



Virtual University

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CS301
Solved Final Terms Papers

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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)

Each operator in a postfix expression refers to the previous _____ operand(s).

Answer (Please select your correct option)

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☐ One

☒ Two correct

☐ Three

☐ Four

Made by: Waqar Siddhu

Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

In the linked list implementation of the queue class, where does the insert member function place the new entry on the linked list?

Answer (Please select your correct option)

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☐ At the head

☒ At the tail correct

☐ After all other entries that are greater than the new entry.

☐ After all other entries that are smaller than the new entry.

Made by: Waqar Siddhu

Question No : 3 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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☒ $\log_2 (n+1) - 1$ correct

☐ 2^n

☐ $\log_2 (n) - 1$

☐ $2^n - 1$

Made by: Waqar Siddhu

Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

Binary Search is an algorithm of searching, used with the _____ data.

Answer (Please select your correct option)

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☒ Sorted correct

☐ Unsorted

☐ Heterogeneous

☐ Random

Made by: Waqar Siddhu

Question No : 5 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 sort

Made by: Waqar Siddhu

Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider a min heap, represented by the following array:
10,30,20,70,40,50,80,60
After inserting a node with value 31. Which of the following is the updated min heap?

Answer (Please select your correct option)

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☒ 10,30,20,31,40,50,80,60,70 **correct**☐ 10,30,20,70,40,50,80,60,31☐ 10,31,20,30,40,50,80,60,31☐ 31,10,30,20,70,40,50,80,60

Made by: Waqar Siddhu

Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

We can build a heap in _____ time.

Answer (Please select your correct option)

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☒ Linear **correct**☐ Exponential☐ Polynomial☐ None of the given options

Made by: Waqar Siddhu

Question No : 8 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose we had a hash table whose hash function is " $n \% 12$ ", if the number 35 is already in the hash table, which of the following numbers would cause a collision?

Answer (Please select your correct option)

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☐ 144☒ 145 **correct**☐ 143☐ 148

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Question No : 9 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following stack operations could result in stack underflow ?

Answer (Please select your correct option)

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☐ is_empty

☒ pop

correct

☐ push

☐ is_full

Made by: Waqar Siddhu

Question No : 10 of 52

Marks: 1 (Budgeted Time 1 Min)

It will be efficient to place stack elements at the start of the list because insertion and removal take _____ time.

Answer (Please select your correct option)

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☐ Variable

☒ Constant

correct

☐ Inconsistent

☐ Non-linear

Made by: Waqar Siddhu

Question No : 11 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 $\log_2 N$

correct

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Question No : 12 of 52

Marks: 1 (Budgeted Time 1 Min)

In Threaded Binary Tree, every node that does not have a left-child has a thread to its

Answer (Please select your correct option)

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- ☐ in-order successor
- ☐ pre-order successor
- ☒ in-order predecessor **correct**
- ☐ pre-order predecessor

Made by: Waqar Siddhu

Question No : 13 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 **correct**
- ☐ Linked list
- ☐ Triply linked list

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Question No : 14 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 **correct**
- ☐ Heap data structure
- ☐ Huffman encoding

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Question No : 15 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is TRUE about arrays ?

Answer (Please select your correct option)

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C

We can increase the size of arrays after their creation.

correct

C

We can decrease the size of arrays after their creation.

C

We can increase but can't decrease the size of arrays after their creation.

C

We can neither increase nor decrease the array size after their creation.

Made by: Waqar Siddhu

Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4

Array after the FIRST iteration of the main loop in **selection sort** algorithm will be (sorting from smallest to largest) :

Answer (Please select your correct option)

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C

0 3 8 9 1 7 5 2 6 4

correct

C

2 6 4 0 3 8 9 1 7 5

C

2 6 4 9 1 7 0 3 8 5

C

0 3 8 2 6 4 9 1 7 5

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Question No : 17 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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C

 $\log_2 n$

correct

C

 $n \log_2 n$

C

 $n \log_2 n + 1$

C

 $\log_2 n - 1$

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Question No : 18 of 52

Marks: 1 (Budgeted Time 1 Min)

What is the best definition of *collision* in a hash table?

Answer (Please select your correct option)

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☐

Two entries are identical except for their keys.

☐

Two entries with different data have different keys.

☒

Two entries with different keys have the same hash value. **correct**

☐

Two entries with the same key have different hash values.

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Question No : 19 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is NOT true regarding the maze generation?

Answer (Please select your correct option)

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☐

Randomly remove walls until the entrance and exit cells are in the same set.

☐

Removing a wall is the same as doing a union operation.

☒

Remove a randomly chosen wall if the cells it separates are already in the same set.

☐

Do not remove a randomly chosen wall if the cells it separates are already in the same set.

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Question No : 20 of 52

Marks: 1 (Budgeted Time 1 Min)

"++" is a ----- operator.

Answer (Please select your correct option)

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☐

Unary

☒

Binary **correct**

☐

Ternary

☐

Binary and Ternary

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Question No : 21 of 52

Marks: 1 (Budgeted Time 1 Min)

In the call by methodology, a copy of the object is passed to the called function.

Answer (Please select your correct option)

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☐ Reference

☒ Value **correct**

☐ Reference & Value

☐ Copy of the object can not be passed

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Question No : 22 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 **correct**

☐ 1

☐ 2

☐ 3

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Question No : 23 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 **correct**

☐ Non-increasing

☐ Random

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Question No : 24 of 52

Marks: 1 (Budgeted Time 1 Min)

The balance factor of an empty AVL tree is:

Answer (Please select your correct option)

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1

☐

-1

☐

2

☐

0

☐

correct

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Question No : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

Hash function can reduce searching operation to in its best and average cases.

Answer (Please select your correct option)

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Constant time

☐

Linear time

☐

Algorithmic time

☐

correct

Quadratic time

☐

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Question No : 26 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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☐ $O(n)$

☐

☒ $O(n^2)$

☐

☐ $O(\log n)$

☐

☐ $O(n \log n)$

☐

correct

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Question No : 27 of 52

Marks: 1 (Budgeted Time 1 Min)

If a list contains 32 elements, how many times the list must split during merge sort?

Answer (Please select your correct option)

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☐ Log (32) times

☐ 32 times

☐ 16 times

☒ Log (32/2) times **correct**

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Question No : 28 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 **correct**

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Question No : 29 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 : 30 of 52

Marks: 1 (Budgeted Time 1 Min)

Which formula is the best approximation for the depth of a heap with n nodes?

Answer (Please select your correct option)

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☒ log (base 2) of n

☐ The number of digits in n (base 10), e.g., 145 has three digits

☐ The square root of n

☐ n

Made by: Waqar Siddhu

Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

A complete binary tree of height ____ has nodes between 16 to 31.

Answer (Please select your correct option)

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☐ 2

☐ 3

☒ 4

☐ 5

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Question No : 32 of 52

Marks: 1 (Budgeted Time 1 Min)

get () method of *list* is:

Answer (Please select your correct option)

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☐ zero step method

☒ one step method **correct**

☐ two step method

☐ three step method

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Question No : 33 of 52

Marks: 1 (Budgeted Time 1 Min)

Using Huffman Encoding for data to be sent on network enables us to send it with....

Answer (Please select your correct option)

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- ☐ Large data size and More transmission time
- ☐ Small data size and More transmission time
- ☐ Small data size and Less transmission time
- ☒ Large data size and Less transmission time correct

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Question No : 34 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 correct
- ☐ Array
- ☐ Binary tree

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Question No : 35 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 : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

A binary tree with 24 internal nodes has _____ external nodes.

Answer (Please select your correct option)

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☐ 22

☐ 23

☐ 48

☒ 25

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Question No : 37 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ N -1

☒ N+1

correct

☐ N+2

☐ N

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Question No : 38 of 52

Marks: 1 (Budgeted Time 1 Min)

If there are 56 internal nodes in a binary tree then how many external nodes this binary tree will have?

Answer (Please select your correct option)

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☐ 54

☐ 55

☐ 56

☒ 57

correct

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Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

In disjoint sets, union is a _____ time operation.

Answer (Please select your correct option)

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☐ Constant **correct**

☐ Variable

☐ Exponential

☐ Quadratic

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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 **correct**

☐ Set of pixels

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Question No : 41 of 52

Marks: 2 (Budgeted Time 4 Min)

In array representation of a Heap, if parent node is present at index i then at what indexes child nodes are present ?

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

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Normal Arial 12 B I U

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Question No : 42 of 52

Marks: 2 (Budgeted Time 4 Min)

Give any two important characteristics of skip list.

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

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Question No : 43 of 52

Marks: 2 (Budgeted Time 4 Min)

How we can use Disjoint sets for Image Segmentation ?

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

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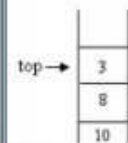


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Question No : 44 of 52

Marks: 2 (Budgeted Time 4 Min)

Give array representation of the following stack.



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

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Question No : 45 of 52

Marks: 3 (Budgeted Time 6 Min)

Write down the code for isEmpty() and isFull() functions of the Stack data structure implemented through Arrays.

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

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Question No : 46 of 52

Marks: 3 (Budgeted Time 6 Min)

Consider the min-heap represented in the following array:

1	2	3	4	5	6	7	8	9	10	11
13	15	19	16	18	40	20	24	36	21	

Show the updated min-heap in the array after inserting 14.

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)

Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4

Draw this array after the FIRST iteration of main loop of insertion sort (sorting from smallest to largest). This iteration has shifted at least one item in the array!

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

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Made by: Waqar Siddhu

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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Made by: Waqar Siddhu

Question No : 49 of 52

Marks: 5 (Budgeted Time 10 Min)

Perform the Preorder and Inorder traversal on the tree given below and show the result in both cases (you have to perform the traversal manually not using any programming language)



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

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Question No : 50 of 52

Marks: 5 (Budgeted Time 10 Min)

Following function searches an element from a sorted array. But there are some mistakes in it, you are required to find and correct those mistakes.

```
int isPresent(int *arr, int val, int N)
{
    int low = 0;
    int high = N - 1;
```

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)

Consider the following keys,
57, 45, 60, 75, 95

Draw an array of size 13 and apply the hash function $f(h) = \text{key} \% 13$ to find the hash values and store these keys in this array.

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

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Made by: Waqar Siddhu

Question No : 52 of 52

Marks: 5 (Budgeted Time 10 Min)

We can use a heap to implement a priority queue.

The **Remove()** function returns the highest priority item that will be the maximum heap element.

Write C++ code for **Remove()** function of priority queue. You must have to use heap in the implementation of these functions.

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

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