



Virtual University

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CS301
Solved Final Terms Papers

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Year
2017

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

Paper Pattern

MCQS 40 each 1 mark
Short 4 each 2 marks
Short 4 each 3 marks
long 4 each 5 marks

Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)

Here is a small function definition:

```
void f(int i, int &k)
{
    i = 1;
    k = 2;
```

Answer (Please select your correct option)

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☐ Both x and y are still 0.

☐ x is now 1, but y is still 0.

☒ x is still 0, but y is now 2.

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☐ x is now 1, and y is now 2.

Made by: Waqar Siddhu

Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

If a complete binary tree has n number of nodes then its height will be,

Answer (Please select your correct option)

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☒ $\log_2(n+1) - 1$

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☐ 2^n

☐ $\log_2(n) - 1$

☐ $2^n - 1$

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Question No : 3 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is NOT an implementation of Table ADT?

Answer (Please select your correct option)

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☐ Sorted Sequential Array

☐ Linked List

☐ Skip list

☒ Stack

repeated

Made by: Waqar Siddhu

Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider a min heap, represented by the following array:

3,4,6,7,5

After calling the function deleteMin(). Which of the following is the updated min heap?

Answer (Please select your correct option)

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☐ 4,6,7,5

☐ 6,7,5,4

☒ 4,5,6,7

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☐ 4,6,5,7

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Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is related to De-referencing ?

Answer (Please select your correct option)

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☒ Accessing the data at the memory address that a pointer contains

p 200

☐ Accessing a variable address using reference & operator

☐ Removing the data at the memory address that a pointer contain

☐ Removing a variable address using reference & operator

Made by: Waqar Siddhu

Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

The memory address of the first element of an array is called

Answer (Please select your correct option)

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☐ First address

☐ Base address

☐ Floor address

☒ Current address

p 28 idea

Made by: Waqar Siddhu

Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

Insertion in a linked list can be done at

Answer (Please select your correct option)

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☒ Front only

p 441

☐ Back only

☐ Somewhere in middle only

☐ Front, back and somewhere in the middle

Made by: Waqar Siddhu

Question No : 8 of 52

Marks: 1 (Budgeted Time 1 Min)

The worst case of deletion in AVL tree requires _____

Answer (Please select your correct option)

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☐ Only one rotation

☐ Rotation at each non-leaf node

☐ Rotation at each leaf node

☒ Rotations equal to $\log_2 N$

Made by: Waqar Siddhu

Question No : 9 of 52

Marks: 1 (Budgeted Time 1 Min)

Huffman encoding uses _____ to develop codes of varying lengths for the letters used in the original message.

Answer (Please select your correct option)

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☐ Linked list

☐ Stack

☐ Queue

☒ Binary tree

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Question No : 10 of 52

Marks: 1 (Budgeted Time 1 Min)

Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

option is not given

Question No: 25 (Marks: 1) - Please choose one

Mergesort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

- ▶ Elements half of the array.
- ▶ None of
- ▶ The array elements form a heap.
- ▶ Elements in the second half of the array are less than or equal to elements in the first half of the array.

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Answer (Please select your correct option)

☒ The array elements form a heap.

doubt

☐ Elements in each half of the array are sorted amongst themselves.

☐ Elements in the first half of the array are less than or equal to elements in the second half of the array.

☐ Each half of array is still unsorted.

Made by: Waqar Siddhu

Question No : 11 of 52

Marks: 1 (Budgeted Time 1 Min)

Each node in Binary Search Tree has

Answer (Please select your correct option)

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☐ 1 pointer

☒ 2 pointers

☐ 3 pointers

☐ 4 pointers

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Question No : 12 of 52

Marks: 1 (Budgeted Time 1 Min)

A tree whose all leaves are at the same level, is called:

Answer (Please select your correct option)

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☐ Binary Tree

☐ Strictly Binary Tree

☒ Complete Binary Tree

p 123

☐ Simple Tree

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Question No : 13 of 52

Marks: 1 (Budgeted Time 1 Min)

The depth of a binary tree is

Answer (Please select your correct option)

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☒ Total number of nodes in the tree

p 125

☐ Number of leaf nodes in the tree

☐ Number of non-leaf nodes in the tree

☐ Longest path from root node to farthest leaf node

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Question No : 14 of 52

Marks: 1 (Budgeted Time 1 Min)

A Binary tree can be traversed using _____.

Answer (Please select your correct option)

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☐ recursion

☐ iteration

☐ both recursion and iteration

☒ traversal can only be done on BST

rep

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Question No : 15 of 52

Marks: 1 (Budgeted Time 1 Min)

Which one of the following is TRUE about iteration?

Answer (Please select your correct option)

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- ☐ Iteration extensively uses stack memory.
- ☐ Threaded Binary Trees use the concept of iteration.
- ☐ Iterative function calls consumes a lot of memory.
- ☒ Recursion is more efficient than iteration.

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Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is a property of Binary tree?

Answer (Please select your correct option)

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- ☐ A binary tree of N external nodes has N internal nodes.
- ☒ A binary tree of N internal nodes has N+1 external nodes.
- ☐ A binary tree of N external nodes has N+1 internal nodes.
- ☐ A binary tree of N internal nodes has N-1 external nodes.

p 303

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Question No : 17 of 52

Marks: 1 (Budgeted Time 1 Min)

Which one of the following is NOT the property of equivalence relation:

Answer (Please select your correct option)

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- ☐ Reflexive
- ☐ Symmetric
- ☐ Transitive
- ☒ Associative

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Question No : 18 of 52

Marks: 1 (Budgeted Time 1 Min)

When unions are done by weight (size) and $N=1000,000$ where N is the number of nodes then what will be the maximum levels of tree ?

36. When unions are done by weight (size) and $N=1000,000$ where N is the number of nodes then what will be the maximum levels of tree ?

1000,000

100

20 420P

200

Answer (Please select your correct option)

1000,000

☐

100

☐

20

☒

200

☐

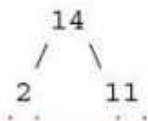
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Question No : 19 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following tree:



Answer (Please select your correct option)

2

☐

4

☐

6

☐

9

☐

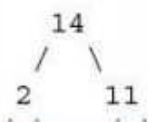
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Question No : 20 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following tree:



Answer (Please select your correct option)

5

☐

6

☐

7

☐

8

☐

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Question No : 21 of 52

Marks: 1 (Budgeted Time 1 Min)

The subscript of an array is used for,

- I) Negating array size
- II) Retrieving array elements
- III) Changing array name
- IV) Multiplication of array size

Answer (Please select your correct option)

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☐ I and II Only

☐ II Only

☒ I and IV Only

☐ IV Only

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Question No : 22 of 52

Marks: 1 (Budgeted Time 1 Min)

Compiler uses which one of the following to evaluate a mathematical equation?

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Answer (Please select your correct option)

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☐ Binary Tree

☐ Binary Search Tree

☒ Parse Tree

☐ AVL Tree

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Question No : 23 of 52

Marks: 1 (Budgeted Time 1 Min)

Running time of $find(i)$ is proportional to the _____ of the tree containing node i .

rep

Answer (Please select your correct option)

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☐ Weight

☒ Height

☐ Root

☐ Number of links

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Question No : 24 of 52

Marks: 1 (Budgeted Time 1 Min)

In a skip list of 'n' elements, which level includes all the elements?

Answer (Please select your correct option)

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☒ 0

☐ 1

☐ 2

☐ 3

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Question No : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

In a skip list, list S_0 holds the keys of S in which of the following order?

Answer (Please select your correct option)

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☐ Decreasing

☒ Non-decreasing

☐ Non-increasing

☐ Random

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Question No : 26 of 52

Marks: 1 (Budgeted Time 1 Min)

In which of the following, there is no need to go for rotations and balancing?

Answer (Please select your correct option)

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☐ Skip list

☐ AVL tree

☒ Unbalanced tree

☐ None of the given

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Question No : 27 of 52

Marks: 1 (Budgeted Time 1 Min)

Hash function is used to convert:

Answer (Please select your correct option)

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- ☐ A hash number key to a key
- ☒ A key to a hash value
- ☐ Data into table
- ☒ Character data into integer data

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Question No : 28 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose there are two key values K1 and K2 which generate a same array index "i" respectively, in this situation:

Answer (Please select your correct option)

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- ☐ K2 will store at index i
- ☐ Neither k1 nor k2 will store at index i
- ☐ K1 will store at index i
- ☐ Both k1 and k2 can store at index i

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Question No : 29 of 52

Marks: 1 (Budgeted Time 1 Min)

When does the best case of an insertion sort algorithm occur?

Answer (Please select your correct option)

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- ☒ When data is already sorted
- ☐ When more than 50% data already sorted
- ☐ When no element is on its proper position
- ☐ When about 90% of data is already sorted

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Question No : 30 of 52

Marks: 1 (Budgeted Time 1 Min)

Best case running time of insertion sort algorithm is:

Answer (Please select your correct option)

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☐ (n)

☒ (n²)

☐ (logn)

☐ (nlogn)

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Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

Choosing the first element in the list as pivot element during Quick sort is:

Answer (Please select your correct option)

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☒ Good option

☐ To increase the sorting process

☐ Bad option

☐ Some how good option

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Question No : 32 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is the most difficult case of deleting a node from an AVL tree?

Answer (Please select your correct option)

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☐ The node to be deleted is the leaf node

☐ The node to be deleted has left child (subtree)

☐ The node to be deleted has right child (subtree)

☐ The node to be deleted has both the left and right children (subtree)

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Question No : 33 of 52

Marks: 1 (Budgeted Time 1 Min)

.....in equivalence relations is as, if x leads to y and y to z then x leads to z.

Answer (Please select your correct option)

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☐ Equality

☐ Symmetry

☐ Non-Symmetry

☒ Transitivity

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Question No : 34 of 52

Marks: 1 (Budgeted Time 1 Min)

In Disjoint Set ADT, each set contains elements..... to each other.

What is Disjoint Set ADT?

Answer (Please select your correct option)

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☒ Opposite

☐ Exclusive

☐ Inclusive

☐ Unite

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Question No : 35 of 52

Marks: 1 (Budgeted Time 1 Min)

Return value of getMin() method is always of MinHeap.

Answer (Please select your correct option)

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☒ Root

☐ Right

☐ Left

☐ Leaf

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Question No : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is NOT a factor in *Union by Size*?

Answer (Please select your correct option)

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- ☐ Maintains sizes (number of nodes) of all trees
- ☐ Makes smaller tree, the subtree of the larger one
- ☒ Makes the larger tree, the subtree of the smaller one
- ☐ Maintains sizes (number of nodes) while performing union operation

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Question No : 37 of 52

Marks: 1 (Budgeted Time 1 Min)

If there are N internal nodes in a binary tree, then number of external nodes will be:

Answer (Please select your correct option)

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- ☐ $N - 1$
- ☐ N
- ☒ $N + 1$
- ☐ $N + 2$

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Question No : 38 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is NOT an example of equivalence relation?

Answer (Please select your correct option)

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- ☐ Electrical connectivity
- ☐ Set of people
- ☒ \leq relation
- ☐ Set of pixels

Made by: Waqar Siddhu

Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

In a min heap, percolateDown procedure will move smaller value _____ and bigger value _____.

Answer (Please select your correct option)

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☐ Left, Right

☐ Right, Left

☒ Up, Down

☐ Down, Up

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Question No : 40 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following heap methods, increases the value of key at position 'p' by the amount 'delta'?

Answer (Please select your correct option)

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☒ IncreaseKey(p, delta)

☐ PercolateDown(p, delta)

☐ DecreaseKey(p, delta)

☐ Remove(p, delta)

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Question No : 41 of 52

Marks: 2 (Budgeted Time 4 Min)

What are the AVL insertion cases in which single rotation is successful ?

Answer (Please click here to Add Answer)

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Rich text editor toolbar with icons for Bold, Italic, Underline, Text Color, Background Color, Bulleted List, Numbered List, Indent, Outdent, Link, Unlink, and a 100% zoom level. The text area below is empty.

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Question No : 42 of 52

Marks: 2 (Budgeted Time 4 Min)

What are different applications of Hashing?

Answer (Please [click here](#) to Add Answer)

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Question No : 43 of 52

Marks: 2 (Budgeted Time 4 Min)

Which factors should be considered while building a data structure?

Answer (Please [click here](#) to Add Answer)

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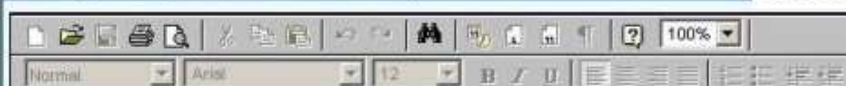
Question No : 44 of 52

Marks: 2 (Budgeted Time 4 Min)

What are the properties of equivalence class? Write any two.

Answer (Please [click here](#) to Add Answer)

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Question No : 45 of 52

Marks: 3 (Budgeted Time 6 Min)

"For smaller lists, linear insertion sort performs well, but for larger lists, quick sort is suitable to apply." Justify why?

Answer (Please [click here to Add Answer](#))

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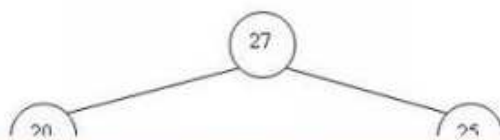


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Question No : 46 of 52

Marks: 3 (Budgeted Time 6 Min)

Consider the following Max Heap add node 24 in it and show the resultant Heap.



Answer (Please [click here to Add Answer](#))

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Question No : 47 of 52

Marks: 3 (Budgeted Time 6 Min)

What will be the output of following linked list function ?

```
void LinkedList::mystery(){
    Node *temp = headNode;
    int result = 0;
```

Answer (Please [click here to Add Answer](#))

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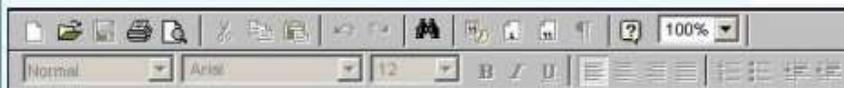
Question No : 48 of 52

Marks: 3 (Budgeted Time 6 Min)

Why binary search can not be used for linked list?

Answer (Please [click here to Add Answer](#))

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**Made by: Waqar Siddhu**

Question No : 49 of 52

Marks: 5 (Budgeted Time 10 Min)

Consider the following sequence of union commands on the set of elements

{1,2,3,4, 5}:

Answer (Please [click here to Add Answer](#))

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Question No : 50 of 52

Marks: 5 (Budgeted Time 10 Min)

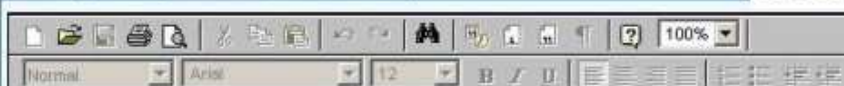
Consider the min-heap represented in the following array:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	20	30	50	40	70	60	80	90	110	100	130	120	140	150

Show the updated min-heap in the array after deleting 10.

Answer (Please [click here to Add Answer](#))

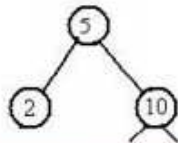
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Question No : 51 of 52

Marks: 5 (Budgeted Time 10 Min)

Draw the resultant binary search tree (BST) after deleting the node 10 from the following BST.



Answer (Please [click here](#) to Add Answer)

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Question No : 52 of 52

Marks: 5 (Budgeted Time 10 Min)

Sort the list [2 9 7 5 8] through insertion sort algorithm, show each step in your solution.

Answer (Please [click here](#) to Add Answer)

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