Name of the student:_____ Roll No.:_____
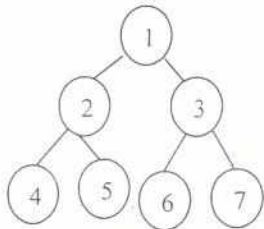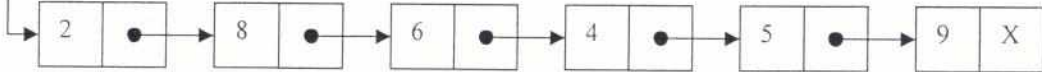
THAPAR UNIVERSITY, PATIALA
Computer Science & Engineering Department

B.Tech 6th Semester (MSE)	UCS732: Advance Data Structures
March 19, 2016	Saturday, 13.00 – 15.00 Hrs
Time: 2 Hrs; Maximum Marks (M.M.): 25	Name of Faculty: Anshu Singla

Note:

- Answer all the questions in the sequence.

1.	Write short note on Abstract Data Type with example.	2
2.	State whether the given statement is true or false. "The subtree of the root of a red-black tree is always itself a red-black tree". Justify your answer.	2
3.	What is the time complexity of the function fun()?Explain	2

```
(a)
    int fun(int n)
    {int count = 0;
    for (int i = n; i > 0; i /= 2)
        for (int j = 0; j < i; j++)
            count += 1;
    return count;}
```
```
(b)
    int fun(int n)
    {int count = 0;
    for (int i = 0; i < n; i++)
        for (int j = i; j > 0; j--)
            count = count + 1;
    return count;}
```

4.	An expression "ab-cd*+" is equivalent to the post order of the binary tree given below:	3

What will be the values of 1,2,3,4,5,6,7? Explain.

5.	Explain the output step by step of the code given below for the link-list input as follows:	3


```
void fun2(struct node* head)
{ if(head== NULL)
   return;
  printf("%d ", head->data);

  if(head->next != NULL )
   fun2(head->next->next);
  printf("%d ", head->data); }
```

6.	What is meant by sparse array? How it can be stored efficiently? Explain with an example.	4
7.	Show the AVL tree that results after each of the element keys 9, 27, 50, 15, 2, 21, and 36 are inserted, in the mentioned order, into an initially empty AVL tree. Clearly show the tree that results after each insertion, and make clear any rotations that must be performed with reasons.	4
8.	Show the red-black tree using both bottom-up and top-down that results after each of the integer keys 21, 32, 64, 75, and 15 are inserted, in that order, into an initially empty red-black tree. Clearly show the tree that results after each insertion (indicating the color of each node), and make clear any rotations that must be performed.	5