VU MALIK


CS301 VU Final Term Past Papers
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To seek knowledge is the duty of every Muslim man and woman

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1) If there are 100 elements in a heap and 100 delete Min operation are performed, will get _____list
    a. Sorted
    b. Unsorted
    c. Nonlinear
    d. Noe
2) Sorting procedure normally takes____times
    a) NLogN
    b) 2N
    c) N*N*N
    d) N
3) The expression if(!heap-> is empty ())
    Checks
    a) Heap is empty
    b) Heap is full
    c) Heap is not empty
4) If the height of a perfect binary tree is 4.What will be the total number of nodes in it?
    a) 15
    b) 16
    c) 31
    d) 32
5) A binary relation R over S is called an equivalence relation if it has following property(S)?
    a) Reflexivity
    b) Symmetry
    c) Transitivity
    d) All of the given
6) If a tree has 20 edges/links, then the total number of nodes in the tree will be:
    a) 19
    b) 20
    c) 21
    d) Cannot be determined
7) For a perfect binary tree of height 4, what will be the sum of highest of node
    a) 31
    b) 30
    c) 27
    d) 26
8) If Ahmed is cousin of Ali and Ali is cousin of Asad then Ahmed is also cousin of Asad.
    This statement has the following property
    a) Reflexivity
    b) Symmetry
    c) Transitivity
    d) All of the above
9) Which property of equivalence relation is satisfied if we say:
    Ahmad is cousin of Ali and Ali is also cousin of Ahmed

a) Reflexivity
b) Symmetry
c) Transitivity
d) All of the given

10) Which one of the following is NOT the property of equivalence relation?
a) Reflexive
b) Symmetric
c) Transitive
d) Associative

11) The main reason of using heap in priority queue is
a) Improve performance
b) Code readable
c) Less code
d) Heap can't be used in priority queues

12) The total number of nodes on 10^{th} level of perfect binary tree are
a) 256
b) 512
c) 1024
d) Can't be determined

13) Suppose there are 100 elements in an equivalence class, so initially there will be 100 trees, the collection of these trees is called_____.
a) Cluster
b) Class
c) Forest
d) Bunch

14) The percolate Down procedure will move the smaller value_____and bigger value _____.
a) Left, right
b) Right, left
c) Down, up
d) Up, down

15) For a perfect binary tree of height h, having N nodes, the Sum of height of nodes is _____
a) N - h -1
b) N - 1
c) N - 1 + h
d) N - (h - 1)

16) Which of the following method is helpful in creating the heap at on

a. Insert
b. Add
c. Update
d. percolateDown

17. If ahmad is boss of Ahsan and ehsan is boss of umer then ahmad is also boss of umer, the above mentioned relation is_____.

a. Reflexive
b. Symmetry
c. Transitive
d. None of given

18. If we want to find 3rd minimum element from an array of element, then after applying build heap method. How many times deleteMin method will be called?

e. 1
f. 2
g. 3
h. 4

19
If we want to find median of 50 elements, then after applying builtHeap method, how many time deleteMin method will be called?

i. 5
j. 25
k. 35
l. 50

20 Which of the following properties are satisfied by equivalence relationship?

m. Reflexive, symmetric
n. Reflexive, transitive
o. Symmetric, transitive
p. Reflexive, symmetric and transitive

21.The Expressionif (! heap->isFull()) Check

q. Heap is empty
r. Heap is full
s. Heap is not empty
t. Heap is not full

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22 Given the values are the array representation of heap:

12 23 26 31 34 44 56 64 78 100

If we perform 4 deleteMin operation, the last element deleted is_____.

a. 31
b. 34
c. 44
d. 56

23 Which of the following heap method increase the value if key at position 'p' by the amount 'delta'?

e. increaseKey(p, delta)
f. decreaseKey(p, delta)
g. percolateDown(p, delta)
h. remove(p, delta)

24 Which property of equivalence relation is satisfied if we say: Ahmad R(is related to)Ahmad

i. Reflexivity
j. Symmetry
k. Transitivity
l. All of Above

25 The total number of nodes on 5^{th} level of perfect binary tree are:

m. 16
n. 15
o. 31
p. 32

26 Which property of equivalence relation is satisfied if we say: Ahmad is cousin of Ali and Ali is also Cousin of Ahmad

a. Reflexivity
b. Symmetry
c. Transitivity
d. All of the Above

27 If a tree has 50 nodes , then the total edges/links in the tree will be

a. 55
b. 51
c. 50
d. 49

28 If the height of perfect binary tree is 4, what will be the total number of nodes in it?

a. 15
b. 16
c. 31
d. 32

29 Suppose there are set of fruits and the set of vegetables, both sets are_____sets.
- a. Disjoint
- b. Subset
- c. Whole
- d. Equal

30 A binary relation R over S is called an equivalence relation if it has following property(s)
- a. Reflexivity
- b. Symmetry
- c. Transitivity
- d. All of Above

31 Heap can be used to implement
- a. Stack
- b. Linked list
- c. Queue
- d. Priority queue

32 If a tree has 20 edges/links, then the total number of nodes in the tree will be:
- a. 19
- b. 20
- c. 21
- d. Can't be determined

33 If there are 100 elements in an equivalence class, then we will have_____ sets initially.
- a. 50
- b. 100
- c. 1000
- d. 80

34 Given the values are the array representation of heap; 12 23 26 31 34 44 56 64 78 100

What is the 5th smallest element in the given heap?
- a. 31
- b. 34
- c. 44
- d. 57

35. 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

36 Which one of the following is known as "Last-In, First-Out" or LIFO Data Structure?
- ► Linked List
- ► **Stack (Page 54)**
- ► Queue
- ► Tree

37 What will be postfix expression of the following infix expression?

infix Expression: a+b*c-d
- ► ab+c*d-
- ► **abc*+d-**

- abc+*d-
- abcd+*-

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

- **True**
- False

39 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
- aaapppppllеess

40 A binary tree of N nodes has_____.

- Log_{10} N levels
- **Log_2 N levels (Page 212)**
- N / 2 levels
- N x 2 levels

41 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

42 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
- $Nlog_2N$
- **log_2N (page 440)**

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43 Merge sort and quick sort both fall into the same category of sorting algorithms. What is this category?

- ► O(nlogn) sorts
- ► Interchange sort (not sure)
- ► Average time is quadratic
- ► **None of the given options. (Page 488)**

44 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

45 We convert the_____ pointers of binary to threads in threaded binary tree.

- ► Left
- ► Right
- ► **NULL (Page 312)**
- ► None of the given options

46 If the bottom level of a binary tree is NOT completely filled, depicts that the tree is NOT

- ► Expression tree
- ► Threaded binary tree
- ► **complete Binary tree (Page 323)**
- ► Perfectly complete Binary tree

47 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.

48 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

49 .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)**

50 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;
   }
}
```

- The function has no problem and will fulfill the purpose successfully.
- The function cannot be compile as it has syntax error.
- The function has logical problem, therefore, it will not work properly.
- The function will be compiled but will throw runtime exception immediately after the control is transferred to this function.

51. 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

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

- Push
- Pop
- **Top (page 53)**
- First

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

54 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

55 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.

56 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

57 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.

58 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 parent[i] to -1, set it to -k if tree rooted at i has k nodes.

59. 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 above

60. 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

61. 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().

62, What kind of list is best to answer questions such as "What is the item at position n?"

- **Lists implemented with an array.**
- Doubly-linked lists.
- Singly-linked lists.
- Doubly-linked or singly-linked lists are equally best

63 Each node in doubly link list has,

- 1 pointer
- **2 pointers (page 39)**
- 3 pointers
- 4 pointers

64 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)**
- x R z

65 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. (page 487)**
- $O(n^3)$ time, because the worst case has really random input which takes longer to sort.

66 Merge sort and quick sort both fall into the same category of sorting algorithms. What is this category?

- O(nlogn) sorts
- Interchange sort
- Average time is quadratic
- **None of the given options. (Page 488)**

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

- Linked list
- Stack
- Queue
- **Binary tree (page 287)**

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68 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 (page 336)**
- 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

69 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 (page 336)**
- 11,22,33,44,66,55
- 11,22,33,66,44,55
- 11,22,66,33,44,55

70 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

71. Is a data structure that can grow easily dynamically at run time without having to copy existing elements.

- Array ()
- List
- **Both of these (page 10)**
- None of these

72. A complete binary tree of height___has nodes between 16 to 31 .

- 2
- 3
- **4 (page 373)**
- 5

73. 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 parent[i] to -1, set it to -k if tree rooted at i has k nodes.

74. 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

75. Suppose A is an array containing numbers in increasing order, but some numbers occur more than once when using a binary search for a value, the binary search always finds

- **the first occurrence of a value.**
- the second occurrence of a value.
- may find first or second occurrence of a value.
- None of the given options.

76. A binary tree with 24 internal nodes has___external nodes. 22

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

77. 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

78.* "+" is a_____*operator.

- Unary
- **Binary (page 64)**
- Ternary
- None of the above

79. A kind of expressions where the operator is present between two operands called____expressions.

- Postfix
- **Infix (page 64)**
- Prefix
- None of the above.

80. 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.

binary tree with N internal nodes has____links,_links to internal nodes and_links to external nodes

- ► N+1, 2N, N-1
- ► N+1, N-1, 2N
- ► **2N, N-1, N+1 (page 304)**
- ► N-1, 2N, N+1

82. Each node in doubly link list has,

- ► 1 pointer
- ► **2 pointers (Page 39)**
- ► 3 pointers
- ► 4 pointers

83. If you know the size of the data structure in advance, i.e., at compile time, which one of the following is a good data structure to use.

- ► Array
- ► List
- ► **Both of these (page 10)**
- ► None of these

84. Which one is a self-referential data type?

- ► Stack
- ► Queue
- ► **Link list**
- ► All of these

85. There is/are___case/s for rotation in an AVL tree,

- ► 1
- ► 3
- ► 2
- ► **4 (page 229)**

86. Which of the following can be the inclusion criteria for pixels in image segmentation.

- ► Pixel intensity
- ► Texture
- ► Threshold of intensity

► **All of the given options (page 421)**

87. In a perfectly balanced tree the insertion of a node needs _.

► **One rotation (Page 225)**
► Two rotations
► Rotations equal to number of levels
► No rotation at all

88; 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)**

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

► In a table, the type of information in columns may be different.
► **A table consists of several columns, known as entities. (page 408)**
► 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.

90. 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 either the 7 or the 9.(page 506)**
► 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.

91 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.

92. 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

binary tree with 33 internal nodes has___links to internal nodes.

- 31
- **32 (Page 304)**
- 33
- 66

94. 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 (see min heap property at page 337)**

95. 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.

96. 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

97. The_____method of list will position the *currentNode* and *lastCurrentNode* at the start of the list.

- Remove
- Next
- **Start (Page 38)**
- Back

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

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

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

- **True**
- False

Question No: 100
If numbers 5, 222, 4, 48 are inserted in a queue, which one will be removed first?

- 48
- 4
- 222
- **5**

Question No: 101
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: 102
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: 103
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: 104

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: 105

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: 106

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 (n-1) (Page 306)**

Question No: 107

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

- insert
- add
- update
- **preculateDown (Page 370)**

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Question No: 108
If both pointers of the node in a binary tree are NULL then it will be a/an_____.

- ► Inner node
- ► **Leaf node (Page 311)**
- ► Root node
- ► None of the given optio

Question No: 108
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: 109
A complete binary tree of height *3* has between _____nodes.

- ► 8 to 14
- ► **8 to 15 (Page 124)**
- ► 8 to 16
- ► 8 to 17

2^(d+1) - 1 = 2^(3+1) -1 = 2^4 -1 = 16-1 = 15

Question No: 110
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 (page 337)**

Question No: 111
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 (page 337)**
- ► 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: 112
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: 113

The following are statements related to queues.

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

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: 114

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: 115

We are given N items to build a heap, this can be done with_____successive inserts.

- N-1
- **N (Page 355)**
- N+1
- N^2

Question No: 116

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: 117

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 483)**
- 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

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Question No: 118
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: 119
In case of deleting a node from AVL tree, rotation could be prolong to the *root* node.

- **Yes (Page 266)**
- No

Question No 119
_____only removes items in reverse order as they were entered.

- **Stack (Page 79)**
- Queue
- Both of these
- None of these

Question No:120
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:121
Select the one *FALSE* statement about binary trees:

- **Every binary tree has at least one node. (Page 109)**
- 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: 122
Searching an element in an AVL tree take maximum_____time (where n is no. of nodes in AVL tree),

- $Log_2(n+1)$
- $Log_2(n+1) -1$
- **$1.44\ Log_2 n$ (Page 235)**
- $1.66\ Log_2 n$

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Question No: 123
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: 124
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**

According to max heap property

Question No: 125
Which one of the following is NOT the property of equivalence relation:

- ► Reflexive
- ► Symmetric
- ► Transitive
- ► **Associative (Page 385)**

Question No: 126
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 (Page 385)**
- ► For all elements w, x, y and z, if x R y and w R z then x R z

Question No: 127
Union is a_____time operation.

- ► **Constant (Page 416)**
- ► Polynomial
- ► Exponential
- ► None of the given option

Question No: 128
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. (Page 437)**
- ► 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.

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Question No: 129

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 log2 N**

Question No: 130

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: 131

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 (page 337)**
- ► 11,22,33,44,66,55
- ► 11,22,33,66,44,55
- ► 11,22,66,33,44,55

Question No: 132

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 (page 349)**
- ► 4,6,5,7

Question No: 133

We can build a heap in _____time.

- ► **Linear (Page 353)**
- ► Exponential
- ► Polynomial
- ► None of the given options

Question No: 134

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 either the 7 or the 9. (page 506)**
- ► 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: 135

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 136

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: 137

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

- **Randomly (Page 289)**
- That occur first in the text message
- That are lexically smaller among others.
- That are lexically greater among others

Question No: 138

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 (Page 52)**
- (i) tree (ii) insertion (iii) removals (iv) top

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Question No: 139
A binary tree with 33 internal nodes has_____links to internal nodes.

- 31
- **32 (n-1 links to internal nodes) (Page 304)**
- 33
- 66 .

Question No: 140
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: 141
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: 142
Which of the following is a non linear data structure?

- Linked List
- Stack
- Queue
- **Tree (Page 112)**

Question No: 143
The data of the problem is of 2GB and the hard disk is of 1GB capacity, to solve this problem we should

- Use better data structures
- **Increase the hard disk space (Page 5)**
- Use the better algorithm
- Use as much data as we can store on the hard disk

Question No: 144
In an array list the current element is

- **The first element**
- **The middle element**
- The last element
- The element where the current pointer points to

Question No: 145
Which one of the following is a valid postfix expression?

- ab+c*d-
- **abc*+d- (According to rule)**
- abc+*d-
- (abc*)+d-

Question No: 146
In sequential access data structure, accessing any element in the data structure takes different amount of time. Tell which one of the following is sequential access data structure,

- Arrays
- **Lists**
- Both of these
- None of these

Question No: 147
I have implemented the queue with a circular array. If data is a circular array of CAPACITY elements, and last is an index into that array, what is the formula for the index after last?

- (last % 1) + CAPACITY
- last % (1 + CAPACITY)
- **(last + 1) % CAPACITY**
- last + (1 % CAPACITY)

This expression will point to field after last that will be the first field.

Question No: 148
Which one of the following is TRUE about recursion?

- **Recursion extensively uses stack memory. (page 149)**
- Threaded Binary Trees use the concept of recursion.
- Recursive function calls consume a lot of memory.
- Iteration is more efficient than iteration.

Question no.149
Which one of the following is TRUE about iteration?

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

Question No: 150
If a max heap is implemented using a partially filled array called data, and the array contains n elements (n > 0), where is the entry with the greatest value? **Data[0] is correct**

- data[1]
- data[n-1]
- data[n]
- data[2*n+1]

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Question No: 151
If there are 56 internal nodes in a binary tree then how many external nodes this binary tree will have?

- 54
- 55
- 56
- **57 (n+1)**

Question No: 152
Which of the following heap method increase the value of key at position „p" by the amount „delta"?

- **increaseKey(p,delta) (Page 363)**
- decreaseKey(p,delta)
- preculateDown(p,delta)
- remove(p,delta)

Question No: 153
If we have 1000 sets each containing a single different person. Which of the following relation will be true on each set:

- **Reflexive (page 388)**
- Symmetric
- Transitive
- Associative

Question No: 154
Which one of the following is not an example of equivalence relation?

- Electrical connectivity
- Set of people
- **<= relation (Page 385)**
- Set of pixels

Question No: 155
A binary tree of nodes has_____.

- Log_{10} N levels
- **Log_2 N levels (Page 279)**
- N / 2 levels
- N x 2 levels

Question No: 156
Binary Search is an algorithm of searching, used with the_____data.

- **Sorted (Page 428)**
- Unsorted
- Heterogeneous
- Random

Question No: 157
Consider te 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 (According to rule)**

Question No: 158
Which of the following statements is correct property of binary trees?

- A binary tree with N internal nodes has N+1 internal links.
- A binary tree with N external nodes has 2N internal nodes.
- **A binary tree with N internal nodes has N+1 external nodes. (page 304)**
- None of above statement is a property of the binary tree

Question No: 159
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: 160
In a selection sort of n elements, how many times the swap function is called to complete the execution of the algorithm?

- **n-1**
- n log n
- n^2
- 1

Question No: 161
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: 162
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.

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Question No: 163
Consider the following postfix expression S and the initial values of the variables.
S = A B - C + D E F - + ^
Assume that A=3, B=2, C=1, D=1, E=2, F=3
What would be the final output of the stack?

- **1**
- 2
- 0
- -1

Question No: 164
The maximum number of external nodes (leaves) for a binary tree of height H is _____

- 2h
- 2^H+1
- 2^H-1
- 2^H+2

Question No: 165
In threaded binary tree the NULL pointers are replaced by ,

- preorder successor or predecessor
- **inorder successor or predecessor (Page 310)**
- postorder successor or predecessor
- NULL pointers are not replaced

Question No: 166
In a min heap , preculateDown procedure will move smaller value_____and bigger value_____.

- left,right
- right,left
- **up,down (Page 358)**
- down,up

Question No: 167
Which of the following statement is correct about union:

- **To perform Union of two sets, we merge the two trees by making the root of one tree point to the root of the other. (Greedy algorithms , Page 7)**
- To perform Union of two sets, we merge the two trees by making the leaf node of one tree point to the root of the other.
- To perform Union of two sets, merging operation of trees in not required at all.
- None of the given options.

Suppose A is an array containing numbers in increasing order, but some numbers occur more than once when using a binary search for a value, the binary search always finds _

- **the first occurrence of a value.**
- the second occurrence of a value.
- may find first or second occurrence of a value.
- None of the given options.

Question No: 169

Let heap stored in an array as H = [50, 40, 37, 32, 28, 22, 36, 13]. In other words, the root of the heap contains the maximum element. What is the result of deleting 40 from this heap

- **[50,32, 37,13, 28, 22, 36] according to max heap property.**
- [37, 28, 32, 22, 36, 13]
- [37, 36, 32, 28, 13, 22]
- [37, 32, 36, 13, 28, 22]

Question No: 170

In an array we can store data elements of different types.

- True
- **False**

we cannot store multiple datatype in an Array, we can store similar datatype only in an **Array.**

Question no 171

Which one of the following statement is NOT correct?

- In linked list the elements are necessarily to be contiguous
- **In linked list the elements may locate at far positions in the memory (page 17)**
- In linked list each element also has the address of the element next to it
- In an array the elements are contiguous

Question no 172

Doubly Linked List always has one NULL pointer.

- True
- **False(page 450)**

Question No: 173

A queue is a data structure where elements are,

- **inserted at the front and removed from the back. . (page #89 nd 90)**
- inserted and removed from the top.
- inserted at the back and removed from the front.
- inserted and removed from both ends.

Question No: 174

Each node in doubly link list has,

- 1 pointer
- **2 pointers(page 38)**
- 3 points
- 4 poiner

Question No: 175

I have implemented the queue with a linked list, keeping track of a front pointer and a rear pointer. Which of these pointers will change during an insertion into an *EMPTY* queue?

- ► Neither changes
- ► Only front pointer changes.
- ► Only rear pointer changes.
- ► Both change

Since it is an empty queue the front and rear are initialize to -1, so on insertion both the pointers will change and point to 0.

Question No: 176

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

- ► Binary Tree
- ► Binary Search Tree
- ► **Parse Tree(page 279)**
- ► AVL Tree

Question No: 177

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

- ► **$Log_2 (n+1) -1$(page 136)**
- ► 2^n
- ► $Log_2 (n) - 1$
- ► $2^n - 1$

Question No: 178

If a complete binary tree has height h then its no. of nodes will be,

- ► Log (h)
- ► **$2^{h+1} - 1$**
- ► Log (h) - 1
- ► $2^h - 1$

Question No: 179

A binary relation R over S is called an equivalence relation if it has following property(s)

- ► Reflexivity
- ► Symmetry
- ► Transitivity
- ► **All of the given options (page 385)**

Question No: 180

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
- $Nlog_2N$
- **log_2N (page 429)**

Question No: 181
Use of binary tree in compression of data is known as_____.

- Traversal
- Heap
- Union
- **Huffman encoding (page 292)**

Question No: 182
While building Huffman encoding tree the new node that is the result of joining two nodes has the frequency.

- Equal to the small frequency
- Equal to the greater
- **Equal to the sum of the two frequencies (page 293)**
- Equal to the difference of the two frequencies

Question No: 183
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 PREOREDR 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. (Page 307)**
- 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: 184
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_____successor.

- levelorder
- Preorder
- **Inorder**
- Postorder

Question No: 185
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 324)**
- This dummy node has always some integer value.

Question No: 186

A complete binary tree is a tree that is_____filled, with the possible exception of the bottom level.

- partially
- **completely (page 326)**
- incompletely
- partly

Question No: 187

A complete binary tree of height *3* has between _____nodes.

- 8 to 14
- **8 to 15 (page 124)**
- 8 to 16
- 8 to 17

Question No: 188

We can build a heap in _____time.

- **Linear (page 355)**
- Exponential
- Polynomial
- None of the given options

Question No: 189

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: 190

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: 191

(Consider the following infix

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expression:
x – y a + b / c
Which of the following is a correct equivalent expression(s) for the above?

- x y -a * b +c /
- x *y a - b c / +
- **x y a * - b c / +** **Hint :- (x – y * a) +(b / c)**