the following. [5 x 1 =5]**

I) Which of the following method used in Marge Sort algorithm:
a)backtracking b)Divide-and-conquer c)Greedy Method d)Dynamic programming

II) Time complexity of Quick Sort in worst case is
a)O(n) b)O(n log n) c)$O(n^2)$ d)O(log n)

III) Time complexity of binary search algorithm:
a)O(n) b)O(n log n) c)$O(n^2)$ d)O(log n)

IV) O -Notation provides an asymptotic
a)upper bound b)lower bound c)tight bound d)none of these

V) Time complexity of linear search algorithm in worst case is:
a)O(n) b)O(n log n) c)$O(n^2)$ d)O(log n)

## Group-B

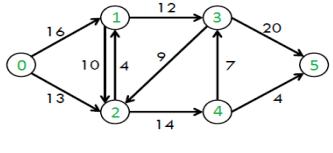
**Answer any two. [2 x 5= 10]**

2. Solve the following recurrence using **Master Theorem**.
   $T(n) = 2T\left(\frac{n}{2}\right) + O(n)$
3. What is the recurrence relation of **Binary search** and derive the **time complexity** of **Binary search.**
4. Derive the Time complexity of **Merge sort algorithm**.

## Group-C

**Answer any one. [1 x15= 15]**

5. a) Find the shortest path between vertex '0' to vertex '5' using Dijkstra's Algorithm for the following graph**.**



[8+7]

b) Create a **Max Heap** for the following key elements. $A = \{25, 20, 45, 58, 70, 86\}$

6. a) Find an **optimal parenthesization** of a **matrix-chain product** whose sequence of dimensions is⟨10,20,50,1,100⟩.

   b) Perform the **partition** operation once (one time) on the following array as per the requirement of the **quicksort algorithm**, assuming the last element is the pivot of the array. Clearly mention the steps. $A[] = \{7,8,2,1,6,5,4,3,9\}$
   [8+7]