

**CS301 MCQs for Paper... This file include most repeated and important MCQs..... By Gum Naam**

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**Question No1** ( Marks: 1 ) - Please choose one A solution is said to be efficient if it solves the problem within its resource constraints i.e. hardware and time.

▶ **True (Page 4)**

▶ False

**Question No:2** ( Marks: 1 ) - Please choose one Which one of the following is known as "Last-In, First-Out" or LIFO Data Structure?

▶ Linked List

▶ **Stack (Page 54)**

▶ Queue

▶ Tree

**Question No: 3** ( Marks: 1 ) - Please choose one What will be postfix expression of the following infix expression? Infix Expression :  $a+b*c-d$

▶  $ab+c*d-$

▶  **$abc*+d-$**

▶  $abc+*d-$

▶  $abcd+*-$

**Question No: 4** ( Marks: 1 ) - Please choose one For compiler a postfix expression is easier to evaluate than infix expression?

▶ **True**

▶ False

**Question No: 5** ( Marks: 1 ) - Please choose one Consider the following pseudo code declare a stack of characters

```
while ( there are more characters in the word to read ) {  
  read a character push the character on the stack } while ( the stack is not empty ) {
```

pop a character off the stack write the character to the screen }

What is written to the screen for the input "apples"?

- ▶ selpa
- ▶ **selppa**
- ▶ apples
- ▶ aaappppplleess

**Question No: 6** ( Marks: 1 ) - Please choose one Consider the following function:

```
void test_a(int n) {  
cout << n << " "; if (n>0) test_a(n-2); }
```

What is printed by the call test\_a(4)?

- ▶ **4 2**
- ▶ 0 2 4
- ▶ 0 2
- ▶ 2 4

**Question No: 7** ( Marks: 1 ) - Please choose one If there are N external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ **N -1 (Page 304)**

- ▶ N+1
- ▶ N+2
- ▶ N

**Question No: 8** ( Marks: 1 ) - Please choose one If there are N internal nodes in a binary tree then what will be the no. of external nodes in this binary tree?

- ▶ N -1
- ▶ N

▶ **N +1 (Page 303)**

- ▶ N +2

**Question No: 9** ( Marks: 1 ) - Please choose one If we have 1000 sets each containing a single different person. Which of the following relation will be true on each set:

▶ **Reflexive (page 387)**

- ▶ Symmetric
- ▶ Transitive
- ▶ Associative

**Question No: 10** ( Marks: 1 ) - Please choose one Which one of the following is NOT the property of equivalence relation:

- ▶ Reflexive
- ▶ Symmetric
- ▶ Transitive

▶ **Associative (page 387)**

**Question No: 11** ( Marks: 1 ) - Please choose one A binary tree of N nodes has \_\_\_\_\_.

**Question No: 12** ( Marks: 1 ) - Please choose one The easiest case of deleting a node from BST is the case in which the node to be deleted \_\_\_\_\_.

▶ **Is a leaf node (Page 173)**

- ▶ Has left subtree only
- ▶ Has right subtree only
- ▶ Has both left and right subtree

**Question No: 13** ( Marks: 1 ) - Please choose one If there are N elements in an array then the number of maximum steps needed to find an element using Binary Search is \_\_\_\_\_ .

- ▶ N
- ▶  $N^2$
- ▶  $N \log$

2

N

▶ **log**

2

**N (page 440)**

**Question No: 14** ( Marks: 1 ) - Please choose one Merge sort and quick sort both fall into the same category of sorting algorithms. What is this category?

- ▶  $O(n \log n)$  sorts
- ▶ Interchange sort (not sure)
- ▶ Average time is quadratic
- ▶ **None of the given options. (Page 488)**

**Question No: 15** ( Marks: 1 ) - Please choose one If one pointer of the node in a binary tree is NULL then it will be a/an \_\_\_\_\_ .

▶ **External node (Page 303)**

- ▶ Root node
- ▶ Inner node
- ▶ Leaf node

**Question No: 16** ( Marks: 1 ) - Please choose one We convert the \_\_\_\_\_ pointers of binary to threads in threaded binary tree.

- ▶ Left
- ▶ Right

▶ **NULL (Page 312)**

- ▶ None of the given options

**Question No: 17** ( Marks: 1 ) - Please choose one If the bottom level of a binary tree is NOT completely filled, depicts that the tree is NOT a

- ▶ Expression tree
- ▶ Threaded binary tree

▶ **complete Binary tree (Page 323)**

- ▶ Perfectly complete Binary tree

**Question No: 18** ( Marks: 1 ) - Please choose one What is the best definition of a collision in a hash table?

- ▶ Two entries are identical except for their keys.
- ▶ Two entries with different data have the exact same key

▶ **Two entries with different keys have the same exact hash value. (page 464)**

- ▶ Two entries with the exact same key have different hash values.

**Question No: 19** ( Marks: 1 ) - Please choose one Suppose that a selection sort of 100 items has completed 42 iterations of the main loop. How many items are now guaranteed to be in their final spot (never to be moved again )

▶ 21

▶ 41

▶ **42**

▶ 43

**Question No: 20** ( Marks: 1 ) - Please choose on 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:

▶ 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 (page 334)**

**Question No: 21** ( Marks: 1 ) - Please choose one Do you see any problem in the code of nextInOrder below: `TreeNode * nextInOrder(TreeNode * p) {`

```
if(p->RTH == thread)
```

```
    return( p->R ); else {
```

```
        p = p->R; while(p->LTH == child) p = p->R; return p; } }
```

**Question No: 22** ( Marks: 1 ) - Please choose one Which of the following statement is correct about find(x) operation:

▶ A find(x) on element x is performed by returning exactly the same node that is found.

▶ **A find(x) on element x is performed by returning the root of the tree containing x. Click here for detail**

▶ A find(x) on element x is performed by returning the whole tree itself containing x.

▶ A find(x) on element x is performed by returning TRUE.

**Question No: 23** ( Marks: 1 ) - Please choose on Which of the following statement is NOT correct about find operation:

▶ It is not a requirement that a find operation returns any specific name, just that finds on two elements return the same answer if and only if they are in the same set.

▶ One idea might be to use a tree to represent each set, since each element in a tree has the same root, thus the root can be used to name the set.

▶ Initially each set contains one element.

▶ Initially each set contains one element and it does not make sense to make a tree of one node only.

**Question No: 24** ( Marks: 1 ) - Please choose one In complete binary tree the bottom level is filled from \_\_\_\_\_

▶ Left to right (Page 323)

▶ Right to left

▶ Not filled at all

▶ None of the given options

**Question No: 25** ( Marks: 1 ) - Please choose one Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4 The array after the FIRST iteration of the large loop in a selection sort (sorting from smallest to largest).

▶ 0 3 8 9 1 7 5 2 6 4 (Page 477)

▶ 2 6 4 0 3 8 9 1 7 5

▶ 2 6 4 9 1 7 0 3 8 5

▶ 0 3 8 2 6 4 9 1 7 5

**Question No: 26** ( Marks: 1 ) - Please choose one What requirement is placed on an array, so that binary search may be used to locate an entry?

▶ The array elements must form a heap.

▶ The array must have at least 2 entries.

▶ The array must be sorted.

▶ The array's size must be a power of two

**Question No: 27** ( Marks: 1 ) - Please choose one Which one of the following operations returns top value of the stack?

▶ Push

▶ Pop

▶ [Top \(page 53\)](#)

▶ First

**Question No: 28** ( Marks: 1 ) - Please choose one Compiler uses which one of the following in Function calls,

▶ [Stack \(page 80\)](#)

▶ Queue

▶ Binary Search Tree

▶ AVL Tree

**Question No: 29** ( Marks: 1 ) – Please choose one Every AVL is

---

▶ Binary Tree

▶ Complete Binary Tree

▶ None of these

▶ [Binary Search Tree](#)

**Question No: 30** ( Marks: 1 ) – Please choose one If there are 56 internal nodes in a binary tree then how many external nodes this binary tree will have?

▶ 54

▶ 55

▶ 56

▶ [57 \(page 303\)](#)

**Question No: 31** ( Marks: 1 ) - Please choose one If there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ 23

▶ 24

▶ 21

▶ [22 \(page 303\)](#)

**Question No: 32** ( Marks: 1 ) - Please choose one Which one of the following is not an example of equivalence relation?

- ▶ Electrical connectivity
- ▶ Set of people
- ▶ **<= relation (page 388)**

- ▶ Set of pixels

**Question No: 33** ( Marks: 1 ) - Please choose one Binary Search is an algorithm of searching, used with the \_\_\_\_\_ data.

- ▶ **Sorted (page 432)**

- ▶ Unsorted
- ▶ Heterogeneous
- ▶ Random

**Question No: 34** ( Marks: 1 ) - Please choose one Which one of the following is NOT true regarding the skip list?

- ▶ Each list  $S_i$

$i$

contains the special keys  $+\infty$  and  $-\infty$ .

- ▶ List  $S_0$

$0$

contains the keys of  $S$  in non-decreasing order.

- ▶ Each list is a subsequence of the previous one.

- ▶ **List  $S_h$**

$h$

**contains only the  $n$  special keys. (page 446)**

**Question No: 35** ( Marks: 1 ) - Please choose one Which of the following is a property of binary tree?

- ▶ A binary tree of  $N$  external nodes has  $N$  internal node.

- ▶ **A binary tree of  $N$  internal nodes has  $N+ 1$  external node. (page 303)**

- ▶ A binary tree of  $N$  external nodes has  $N+ 1$  internal node.

- ▶ A binary tree of  $N$  internal nodes has  $N- 1$  external node.



**Question No: 36** ( Marks: 1 ) - Please choose one By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

- ▶ Binary tree only
- ▶ **Threaded binary tree (page 306)**

- ▶ Heap data structure
- ▶ Huffman encoding

**Question No: 37** ( Marks: 1 ) - Please choose one Which of the following statement is true about dummy node of threaded binary tree?

- ▶ This dummy node never has a value.
- ▶ This dummy node has always some dummy value.
- ▶ **This dummy node has either no value or some dummy value. (Page 321)**
- ▶ This dummy node has always some integer value.

**Question No: 38** ( Marks: 1 ) - Please choose one For a perfect binary tree of height  $h$ , having  $N$  nodes, the sum of heights of nodes is

- ▶  $N - (h - 1)$
- ▶  **$N - (h + 1)$  (page 373)**
- ▶  $N - 1$
- ▶  $N - 1 + h$

**Question No: 39** ( Marks: 1 ) - Please choose one What is the best definition of a collision in a hash table?

- ▶ Two entries are identical except for their keys.
- ▶ Two entries with different data have the exact same key
- ▶ **Two entries with different keys have the same exact hash value. (page 464)**
- ▶ Two entries with the exact same key have different hash values.

**Question No: 40** ( Marks: 1 ) - Please choose one Which formula is the best approximation for the depth of a heap with  $n$  nodes?

- ▶  **$\log$  (base 2) of  $n$  (page 353)**
- ▶ The number of digits in  $n$  (base 10), e.g., 145 has three digits
- ▶ The square root of  $n$
- ▶  $n$

**Question No: 41** ( Marks: 1 ) - Please choose one Which of the following is not true regarding the maze generation?

▶ 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. (page 424)**

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

**Question No: 42** ( Marks: 1 ) – Please choose one In threaded binary tree the NULL pointers are replaced by ,

▶ preorder successor or predecessor

▶ **inorder successor or predecessor (page 307)**

▶ postorder successor or predecessor

▶ NULL pointers are not replaced

**Question No: 43** ( Marks: 1 ) - Please choose one Which of the given option is NOT a factor in Union by Size:

▶ Maintain sizes (number of nodes) of all trees, and during union.

▶ Make smaller tree, the subtree of the larger one.

▶ **Make the larger tree, the subtree of the smaller one. (page 408)**

▶ Implementation: for each root node  $i$ , instead of setting  $\text{parent}[i]$  to  $-1$ , set it to  $-k$  if tree rooted at  $i$  has  $k$  nodes.

**Question No: 44** ( Marks: 1 ) - Please choose one 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?

▶ 144

▶ 145

▶ **143**

▶ 148

**Question No: 45** ( Marks: 1 ) - Please choose o What requirement is placed on an array, so that binary search may be used to locate an entry?

- ▶ The array elements must form a heap.
- ▶ The array must have at least 2 entries.
- ▶ **The array must be sorted.**
- ▶ The array"s size must be a power of two

**Question No: 46** ( Marks: 1 ) - Please choose one A binary tree with 24 internal nodes has \_\_\_\_\_ external nodes.

- ▶ 22
- ▶ 23
- ▶ 48
- ▶ **25 (page 303)**

**Question No: 47** ( Marks: 1 ) - Please choose on In case of deleting a node from AVL tree, rotation could be prolong to the root node.

- ▶ **Yes (Page 267)**
- ▶ No

**Question No: 48** ( Marks: 1 ) - Please choose one when we have declared the size of the array, it is not possible to increase or decrease it during the \_\_\_\_\_ of the program.

- ▶ Declaration
- ▶ **Execution (page 17)**
- ▶ Defining
- ▶ None of the abov

**Question No: 49** ( Marks: 1 ) - Please choose one it will be efficient to place stack elements at the start of the list because insertion and removal take \_\_\_\_\_ time.

▶ Variable

▶ **Constant (page 60)**

▶ Inconsistent

▶ None of the above

**Question No: 50** ( Marks: 1 ) - Please choose one

\_\_\_\_\_ is the stack characteristic but \_\_\_\_\_ was implemented because of the size limitation of the array.

▶ isFull(),isEmpty()

▶ pop(), push()

▶ **isEmpty() , isFull() (page 59)**

▶ push(),pop()

**Question No: 51** ( Marks: 1 ) - Please choose o

Which one of the following operations returns top value of the stack?

▶ Push

▶ **Pop**

▶ Top

▶ First

**Question No: 52** ( Marks: 1 ) - Please choose one

Compiler uses which one of the following in Function calls,

▶ Stack

▶ Queue

▶ **Binary Search Tree**

▶ AVL Tree

**Question No: 53** ( Marks: 1 ) - Please choose one

Every AVL is \_\_\_\_\_

- ▶ Binary Tree
- ▶ Complete Binary Tree
- ▶ None of these
- ▶ Binary Search Tree

**Question No: 54** ( Marks: 1 ) - Please choose one

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

- ▶ 54
- ▶ 55
- ▶ 56
- ▶ 57

**Question No: 55** ( Marks: 1 ) - Please choose one

If there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

- ▶ 23
- ▶ 24
- ▶ 21
- ▶ 22

**Question No: 56** ( Marks: 1 ) - Please choose one

Which one of the following is not an example of equivalence relation?

- ▶ Electrical connectivity

▶ Set of people

▶ <= relation

▶ Set of pixels

**Question No: 57** ( Marks: 1 ) - Please choose one

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

▶ Sorted

▶ Unsorted

▶ Heterogeneous

▶ Random

**Question No: 58** ( Marks: 1 ) - Please choose one

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

▶ 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  $S_n$  contains only the n special keys.

**Question No: 59** ( Marks: 1 ) - Please choose one

A simple sorting algorithm like selection sort or bubble sort has a worst-case of

▶  $O(1)$  time because all lists take the same amount of time to sort

▶  $O(n)$  time because it has to perform n swaps to order the list.

▶  $O(n^2)$  time because sorting 1 element takes  $O(n)$  time - After 1 pass through the list,

either of these algorithms can guarantee that 1 element is sorted.

▶  $O(n^3)$  time, because the worst case has really random input which takes longer to sort.

**Question No: 60** ( Marks: 1 ) - Please choose one

Which of the following is a property of binary tree?

- ▶ A binary tree of N external nodes has N internal node.
- ▶ **A binary tree of N internal nodes has N+ 1 external node.**
- ▶ A binary tree of N external nodes has N+ 1 internal node.
- ▶ A binary tree of N internal nodes has N- 1 external node.

**Question No: 61** ( Marks: 1 ) - Please choose one

By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

- ▶ Binary tree only
- ▶ **Threaded binary tree**
- ▶ Heap data structure
- ▶ Huffman encoding

**Question No: 62** ( Marks: 1 ) - Please choose one

Which of the following statement is true about dummy node of threaded binary tree?

- ▶ This dummy node never has a value.
- ▶ This dummy node has always some dummy value.
- ▶ **This dummy node has either no value or some dummy value.**
- ▶ This dummy node has always some integer value.

**Question No: 63** ( Marks: 1 ) - Please choose one

For a perfect binary tree of height  $h$ , having  $N$  nodes, the sum of heights of nodes is

- ▶  $N - (h - 1)$
- ▶  $N - (h + 1)$
- ▶  $N - 1$
- ▶  $N - 1 + h$

**Question No: 64** ( Marks: 1 ) - Please choose one

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

- ▶ Two entries are identical except for their keys.
- ▶ Two entries with different data have the exact same key
- ▶ Two entries with different keys have the same exact hash value.
- ▶ Two entries with the exact same key have different hash values.

**Question No: 65** ( Marks: 1 ) - Please choose one

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

- ▶  $\log(\text{base } 2) \text{ of } n$
- ▶ The number of digits in  $n$  (base 10), e.g., 145 has three digits
- ▶ The square root of  $n$
- ▶  $n$

**Question No: 66** ( Marks: 1 ) - Please choose one

Which of the following statement is NOT correct about find operation:



▶ It is not a requirement that a find operation returns any specific name, just that finds on two elements return the same answer if and only if they are in the same set.

▶ One idea might be to use a tree to represent each set, since each element in a tree has the same root, thus the root can be used to name the set.

▶ Initially each set contains one element.

▶ Initially each set contains one element and it does not make sense to make a tree of one node only.

**Question No: 67** ( Marks: 1 ) - Please choose one

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

▶ 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.

**Question No: 68** ( Marks: 1 ) - Please choose one

In threaded binary tree the NULL pointers are replaced by ,

▶ preorder successor or predecessor

▶ inorder successor or predecessor

▶ postorder successor or predecessor

▶ NULL pointers are not replaced

**Question No: 69** ( Marks: 1 ) - Please choose one

Which of the given option is NOT a factor in Union by Size:

▶ Maintain sizes (number of nodes) of all trees, and during union.

▶ Make smaller tree, the subtree of the larger one.

▶ **Make the larger tree, the subtree of the smaller one.**

▶ Implementation: for each root node  $i$ , instead of setting  $\text{parent}[i]$  to  $-1$ , set it to  $-k$  if tree rooted at  $i$  has  $k$  nodes.

**Question No: 70** ( Marks: 1 ) - Please choose one

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?

▶ 144

▶ 145

▶ **143**

▶ 148

**Question No: 71** ( Marks: 1 ) - Please choose o

What requirement is placed on an array, so that *binary search* may be used to locate an entry?

▶ The array elements must form a heap.

▶ The array must have at least 2 entries.

▶ **The array must be sorted.**

▶ The array's size must be a power of two

**Question No: 72** ( Marks: 1 ) - Please choose one

A binary tree with 24 internal nodes has \_\_\_\_\_ external nodes.

▶ 22

▶ 23

▶ 48

▶ 25

**Question No: 73** ( Marks: 1 ) - Please choose on

In case of deleting a node from AVL tree, rotation could be prolong to the *root* node.

▶ Yes

▶ No

**Question No: 74** ( Marks: 1 ) - Please choose one

when we have declared the size of the array, it is not possible to increase or decrease it during the \_\_\_\_\_ of the program.

▶ Declaration

▶ Execution

▶ Defining

▶ None of the above

**Question No: 75** ( Marks: 1 ) - Please choose one

it will be efficient to place stack elements at the start of the list because insertion and removal take \_\_\_\_\_ time.

▶ Variable

▶ Constant

▶ Inconsistent

- ▶ None of the above

**Question No: 76** ( Marks: 1 ) - Please choose one

\_\_\_\_\_ is the stack characteristic but \_\_\_\_\_ was implemented because of the size limitation of the array.

- ▶ isFull(),isEmpty()
- ▶ pop(), push()
- ▶ isEmpty() , isFull()
- ▶ push(),pop()

**Question No: 77** ( Marks: 1 ) - Please choose one

The arguments passed to a function should match in number, type and order with the parameters in the function definition.

- ▶ True
- ▶ False

**Question No: 78** ( Marks: 1 ) - Please choose one

If numbers 5, 222, 4, 48 are inserted in a queue, which one will be removed first?

- ▶ 48
- ▶ 4
- ▶ 222

▶ 5

**Question No: 79** ( Marks: 1 ) - Please choose one

Suppose currentNode refers to a node in a linked list (using the Node class with member variables called data and nextNode). What statement changes currentNode so that it refers to the next node?

- ▶ `currentNode ++;`
- ▶ `currentNode = nextNode;`
- ▶ `currentNode += nextNode;`
- ▶ `currentNode = currentNode->nextNode;`

**Question No: 80** ( Marks: 1 ) - Please choose one

A **Compound Data Structure** is the data structure which can have multiple data items of same type or of different types. Which of the following can be considered compound data structure?

- ▶ Arrays
- ▶ [LinkLists](#)
- ▶ Binary Search Trees
- ▶ All of the given options

**Question No: 81** ( Marks: 1 ) - Please choose one

Here is a small function definition:

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

Suppose that a main program has two integer variables `x` and `y`, which are given the value 0. Then the main program calls `f(x,y)`; What are the values of `x` and `y` after the function `f` finishes?

- ▶ 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.

▶ x is now 1, and y is now 2.

**Question No: 82** ( Marks: 1 ) - Please choose one

The difference between a binary tree and a binary search tree is that ,

▶ a binary search tree has two children per node whereas a binary tree can have none, one, or two children per node

▶ in binary search tree nodes are inserted based on the values they contain

▶ in binary tree nodes are inserted based on the values they contain

▶ none of these

**Question No: 83** ( Marks: 1 ) - Please choose one

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

▶ Binary Tree

▶ Binary Search Tree

▶ Parse Tree

▶ AVL Tree

**Question No: 84** ( Marks: 1 ) - Please choose one

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

▶ 54

▶ 55

▶ 56

▶ 57

**Question No: 85** ( Marks: 1 ) - Please choose one

if there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ 23

▶ 24

▶ 21

▶ 22

**Question No: 86** ( Marks: 1 ) - Please choose one

Which of the following method is helpful in creating the heap at once?

▶ insert

▶ add

▶ update

▶ preculateDown (lecture #31 page 1)

**Question No: 87** ( Marks: 1 ) - Please choose one

The definition of Transitivity property is

▶ For all element  $x$  member of  $S$ ,  $x R x$

▶ For all elements  $x$  and  $y$ ,  $x R y$  if and only if  $y R x$

▶ For all elements  $x, y$  and  $z$ , if  $x R y$  and  $y R z$  then  $x R z$

▶ For all elements  $w, x, y$  and  $z$ , if  $x R y$  and  $w R z$  then  $x R z$

**Question No: 88** ( Marks: 1 ) - Please choose one

A binary tree of  $N$  nodes has \_\_\_\_\_.

▶  $\text{Log}_{10} N$  levels

▶  **$\text{Log}_2 N$  levels**

▶  $N / 2$  levels

▶  $N \times 2$  levels

**Question No: 89** ( Marks: 1 ) - Please choose one

If there are  $N$  elements in an array then the number of maximum steps needed to find an element using Binary Search is \_\_\_\_\_ .

▶  $N$

▶  $N^2$

▶  $N \log_2 N$

▶  **$\log_2 N$**

**Question No: 90** ( Marks: 1 ) - Please choose one

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

▶ Heap sort

▶ Selection sort

▶ Insertion sort

▶ **Bubble sort**

**Question No: 91** ( Marks: 1 ) - Please choose one

If both pointers of the node in a binary tree are NULL then it will be a/an \_\_\_\_\_

▶ Inner node

▶ **Leaf node**



- ▶ Root node
- ▶ None of the given options

**Question No: 92** ( Marks: 1 ) - Please choose one

By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

- ▶ Binary tree only
- ▶ **Threaded binary tree**
- ▶ Heap data structure
- ▶ Huffman encoding

**Question No: 93** ( Marks: 1 ) - Please choose one

A complete binary tree of height 3 has between \_\_\_\_\_ nodes.

- ▶ 8 to 14
- ▶ **8 to 15**
- ▶ 8 to 16
- ▶ 8 to 17

**Question No: 94** ( Marks: 1 ) - Please choose one

Consider a min heap, represented by the following array:

3,4,6,7,5,10

After inserting a node with value 1. Which of the following is the updated min heap?

- ▶ 3,4,6,7,5,10,1
- ▶ 3,4,6,7,5,1,10
- ▶ 3,4,1,5,7,10,6

▶ 1,4,3,5,7,10,6 close to correct but correct ans is 1,4,3,7,5,10,6

**Question No: 95** ( Marks: 1 ) - Please choose one

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?

▶ 10,30,20,31,40,50,80,60,70

▶ 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

**Question No: 96** ( Marks: 1 ) - Please choose one

---

Which one of the following algorithms is most widely used due to its good average time,

▶ Bubble Sort

▶ Insertion Sort

▶ Quick Sort

▶ Merge Sort

**Question No: 97** ( Marks: 1 ) - Please choose one

---

Which of the following statement is correct about find(x) operation:

▶ A find(x) on element x is performed by returning exactly the same node that is found.

▶ A find(x) on element x is performed by returning the root of the tree containing x.

- ▶ A find(x) on element x is performed by returning the whole tree itself containing x.
- ▶ A find(x) on element x is performed by returning TRUE.

**Question No: 99** ( Marks: 1 ) - Please choose one

Which of the following statement is NOT correct about find operation:

- ▶ It is not a requirement that a find operation returns any specific name, just that finds on two elements return the same answer if and only if they are in the same set.
- ▶ One idea might be to use a tree to represent each set, since each element in a tree has the same root, thus the root can be used to name the set.
- ▶ Initially each set contains one element.

▶ Initially each set contains one element and it does not make sense to make a tree of one node only.

**Question No: 100** ( Marks: 1 ) - Please choose one

The following are statements related to queues.

- (i) The last item to be added to a queue is the first item to be removed **False statement**
- (ii) A queue is a structure in which both ends are not used **False statement**
- (iii) The last element hasn't to wait until all elements preceding it on the queue are removed **False statement**
- (iv) A queue is said to be a last-in-first-out list or LIFO data structure. **False statement**

Which of the above is/are related to normal queues?

- ▶ (iii) and (ii) only
- ▶ (i), (ii) and (iv) only
- ▶ (ii) and (iv) only

▶ None of the given options

**Question No: 101** ( Marks: 1 ) - Please choose one

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

\_\_\_\_\_

- ▶  $2^H$
- ▶  $2^{H+1}$
- ▶  $2^H - 1$
- ▶  $2^{H+2}$

**Question No: 102** ( Marks: 1 ) - Please choose one

In complete binary tree the bottom level is filled from \_\_\_\_\_

- ▶ Left to right
- ▶ Right to left
- ▶ Not filled at all
- ▶ None of the given options

**Question No: 103** ( Marks: 1 ) - Please choose one

We are given N items to build a heap , this can be done with \_\_\_\_\_ successive inserts.

- ▶ N-1

▶ N

▶ N+1

▶ N<sup>2</sup>

**Question No: 104** ( Marks: 1 ) - Please choose one

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?

▶ 144

▶ 145

▶ 143

▶ 148

**Question No: 105** ( Marks: 1 ) - Please choose one

Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4

The array after the FIRST iteration of the large loop in a selection sort (sorting from smallest to largest).

▶ 0 3 8 9 1 7 5 2 6 4

▶ 2 6 4 0 3 8 9 1 7 5

▶ 2 6 4 9 1 7 0 3 8 5

▶ 0 3 8 2 6 4 9 1 7 5

**Question No: 106** ( Marks: 1 ) - Please choose one

What requirement is placed on an array, so that *binary search* may be used to locate an entry? ▶ The array elements must form a heap.

▶ The array must have at least 2 entries.

▶ **The array must be sorted.**

▶ The array's size must be a power of two.

**Question No: 107** ( Marks: 1 ) - Please choose one

In case of deleting a node from AVL tree, rotation could be prolong to the *root* node.

▶ Yes

▶ **No**

**Question No: 108** ( Marks: 1 ) - Please choose one

\_\_\_\_\_ only removes items in reverse order as they were entered.

▶ **Stack**

▶ Queue

▶ Both of these

▶ None of these

**Question No:109** ( Marks: 1 ) - Please choose one

Here is a small function definition:

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

Suppose that a main program has two integer variables  $x$  and  $y$ , which are given the value 0. Then the main program calls  $f(x,y)$ ; What are the values of  $x$  and  $y$  after the function  $f$  finishes?

- ▶ 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.**
- ▶  $x$  is now 1, and  $y$  is now 2.

**Question No: 110** ( Marks: 1 ) - Please choose one

Select the one *FALSE* statement about binary trees:

- ▶ **Every binary tree has at least one node.**
- ▶ Every non-empty tree has exactly one root node.
- ▶ Every node has at most two children.
- ▶ Every non-root node has exactly one parent.

**Question No: 111** ( Marks: 1 ) - Please choose one

Every AVL is \_\_\_\_\_

- ▶ Binary Tree
- ▶ Complete Binary Tree
- ▶ None of these
- ▶ **Binary Search Tree**

**Question No:112** ( Marks: 1 ) - Please choose one

Searching an element in an AVL tree take maximum \_\_\_\_\_ time (where  $n$  is no. of nodes in AVL tree),

- ▶  $\text{Log}_2(n+1)$

▶  $\log_2(n+1) - 1$

▶ **1.44  $\log_2 n$**

▶  $1.66 \log_2 n$

**Question No: 113** ( Marks: 1 ) - Please choose one

Suppose that we have implemented a *priority queue* by storing the items in a heap. We are now executing a reheapification downward and the out-of-place node has priority of 42. The node's parent has a priority of 72, the left child has priority 52 and the node's right child has priority 62. Which statement best describes the status of the reheapification.

- ▶ The reheapification is done.
- ▶ The next step will interchange the two children of the out-of-place node.
- ▶ The next step will swap the out-of-place node with its parent.
- ▶ The next step will swap the out-of-place node with its left child.

**Question No: 114** ( Marks: 1 ) - Please choose one

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

▶ 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**

**Question No: 115** ( Marks: 1 ) - Please choose one

If there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?



▶ 23

▶ 24

▶ 21

▶ 22

**Lesson # 27(the number of internal nodes is N, the number of external nodes will be N+1.)**

**Question No: 116** ( Marks: 1 ) - Please choose one

If there are N external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ N -1

▶ N+1

▶ N+2

▶ N

**Question No: 117** ( Marks: 1 ) - Please choose one

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

▶ Reflexive

▶ Symmetric

▶ Transitive

▶ Associative (lesson no 34)

**Question No: 118** ( Marks: 1 ) - Please choose one

The definition of Transitivity property is

▶ For all element x member of S,  $x R x$

▶ For all elements x and y,  $x R y$  if and only if  $y R x$

▶ For all elements x, y and z, if  $x R y$  and  $y R z$  then  $x R z$  (lesson no 34)

▶ For all elements w, x, y and z, if  $x R y$  and  $w R z$  then  $x R z$

**Question No: 119** ( Marks: 1 ) - Please choose one

Union is a \_\_\_\_\_ time operation.

▶ Constant ( lesson # 35 page 11)

▶ Polynomial

▶ Exponential

▶ None of the given option

**Question No: 120** ( Marks: 1 ) - Please choose one

Which of the following is NOT a correct statement about Table ADT.

▶ In a table, the type of information in columns may be different. yes

▶ A table consists of several columns, known as entities. (Lesson # 38 page 1 )

▶ The row of a table is called a record.

▶ A major use of table is in databases where we build and use tables for keeping information.

Correct A table consists of several columns, known as fields.

**Question No: 121** ( Marks: 1 ) - Please choose one

In the worst case of deletion in AVL tree requires \_\_\_\_\_.

▶ Only one rotation

▶ Rotation at each non-leaf node

▶ Rotation at each leaf node

▶ Rotations equal to  $\log_2 N$  (lesson # 23)

**Question No: 122** ( Marks: 1 ) - Please choose on

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

▶ Sorted (lesson # 39)

- ▶ Unsorted
- ▶ Heterogeneous
- ▶ Random

**Question No: 123** ( Marks: 1 ) - Please choose on

Which of the following statement is correct?

▶ A Threaded Binary Tree is a binary tree in which every node that does not have a left child has a THREAD (in actual sense, a link) to its INORDER successor.

▶ A Threaded Binary Tree is a binary tree in which every node that does not have a right child has a THREAD (in actual sense, a link) to its PREORDER successor.

▶ A Threaded Binary Tree is a binary tree in which every node that does not have a right child has a THREAD (in actual sense, a link) to its INORDER successor.

▶ A Threaded Binary Tree is a binary tree in which every node that does not have a right child has a THREAD (in actual sense, a link) to its POSTORDER successor.

**Question No: 124** ( Marks: 1 ) - Please choose one

By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

▶ Binary tree only

▶ Threaded binary tree (lesson # 27 page 3)

▶ Heap data structure

▶ Huffman encoding

**Question No: 125** ( Marks: 1 ) - Please choose one

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

- ▶ 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 dummy node points to the root node of the tree.
- ▶ **Left thread of the right-most node points to the *dummy* node.**

*Lecture # 28 "The left pointer of this node is pointing to the root node of the tree while the right pointer is seen pointing itself i.e. to *dummy* node. There is no problem in doing all these things. We have put the address of *dummy* node in its right pointer and pointed the left thread of the left most node towards the *dummy* node. Similarly the right thread of the right-most node is pointing to the *dummy* node. Now we have some extra pointers whose help will make the *nextInorder* routine function properly."*

**Question No: 125** ( Marks: 1 ) - Please choose one

Consider a min heap, represented by the following array:

11,22,33,44,55

After inserting a node with value 66. Which of the following is the updated min heap?

▶ **11,22,33,44,55,66**

▶ 11,22,33,44,66,55

▶ 11,22,33,66,44,55

▶ 11,22,66,33,44,55

**Question No: 126** ( Marks: 1 ) - Please choose one

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?

▶ 4,6,7,5

▶ 6,7,5,4

▶ 4,5,6,7

▶ 4,6,5,7

**Question No: 127** ( Marks: 1 ) - Please choose one

We can build a heap in \_\_\_\_\_ time.

▶ Linear (lecture # 30 page 8)

▶ Exponential

▶ Polynomial

▶ None of the given options

**Question No: 128** ( Marks: 1 ) - Please choose one

Suppose we are sorting an array of eight integers using quick sort, and we have just finished the first partitioning with the array looking like this:

2 5 1 7 9 12 11 10

Which statement is correct?

▶ The pivot could be the 7, but it is not the 9.

▶ The pivot is not the 7, but it could be the 9

- ▶ Neither the 7 nor the 9 is the pivot.

**Question No: 129** ( Marks: 1 ) - Please choose one

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

▶ 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

**Question No: 130** ( Marks: 1 ) - Please choose one

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:

- ▶ 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

**Question No: 131** ( Marks: 1 ) - Please choose one

While joining nodes in the building of Huffman encoding tree if there are more nodes with same frequency, we choose the nodes \_\_\_\_\_.

▶ Randomly

- ▶ That occur first in the text message
- ▶ That are lexically smaller among others.

- ▶ That are lexically greater among others

**Question No: 132** ( Marks: 1 ) - Please choose one

Consider the following paragraph with blanks.

A ..... is a linear list where ..... and ..... take place at the same end . This end is called the .....

What would be the correct filling the above blank positions?

- ▶ (i) queue (ii) insertion (iii) removals (iv) top
- ▶ (i) stack (ii) insertion (iii) removals (iv) bottom
- ▶ **(i) stack (ii) insertion (iii) removals (iv) top**
- ▶ (i) tree (ii) insertion (iii) removals (iv) top

**Question No: 133** ( Marks: 1 ) - Please choose one

A binary tree with 33 internal nodes has \_\_\_\_\_ links to internal nodes.

- ▶ 31
- ▶ **32 (n-1 links to internal nodes)**
- ▶ 33
- ▶ 66 (2n links)

*A binary tree with N internal nodes has N+1 external nodes.*

**Property: A binary tree with N internal nodes has 2N links:**

*N-1 links to internal nodes and N+1 links to external nodes.*

**Question No: 134** ( Marks: 1 ) - Please choose one

Which traversal gives a decreasing order of elements in a heap where the max element is stored at the top?

- ▶ post-order
- ▶ level-order
- ▶ inorder

▶ None of the given options

**Question No: 135** ( Marks: 1 ) - Please choose one

What requirement is placed on an array, so that *binary search* may be used to locate an entry

- ▶ The array elements must form a heap.
- ▶ The array must have at least 2 entries.
- ▶ The array must be sorted. (lecture # 38)
- ▶ The array's size must be a power of two.

**Question No: 136** ( Marks: 1 ) - Please choose one

Which of the following is a non linear data structure?

- ▶ Linked List
- ▶ Stack
- ▶ Queue

▶ Tree (lecture # 11 page 4)

**Question No: 137** ( Marks: 1 ) - Please choose one

A solution is said to be efficient if it solves the problem within its resource constraints i.e. hardware and time.

- ▶ True
- ▶ False



**Question No: 138** ( Marks: 1 ) - Please choose one

Which one of the following is known as "Last-In, First-Out" or LIFO Data Structure?

- ▶ Linked List
- ▶ Stack
- ▶ Queue
- ▶ Tree

**Question No: 139** ( Marks: 1 ) - Please choose one

What will be postfix expression of the following infix expression?

Infix Expression :  $a+b*c-d$

- ▶  $ab+c*d-$
- ▶  $abc*+d-$
- ▶  $abc+*d-$
- ▶  $abcd+*-$

**Question No: 140** ( Marks: 1 ) - Please choose one

For compiler a postfix expression is easier to evaluate than infix expression?

- ▶ True
- ▶ False

**Question No: 141** ( Marks: 1 ) - Please choose o

Which one of the following operations returns top value of the stack?

- ▶ Push
- ▶ **Pop**

▶ Top

▶ First

**Question No: 142** ( Marks: 1 ) - Please choose one

Compiler uses which one of the following in Function calls,

▶ Stack

▶ Queue

▶ Binary Search Tree

▶ AVL Tree

**Question No: 143** ( Marks: 1 ) - Please choose one

Every AVL is \_\_\_\_\_

▶ Binary Tree

▶ Complete Binary Tree

▶ None of these

▶ Binary Search Tree

**Question No: 144** ( Marks: 1 ) - Please choose one

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

▶ 54

▶ 55

▶ 56

▶ 57

**Question No: 145** ( Marks: 1 ) - Please choose one

If there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ 23

▶ 24

▶ 21

▶ 22

**Question No:146** ( Marks: 1 ) - Please choose one

Which one of the following is not an example of equivalence relation?

▶ Electrical connectivity

▶ Set of people

▶  $\leq$  relation

▶ Set of pixels

**Question No: 147** ( Marks: 1 ) - Please choose one

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

▶ Sorted

▶ Unsorted

▶ Heterogeneous

▶ Random

**Question No: 148** ( Marks: 1 ) - Please choose one

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

▶ 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  $S_n$  contains only the  $n$  special keys.

**Question No: 149** ( Marks: 1 ) - Please choose one

A simple sorting algorithm like selection sort or bubble sort has a worst-case of

▶  $O(1)$  time because all lists take the same amount of time to sort

▶  $O(n)$  time because it has to perform  $n$  swaps to order the list.

▶  $O(n^2)$  time because sorting 1 element takes  $O(n)$  time - After 1 pass through the list,

either of these algorithms can guarantee that 1 element is sorted.

▶  $O(n^3)$  time, because the worst case has really random input which takes longer to sort.

**Question No: 150** ( Marks: 1 ) - Please choose one

Which of the following is a property of binary tree?

▶ A binary tree of  $N$  external nodes has  $N$  internal node.

▶ A binary tree of  $N$  internal nodes has  $N+ 1$  external node.

▶ A binary tree of  $N$  external nodes has  $N+ 1$  internal node.

▶ A binary tree of  $N$  internal nodes has  $N- 1$  external node.

**Question No: 151** ( Marks: 1 ) - Please choose one

By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

▶ Binary tree only

▶ Threaded binary tree

▶ Heap data structure

- ▶ Huffman encoding

**Question No: 152** ( Marks: 1 ) - Please choose one

Which of the following statement is true about dummy node of threaded binary tree?

- ▶ This dummy node never has a value.
- ▶ This dummy node has always some dummy value.
- ▶ **This dummy node has either no value or some dummy value.**
- ▶ This dummy node has always some integer value.

**Question No: 153** ( Marks: 1 ) - Please choose one

For a perfect binary tree of height  $h$ , having  $N$  nodes, the sum of heights of nodes is

- ▶  $N - (h - 1)$
- ▶  **$N - (h + 1)$**
- ▶  $N - 1$
- ▶  $N - 1 + h$

**Question No: 154** ( Marks: 1 ) - Please choose one

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

- ▶ Two entries are identical except for their keys.
- ▶ **Two entries with different data have the exact same key**
- ▶ Two entries with different keys have the same exact hash value.
- ▶ Two entries with the exact same key have different hash values.

**Question No: 155** ( Marks: 1 ) - Please choose one

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

▶ log (base 2) of  $n$

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

▶ The square root of  $n$

▶  $n$

**Question No: 156** ( Marks: 1 ) - Please choose one

Which of the following statement is NOT correct about find operation:

▶ It is not a requirement that a find operation returns any specific name, just that finds on two elements return the same answer if and only if they are in the same set.

▶ One idea might be to use a tree to represent each set, since each element in a tree has the same root, thus the root can be used to name the set.

▶ Initially each set contains one element.

▶ Initially each set contains one element and it does not make sense to make a tree of one node only.

**Question No: 157** ( Marks: 1 ) - Please choose one

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

▶ 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.

**Question No: 158** ( Marks: 1 ) - Please choose one

In threaded binary tree the NULL pointers are replaced by ,

- ▶ preorder successor or predecessor
- ▶ **inorder successor or predecessor**
- ▶ postorder successor or predecessor
- ▶ NULL pointers are not replaced

**Question No: 159** ( Marks: 1 ) - Please choose one

Which of the given option is NOT a factor in Union by Size:

- ▶ Maintain sizes (number of nodes) of all trees, and during union.
- ▶ Make smaller tree, the subtree of the larger one.
- ▶ **Make the larger tree, the subtree of the smaller one.**
- ▶ Implementation: for each root node  $i$ , instead of setting  $\text{parent}[i]$  to  $-1$ , set it to  $-k$  if tree rooted at  $i$  has  $k$  nodes.

**Question No: 160** ( Marks: 1 ) - Please choose one

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?

- ▶ 144
- ▶ 145
- ▶ **143**
- ▶ 148

**Question No: 161** ( Marks: 1 ) - Please choose o

What requirement is placed on an array, so that *binary search* may be used to locate an entry?

- ▶ The array elements must form a heap.
- ▶ The array must have at least 2 entries.
- ▶ **The array must be sorted.**
- ▶ The array's size must be a power of two

**Question No: 162** ( Marks: 1 ) - Please choose one

A binary tree with 24 internal nodes has \_\_\_\_\_ external nodes.

- ▶ 22
- ▶ 23
- ▶ 48
- ▶ **25**

**Question No: 163** ( Marks: 1 ) - Please choose on

In case of deleting a node from AVL tree, rotation could be prolong to the *root* node.

- ▶ **Yes**
- ▶ No

**Question No: 164** ( Marks: 1 ) - Please choose one

when we have declared the size of the array, it is not possible to increase or decrease it during the \_\_\_\_\_ of the program.

- ▶ Declaration
- ▶ **Execution**



- ▶ Defining
- ▶ None of the above

**Question No: 165** ( Marks: 1 ) - Please choose one

it will be efficient to place stack elements at the start of the list because insertion and removal take \_\_\_\_\_time.

- ▶ Variable
- ▶ **Constant**
- ▶ Inconsistent
- ▶ None of the above

**Question No: 166** ( Marks: 1 ) - Please choose one

\_\_\_\_\_ is the stack characteristic but \_\_\_\_\_was implemented because of the size limitation of the array.

- ▶ isFull(),isEmpty()
- ▶ pop(), push()
- ▶ **isEmpty() , isFull()**
- ▶ push(),pop()

**Question No: 168** ( Marks: 1 ) - Please choose one

The arguments passed to a function should match in number, type and order with the parameters in the function definition.

- ▶ **True**
- ▶ False

**Question No: 169** ( Marks: 1 ) - Please choose one

If numbers 5, 222, 4, 48 are inserted in a queue, which one will be removed first?

▶ 48

▶ 4

▶ 222

▶ 5

**Question No: 170** ( Marks: 1 ) - Please choose one

Suppose `currentNode` refers to a node in a linked list (using the `Node` class with member variables called `data` and `nextNode`). What statement changes `currentNode` so that it refers to the next node?

- ▶ `currentNode ++;`
- ▶ `currentNode = nextNode;`
- ▶ `currentNode += nextNode;`
- ▶ `currentNode = currentNode->nextNode;`

**Question No: 171** ( Marks: 1 ) - Please choose one

A **Compound Data Structure** is the data structure which can have multiple data items of same type or of different types. Which of the following can be considered compound data structure?

- ▶ Arrays
- ▶ LinkLists
- ▶ Binary Search Trees
- ▶ All of the given options

**Question No: 172** ( Marks: 1 ) - Please choose one

Here is a small function definition:

```
void f(int i, int &k)
```

```
{  
    i = 1;  
    k = 2;  
}
```

Suppose that a main program has two integer variables x and y, which are given the value 0. Then the main program calls f(x,y); What are the values of x and y after the function f finishes?

- ▶ 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.**
- ▶ x is now 1, and y is now 2.

**Question No: 173** ( Marks: 1 ) - Please choose one

The difference between a binary tree and a binary search tree is that ,

- ▶ a binary search tree has two children per node whereas a binary tree can have none, one, or two children per node
- ▶ in binary search tree nodes are inserted based on the values they contain
- ▶ in binary tree nodes are inserted based on the values they contain
- ▶ **none of these**

**Question No: 174** ( Marks: 1 ) - Please choose one

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

- ▶ Binary Tree
- ▶ Binary Search Tree
- ▶ **Parse Tree**

▶ AVL Tree

**Question No: 175** ( Marks: 1 ) - Please choose one

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

▶ 54

▶ 55

▶ 56

▶ 57

**Question No: 176** ( Marks: 1 ) - Please choose one

if there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ 23

▶ 24

▶ 21

▶ 22

**Question No: 177** ( Marks: 1 ) - Please choose one

Which of the following method is helpful in creating the heap at once?

▶ insert

▶ add

▶ update

▶ preculateDown (lecture #31 page 1)

**Question No: 178** ( Marks: 1 ) - Please choose one

The definition of Transitivity property is

- ▶ For all element  $x$  member of  $S$ ,  $x R x$
- ▶ For all elements  $x$  and  $y$ ,  $x R y$  if and only if  $y R x$
- ▶ For all elements  $x, y$  and  $z$ , if  $x R y$  and  $y R z$  then  $x R z$
- ▶ For all elements  $w, x, y$  and  $z$ , if  $x R y$  and  $w R z$  then  $x R z$

**Question No: 179** ( Marks: 1 ) - Please choose one

A binary tree of  $N$  nodes has \_\_\_\_\_.

- ▶  $\log_{10} N$  levels
- ▶  $\log_2 N$  levels
- ▶  $N / 2$  levels
- ▶  $N \times 2$  levels

**Question No: 180** ( Marks: 1 ) - Please choose one

If there are  $N$  elements in an array then the number of maximum steps needed to find an element using Binary Search is \_\_\_\_\_ .

- ▶  $N$
- ▶  $N^2$
- ▶  $N \log_2 N$
- ▶  $\log_2 N$

**Question No: 181** ( Marks: 1 ) - Please choose one

Consider the following array

23 15 5 12 40 10 7

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

16 5 12 23 10 7 40

Name the algorithm used

- ▶ Heap sort
- ▶ Selection sort
- ▶ Insertion sort

▶ **Bubble sort**

**Question No: 182** ( Marks: 1 ) - Please choose one

If both pointers of the node in a binary tree are NULL then it will be a/an \_\_\_\_\_

- ▶ Inner node

▶ **Leaf node**

- ▶ Root node
- ▶ None of the given options

**Question No: 183** ( Marks: 1 ) - Please choose one

By using \_\_\_\_\_ we avoid the recursive method of traversing a Tree, which makes use of stacks and consumes a lot of memory and time.

- ▶ Binary tree only

▶ **Threaded binary tree**

- ▶ Heap data structure
- ▶ Huffman encoding

**Question No: 184** ( Marks: 1 ) - Please choose one

A complete binary tree of height 3 has between \_\_\_\_\_ nodes.

- ▶ 8 to 14

▶ **8 to 15**

- ▶ 8 to 16

- ▶ 8 to 17

**Question No: 185** ( Marks: 1 ) - Please choose one

Consider a min heap, represented by the following array:

3,4,6,7,5,10

After inserting a node with value 1. Which of the following is the updated min heap?

▶ 3,4,6,7,5,10,1

▶ 3,4,6,7,5,1,10

▶ 3,4,1,5,7,10,6

▶ 1,4,3,5,7,10,6 close to correct but correct ans is 1,4,3,7,5,10,6

**Question No: 186** ( Marks: 1 ) - Please choose one

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?

▶ 10,30,20,31,40,50,80,60,70

▶ 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

**Question No: 187** ( Marks: 1 ) - Please choose one

Which one of the following algorithms is most widely used due to its good average time,

▶ Bubble Sort

▶ Insertion Sort

▶ Quick Sort

► Merge Sort

**Question No: 188** ( Marks: 1 ) - Please choose one

Which of the following statement is correct about find(x) operation:

► A find(x) on element x is performed by returning exactly the same node that is found.

**► A find(x) on element x is performed by returning the root of the tree containing x.**

► A find(x) on element x is performed by returning the whole tree itself containing x.

► A find(x) on element x is performed by returning TRUE.

**Question No: 189** ( Marks: 1 ) - Please choose one

Which of the following statement is NOT correct about find operation:

► It is not a requirement that a find operation returns any specific name, just that finds on two elements return the same answer if and only if they are in the same set.

► One idea might be to use a tree to represent each set, since each element in a tree has the same root, thus the root can be used to name the set.

► Initially each set contains one element.

**► Initially each set contains one element and it does not make sense to make a tree of one node only.**

**Question No: 190** ( Marks: 1 ) - Please choose one

The following are statements related to queues.

(v) The last item to be added to a queue is the first item to be removed

**False statement**

(vi) A queue is a structure in which both ends are not used **False statement**



(vii) The last element hasn't to wait until all elements preceding it on the queue are removed **False statement**

(viii) A queue is said to be a last-in-first-out list or LIFO data structure. **False statement**

Which of the above is/are related to normal queues?

▶ (iii) and (ii) only

▶ (i), (ii) and (iv) only

▶ (ii) and (iv) only

▶ None of the given options

**Question No: 191** ( Marks: 1 ) - Please choose one

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

\_\_\_\_\_

▶  $2^H$

▶  $2^H+1$

▶  $2^H-1$

▶  $2^H+2$

**Question No: 192** ( Marks: 1 ) - Please choose one

In complete binary tree the bottom level is filled from \_\_\_\_\_

▶ Left to right

▶ Right to left

▶ Not filled at all

▶ None of the given options

**Question No: 193** ( Marks: 1 ) - Please choose one

We are given N items to build a heap , this can be done with \_\_\_\_\_ successive inserts.

▶ N-1

▶ N

▶ N+1

▶ N<sup>2</sup>

**Question No: 194** ( Marks: 1 ) - Please choose one

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?

▶ 144

▶ 145

▶ 143

▶ 148

**Question No: 195** ( Marks: 1 ) - Please choose one

Here is an array of ten integers:

5 3 8 9 1 7 0 2 6 4

The array after the FIRST iteration of the large loop in a selection sort (sorting from smallest to largest).

▶ 0 3 8 9 1 7 5 2 6 4

▶ 2 6 4 0 3 8 9 1 7 5

▶ 2 6 4 9 1 7 0 3 8 5

▶ 0 3 8 2 6 4 9 1 7 5

**Question No: 196** ( Marks: 1 ) - Please choose one

What requirement is placed on an array, so that *binary search* may be used to locate an entry?

- ▶ The array elements must form a heap.
- ▶ The array must have at least 2 entries.
- ▶ **The array must be sorted.**
- ▶ The array's size must be a power of two.

**Question No: 197** ( Marks: 1 ) - Please choose one

In case of deleting a node from AVL tree, rotation could be prolong to the *root* node.

- ▶ Yes
- ▶ **No**

**Question No: 198** ( Marks: 1 ) - Please choose one

\_\_\_\_\_ only removes items in reverse order as they were entered.

- ▶ **Stack**
- ▶ Queue
- ▶ Both of these
- ▶ None of these

**Question No: 199** ( Marks: 1 ) - Please choose one

Here is a small function definition:

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

```
        k = 2;
    }
```

Suppose that a main program has two integer variables x and y, which are given the value 0. Then the main program calls f(x,y); What are the values of x and y after the function f finishes?

- ▶ 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.**
- ▶ x is now 1, and y is now 2.

**Question No: 200** ( Marks: 1 ) - Please choose one

Select the one *FALSE* statement about binary trees:

- ▶ **Every binary tree has at least one node.**
- ▶ Every non-empty tree has exactly one root node.
- ▶ Every node has at most two children.
- ▶ Every non-root node has exactly one parent.

**Question No: 201** ( Marks: 1 ) - Please choose one

Every AVL is \_\_\_\_\_

- ▶ Binary Tree
- ▶ Complete Binary Tree
- ▶ None of these

### ▶ Binary Search Tree

**Question No: 202** ( Marks: 1 ) - Please choose one

Searching an element in an AVL tree take maximum \_\_\_\_\_ time (where n is no. of nodes in AVL tree),

▶  $\text{Log}_2(n+1)$

▶  $\text{Log}_2(n+1) - 1$

▶ 1.44  $\text{Log}_2 n$

▶  $1.66 \text{Log}_2 n$

**Question No: 203** ( Marks: 1 ) - Please choose one

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

▶ 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

**Question No: 204** ( Marks: 1 ) - Please choose one

If there are 23 external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

▶ 23

▶ 24

▶ 21

▶ 22

**Lesson # 27(the number of internal nodes is  $N$ , the number of external nodes will be  $N+1$ .)**

**Question No: 9** ( Marks: 1 ) - Please choose one

If there are  $N$  external nodes in a binary tree then what will be the no. of internal nodes in this binary tree?

$N - 1$

$N + 1$

$N + 2$

$N$