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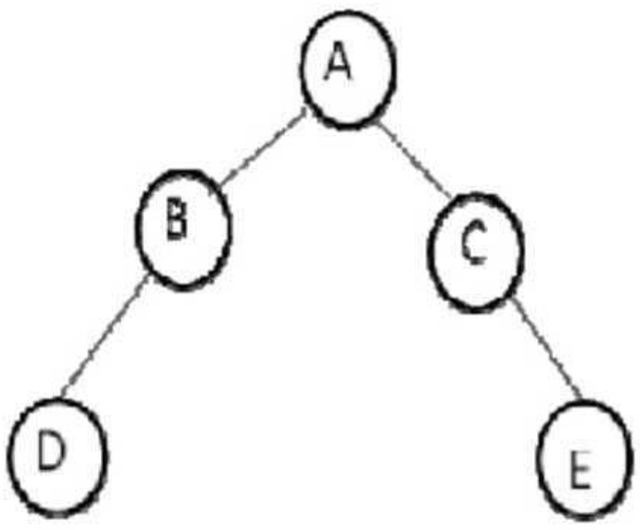
Question No: 31 (Marks: 1)
Describe the conditions for second case of deletion in AVL Trees.
Answer:- (Page 266)
This is the case where the parent of the deleted node had a balance of 1 and the node was deleted in the parent's *left* sub tree.

Question No: 32 (Marks: 1)
What is Table abstract data type.
Answer:- repeat

Question No: 33 (Marks: 2)
How we can generate a maze .Give an algorithm.
Answer:- repeat

Question No: 34 (Marks: 2)
Represent the following Binary tree using array representation.



Answer:- repeat

Question No: 35 (Marks: 3)
What is an Equivalent relation? Give any two examples.
Answer:- repeat

Question No: 36 (Marks: 3)
"For smaller lists, linear insertion sort performs well, but for larger lists, quick sort is suitable to apply." Justify why?
Answer:- repeat

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Question No: 37 (Marks: 3)
How many leaf and non-leaf nodes are present in a complete binary tree if its depth is 7?
Answer:- (Page 125)
Leaf Node = 2^d = 2^7 = 128
Non leaf Nodes = 2^d -1 = (2^7) -1 = 128 – 1 = 127

Question No: 38 (Marks: 5)
Remove the smallest element from the following array which represents a min-heap.

original min-heap	**1**	**3**	**2**	**5**	**4**	**8**	**9**	**10**	**7**

and show the resultant heap in the form of array as shown below,
Answer:- repeat

Question No: 39 (Marks: 5)
Here is an array with exactly 15 elements:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15.
Suppose that we are doing a binary search for an element. Indicate any elements that will be found by examining two or fewer numbers from the array.
Answer:- repeat

Question No: 40 (Marks: 10)
(a) Write C++ algorithm for Binary Search

Answer:- (Page 125)
```
int isPresent(int *arr, int val, int N)
{
int low = 0;
int high = N - 1;
int mid;
while ( low <= high )
{
mid = ( low + high )/2;
if (arr[mid] == val)
return 1; // found!
else if (arr[mid] < val)
low = mid + 1;
else
high = mid - 1;
}
return 0; // not found
```

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b) Consider the following array of values; show how the binary search algorithm would find the value -5. Clearly show/explain your work; that is, show the values of start, end, etc. for each step of the algorithm.

0	-15
1	-5
2	0
3	7
4	13
5	16
6	27
7	30
8	42

Answer : (page 437)

Value < mid
Value = -5
Mid=(0+8)/2=4
Low=0
High=mid -1=4-1

-15	-5	0	7	13	16	27	30	42
0	1	2	3	4	5	6	7	8
low			high	mid				

Starting from the low which is -15.now compare the -5 form the next index which is at position 1.

-15	-5	0	7	13	16	27	30	42
0	1	2	3	4	5	6	7	8
low			high	mid				

-15	-5	0	7	13	16	27	30	42
0	1	2	3	4	5	6	7	8
low			high	mid				

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Question No: 41 (Marks: 10)
Show the result of following sequence of instructions

Union(1,2)
Union(3,4)
Union(3,5)
Union(1,7)
Union(3,6)
Union(8,9)
Union(1,8)
Union(3,10)
Union(3,11)
Union(3,12)
Union(3,13)
Union(14,15)
Union(16,17)
Union(14,16)
Union(1,3)
Union(1,14)
When the unions are performed by height
Note: You have to show only Final tree, No need to show all steps.

Answer:-
Solve it yourself; take help from previous same question that I have solved in page 12 of this file.

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Question No: 31 (Marks: 1)
If a Binary Tree has N internal nodes what are the no. of external nodes in it.
Answer:- (Page 304)
The No. of external nodes will be **N+1**

Question No: 32 (Marks: 1)
What is meant by Symmetry in equivalence relations?
Answer:- (Page 387)
Symmetry in equivalence relations mean for all elements x and y, x R y if and only if y R x

Question No: 33 (Marks: 2)
How heap sort works to sort a set of data.
Answer:- Repeated

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Question No: 34 (Marks: 2)
How we can apply Find operation on elements combined through Union operation.
Answer:-Repeated

Question No: 35 (Marks: 3)
How we can use concept of equivalence relations to generate a Maze.
Answer:-Repeated

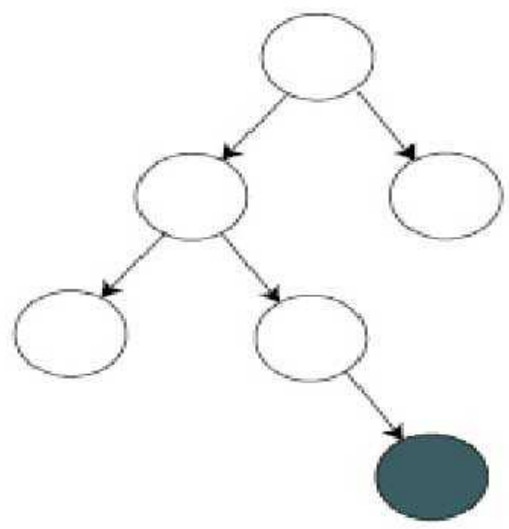
Question No: 36 (Marks: 3)
Suppose we are sorting an array of eight integers using a some quadratic sorting algorithm. After four iterations of the algorithm's main loop, the array elements are ordered as shown here:
2 4 5 7 8 1 3 6
Which statement is correct? (Note: Our selectionsort picks largest items first.)

A. The algorithm might be either selection sort or insertion sort.
B. The algorithm might be selection sort, but it is not insertion sort.
C. The algorithm is not selection sort, but it might be insertion sort.
D. The algorithm is neither selection sort nor insertion sort.
E. None of these.

Answer:-
C. The algorithm is not selection sort, but it might be insertion sort. (Correct)

Question No: 37 (Marks: 3)
How many leaf and non-leaf nodes are present in a complete binary tree if its depth is 7 ?
Answer:- repeat

Question No: 38 (Marks: 5)
If we insert a new element into an AVL tree of height 4, is one rotation sufficient to re-establish balance? Justify your answer.
Answer:-
No, one rotation is not always sufficient to re-establish balance. For example, consider the insertion of the shaded node in the following AVL tree:



Though the original tree was balanced, more than one rotation is needed to restore balance following the insertion.

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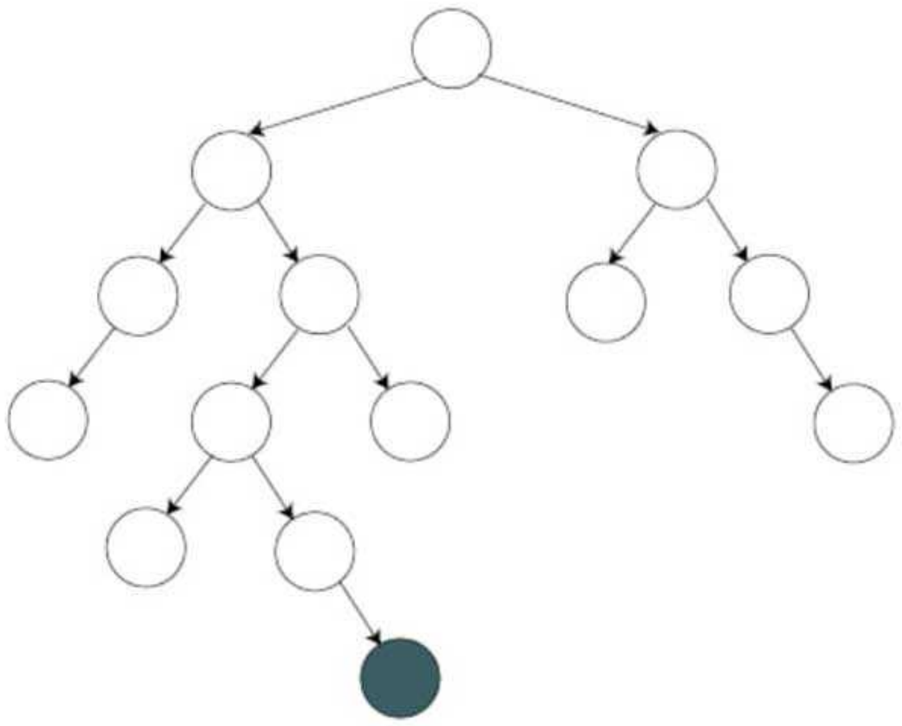
This can be seen by an exhaustive enumeration of the rotation possibilities.
The problem asks for a tree of height 4, so we can extend the above example into a larger tree:



Question No: 39 (Marks: 5)
Write down the C++ code from Selection Sort Algorithm.
Answer:- (Page 480)

```
void selectionSort(int *arr, int N)
{
int posmin, count, tmp ;
for (count=0;count<N;count++)
{
posmin = findIndexMin(arr, count, N) ;
tmp=arr[posmin] ;
arr[posmin]=arr[count] ;
arr[count]=tmp ;
}
}
int findIndexMin (int *arr, int start, int N)
{
int posmin=start ;
int index ;
for(index=start; index < N; index++)
if (arr[index]<arr[posmin])
posmin=index ;
return posmin ;
}
```

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