

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)

The data of the problem is of 2GB and the hard disk is of 1GB capacity, to solve this problem we should

Answer (Please select your correct option)

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- ☐ Use better data structures
- ☒ Increase the hard disk space concept
- ☐ Use the better algorithm
- ☐ Use as much data as we can store on the hard disk

Made by: Waqar Siddhu

Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

Four statements about trees are below. Three of them are correct. Which one is INCORRECT?

Answer (Please select your correct option)

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- ☐ Trees are recursively defined multi-dimensional data structures
- ☐ The order of a tree indicates a maximum number of children allowed at each node of the tree
- ☒ A search tree is a special type of tree where all values (i.e. keys) are ordered p 355 unordered
- ☐ If Tree1's size is greater than Tree2's size, then the height of Tree1 must also be greater than Tree2's height

Made by: Waqar Siddhu

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

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Made by: Waqar Siddhu

Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following array

23 15 5 12 40 10 7

After the first pass of a particular algorithm, the array looks like

15 5 12 23 10 7 40

Name the algorithm used

Answer (Please select your correct option)

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☐ Heap sort☐ Selection sort☐ Insertion sort☒ Bubble sortaccording to rule
page 485

Made by: Waqar Siddhu

Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)

Which one of the following algorithms is least efficient,

ref →

CS-301 Data Structure

Tariq Hanif

Answer (Please select your correct option)

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☒ Quick Sort☐ Insertion Sort☐ Merge Sort☐ Bubble Sort

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8. Which one of the following algorithms is least efficient,

Quick Sort

Insertion Sort

Merge Sort

Bubble Sort

Made by: Waqar Siddhu

Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose a pointer has been declared in main but has not assigned any variable address then

Answer (Please select your correct option)

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- ☐ That pointer points to First byte in main function
- ☐ That pointer contains a NULL value
- ☐ That pointer points to last byte in the main function
- ☒ That pointer points to any memory address

Made by: Waqar Siddhu

Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

If we insert a new node in an AVL tree which is perfectly balanced tree, then we will need _____ to keep it AVL.

Answer (Please select your correct option)

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- ☒ One rotation p 225
- ☐ Two rotations
- ☐ Rotations equal to number of levels
- ☐ No rotation at all

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 $\log_2 N$

ref: moazz files

Made by: Waqar Siddhu

Question No : 9 of 52

Marks: 1 (Budgeted Time 1 Min)

To create a _____, we link the last node with the first node in the list.

Answer (Please select your correct option)

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☐ Doubly linked list

☒ Circularly linked list

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☐ Linked list

☐ Triply linked list

Made by: Waqar Siddhu

Question No : 10 of 52

Marks: 1 (Budgeted Time 1 Min)

I have implemented the queue with a circular array. If that circular array has capacity of N elements, and **last** is an index into that array, what is the formula for the index after last?

Answer (Please select your correct option)

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☐ $(last \% 1) + N$

☐ $last \% (1 + N)$

☒ $(last + 1) \% N$

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☐ $last + (1 \% N)$

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Question No : 11 of 52

Marks: 1 (Budgeted Time 1 Min)

By using _____, we avoid the recursive method of traversing a Tree.

Answer (Please select your correct option)

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☐ Binary tree only

☒ Threaded binary tree

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☐ Heap data structure

☐ Huffman encoding

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Question No : 12 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

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Question No : 13 of 52

Marks: 1 (Budgeted Time 1 Min)

In complete Binary tree, the bottom level is filled from _____.

Answer (Please select your correct option)

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- ☒ Left to right
- ☐ Right to left
- ☐ Not filled at all
- ☐ Up to down

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Question No : 14 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following statement is NOT true for Huffman code?

Answer (Please select your correct option)

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- ☐ It is a method for the compression of standard text documents.
- ☐ It uses Binary tree to develop codes of varying lengths for the letters used in the original message.
- ☒ It is no more used in any compressed file format.
- ☐ It is also part of the JPEG image compression scheme.

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Question No : 15 of 52

Marks: 1 (Budgeted Time 1 Min)

If a complete Binary tree has height h , then its number of nodes will be :

answer from moazz

Answer (Please select your correct option)

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☐ Log (h)

☒ $2^{h+1} - 1$

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☐ Log (h) - 1

☐ $2^h - 1$

Made by: Waqar Siddhu

Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

While building Huffman encoding tree, the new node that is the result of joining two nodes has the frequency.

Answer (Please select your correct option)

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☐ Equal to the small frequency

☐ Equal to the greater frequency

☒ Equal to sum of the two frequencies

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☐ Equal to difference of the two frequencies

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Question No : 17 of 52

Marks: 1 (Budgeted Time 1 Min)

Which one of the following is NOT true regarding the skip list?

Answer (Please select your correct option)

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☐ Each list S_i contains the special keys + infinity and - infinity.

☐ List S_0 contains the keys of S in non-decreasing order.

☐ Each list is a subsequence of the previous one.

☒ List S_h contains only the n special keys.

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Made by: Waqar Siddhu

Question No : 18 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 : 19 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is true for disjoint sets A and B ?

Answer (Please select your correct option)

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☐ Intersection of A & B is equal to B

☐ Union of A & B is empty

☒ Intersection of A & B is empty

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☐ Intersection of A & B is equal to A

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Question No : 20 of 52

Marks: 1 (Budgeted Time 1 Min)

When unions are done by weight (size), the depth of any element is never greater than

Answer (Please select your correct option)

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☒ $\log_2 n$

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☐ $n \log_2 n$

☐ $n \log_2 n + 1$

☐ $\log_2 n - 1$

Made by: Waqar Siddhu

Question No : 21 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose you implement a Min heap (with the smallest element on top) in an array. Consider the different arrays below, determine the one that *cannot* possibly be a heap:

Answer (Please select your correct option)

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☐ 16, 18, 20, 22, 24, 28, 30

☐ 16, 20, 18, 24, 22, 30, 28

☐ 16, 24, 18, 28, 30, 20, 22

☒ 16, 24, 20, 30, 28, 18, 22

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Question No : 22 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose currentNode refers to a node in a linked list (using the Node class with member variables called *data* and *nextNode*). Which boolean expression will be true when CurrentNode refers to the tail node of the list?

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Answer (Please select your correct option)

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☒ (currentNode == null)

38. Suppose currentN variables called *data* and *nextNode*. Which boolean expression will be true when CurrentNode refers to the tail node of the list?

☐ (currentNode->nextNode == null)

☒ (currentNode == null)

☐ (currentNode->nextNode == null)

☐ (nextNode.data == null)

☐ (nextNode.data == null)

☐ (currentNode.data == 0.0)

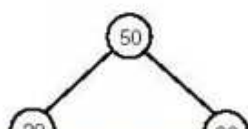
☐ (currentNode.data == 0.0)

Made by: Waqar Siddhu

Question No : 23 of 52

Marks: 1 (Budgeted Time 1 Min)

Below is a Binary Search Tree (BST). If we delete the value 50 from the root node, what would be the value in the root of the remaining tree?



Answer (Please select your correct option)

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☐ 50

☐ 60

☐ 70

☐ 80

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Question No : 24 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 : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

Searching an element in an AVL tree takes maximum _____ time (where n is number of nodes in AVL tree)

Answer (Please select your correct option)

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☐ $\log_2(n+1)$

☐ $\log_2(n+1) - 1$

☒ $1.44 \log_2 n$

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☐ $1.66 \log_2 n$

Made by: Waqar Siddhu

Question No : 26 of 52

Marks: 1 (Budgeted Time 1 Min)

A complete binary tree having "N" nodes consists of Levels.

Answer (Please select your correct option)

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☐ $\log_2 (N+1) - 1$

☐ $\log_2 (N-1) - 1$

☒ $\log_2 (N+1) + 1$

☐ $\log_2 (N-1) + 1$

Made by: Waqar Siddhu

Question No : 27 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ Weight

☒ Height

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☐ Root

☐ Number of links

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Question No : 28 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is used to represent an image in the computer?

Answer (Please select your correct option)

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☐ Characters

☐ Text

☒ Numbers

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☐ Audio

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Question No : 29 of 52

Marks: 1 (Budgeted Time 1 Min)

Hash function is used to convert:

confusion

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 : 30 of 52

Marks: 1 (Budgeted Time 1 Min)

Hash function is:

Answer (Please select your correct option)

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☐ A Table

☒ An Algorithm

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☐ A Data Structure

☐ A program

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Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

When two or more than two keys produce a same index in hashing function, this situation is know as:

Answer (Please select your correct option)

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☐ Same key generation

☐ Same value generation

☐ Same key and same value

☒ Collision

p 464

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Question No : 32 of 52

Marks: 1 (Budgeted Time 1 Min)

Best case running time of selection sort algorithm is:

Answer (Please select your correct option)

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☐ $O(n)$

☒ $O(n^2)$

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☐ $O(\log n)$

☐ $O(n \log n)$

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Question No : 33 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)

p 485

☐ (logn)

☐ (nlogn)

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Question No : 34 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following can NOT be a max-heap ?

Answer (Please select your correct option)

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☐ 7 6 5 4 3 2 1

☐ 7 3 6 2 1 4 5

☐ 7 6 4 3 5 2 1

☒ 7 3 6 4 2 5 1

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Question No : 35 of 52

Marks: 1 (Budgeted Time 1 Min)

The maximum number of external nodes (leaves) for a binary tree of height H is _____

Answer (Please select your correct option)

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☒ 2^H

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☐ 2^H + 1

☐ 2^H - 1

☐ 2^H + 2

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Question No : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is the most significant part of compilers?

Answer (Please select your correct option)

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☐ AVL tree

☒ Expression tree

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☐ Array

☐ Binary tree

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Question No : 37 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

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☐ Maintains sizes (number of nodes) while performing union operation

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Question No : 38 of 52

Marks: 1 (Budgeted Time 1 Min)

A binary tree with 33 internal nodes has _____ links to internal nodes.

Answer (Please select your correct option)

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☐ 31

☒ 32

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☐ 33

☐ 66

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Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following statements is NOT true about threaded binary tree?

Answer (Please select your correct option)

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- ☐ Right thread of the right-most node points to the *dummy* node.
- ☐ Left thread of the left-most node points to the *dummy* node.
- ☐ The left pointer of the *dummy* node points to the root node of the tree.
- ☒ Left thread of the right-most node points to the *dummy* node.

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Question No : 40 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

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Question No : 41 of 52

Marks: 2 (Budgeted Time 4 Min)

How we can delete an element from Skip List

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.

Made by: Waqar Siddhu

Question No : 42 of 52

Marks: 2 (Budgeted Time 4 Min)

What are the maximum number of comparisons we have to perform during insertion in BST ?

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

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Question No : 43 of 52

Marks: 2 (Budgeted Time 4 Min)

How Table ADT can be implemented using Linked List ?

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

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Question No : 44 of 52

Marks: 2 (Budgeted Time 4 Min)

What is maximum level difference between two leaf nodes in a Heap? Justify your answer as well.

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

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Question No : 45 of 52

Marks: 3 (Budgeted Time 6 Min)

What are the three basic things that are associated with data structures?

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

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Question No : 46 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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**Made by: Waqar Siddhu**

Question No : 47 of 52

Marks: 3 (Budgeted Time 6 Min)

The following array represents a heap structure:

1	2	3	4	5	6	7	8	9	10	11	12
97	76	61	42	54	59	31	23	17	44	49	

Insert a new value **86** into the heap. Show the resultant heap, after insertion, in the form of array

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

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Question No : 48 of 52

Marks: 3 (Budgeted Time 6 Min)

What is an Equivalence relation? Give any two examples.

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

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Question No : 49 of 52

Marks: 5 (Budgeted Time 10 Min)

Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4

Sort the array by using **selection sort** algorithm and show content of array after each step.

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

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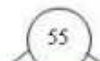


Made by: Waqar Siddhu

Question No : 50 of 52

Marks: 5 (Budgeted Time 10 Min)

Insert nodes 59 and 77 into the following AVL tree. You have to balance the AVL tree.
Steps are not required. Only show the resultant AVL tree.



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

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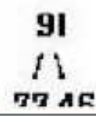


Made by: Waqar Siddhu

Question No : 51 of 52

Marks: 5 (Budgeted Time 10 Min)

Why the given Binary tree is NOT a Heap? How can we make it Heap with minimum changes ?



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

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Arial

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B / I / U



Made by: Waqar Siddhu


Question No : 52 of 52

Marks: 5 (Budgeted Time 10 Min)

Write and explain the code for "Union" and "Find" operations of Parent array in disjoint sets.

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

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B / I / U



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