**Unit-4**

**Trees**

1. How many children does a binary tree have?  
   a) 2 b) any number of children c) 0 or 1 or 2 d) 0 or 1
2. What is/are the disadvantages of implementing tree using normal arrays?  
   a) difficulty in knowing children nodes of a node  
   b) difficult in finding the parent of a node  
   c) have to know the maximum number of nodes possible before creation of trees  
   d) difficult to implement
3. What must be the ideal size of array if the height of tree is ‘l’?  
   a) 2l-1 b) l-1 c) l d) 2l
4. What are the children for node ‘w’ of a complete-binary tree in an array representation?  
   a) 2w and 2w+1 b) 2+w and 2-w

c) w+1/2 and w/2 d) w-1/2 and w+1/2

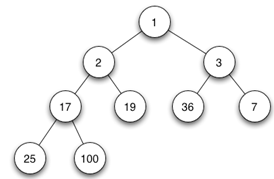
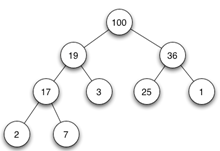
1. What is the parent for a node ‘w’ of a complete binary tree in an array representation when w is not 0?  
   a) floor(w-1)/2 b) ceil(w-1/2) c) w-1/2 d) w/2
2. If the tree is not a complete binary tree then what changes can be made for easy access of children of a node in the array?  
   a) every node stores data saying which of its children exist in the array  
   b) no need of any changes continue with 2w and 2w+1, if node is at i  
   c) keep a separate table telling children of a node  
   d) use another array parallel to the array with tree
3. Advantages of linked list representation of binary trees over arrays?  
   a) dynamic size  
   b) ease of insertion/deletion  
   c) ease in randomly accessing a node  
   d) both dynamic size and ease in insertion/deletion
4. Disadvantages of linked list representation of binary trees over arrays?  
   a) Randomly accessing is not possible  
   b) Extra memory for a pointer is needed with every element in the list  
   c) Difficulty in deletion  
   d) Random access is not possible and extra memory with every element
5. Which of the following traversing algorithm is not used to traverse in a tree?  
   a) Post order b) Pre order c) Post order d) Randomized
6. Level order traversal of a tree is formed with the help of  
   a) breadth first search b) depth first search c) dijkstra’s algorithm d) prims algorithm
7. What is the maximum number of children that a binary tree node can have?  
   a) 0 b) 1 c) 2 d) 3
8. A binary tree is a rooted tree but not an ordered tree.  
   a) true b) false
9. How many orders of traversal are applicable to a binary tree (In General)?  
   a) 1 b) 4 c) 2 d) 3
10. If binary trees are represented in arrays, what formula can be used to locate a left child, if the node has an index i?  
    a) 2i+1 b) 2i+2 c) 2i d) 4i
11. Using what formula can a parent node be located in an array?  
    a) (i+1)/2 b) (i-1)/2 c) i/2 d) 2i/2
12. Which of the following properties are obeyed by all three tree – traversals?  
    a) Left subtrees are visited before right subtrees

b) Right subtrees are visited before left subtrees  
c) Root node is visited before left subtree

d) Root node is visited before right subtree

1. To obtain a prefix expression, which of the tree traversals is used?  
   a) Level-order traversal b) Pre-order traversal  
   c) Post-order traversal d) In-order traversal
2. Consider the following data. The pre order traversal of a binary tree is A, B, E, C, D. The in order traversal of the same binary tree is B, E, A, D, C. The level order sequence for the binary tree is \_\_\_\_\_\_\_\_\_  
   a) A, C, D, B, E b) A, B, C, D, E c) A, B, C, E, D d) D, B, E, A, C
3. Consider the following data and specify which one is Preorder Traversal Sequence, Inorder and Postorder sequences.  
   S1: N, M, P, O, Q  
   S2: N, P, Q, O, M  
   S3: M, N, O, P, Q  
   a) S1 is preorder, S2 is inorder and S3 is postorder

b) S1 is inorder, S2 is preorder and S3 is postorder  
c) S1 is inorder, S2 is postorder and S3 is preorder  
d) S1 is postorder, S2 is inorder and S3 is preorder

1. In postorder traversal of binary tree right subtree is traversed before visiting root.  
   a) True b) False
2. What is the possible number of binary trees that can be created with 3 nodes, giving the sequence N, M, L when traversed in post-order.  
   a) 15 b) 3 c) 5 d) 8
3. The post-order traversal of a binary tree is O P Q R S T. Then possible pre-order traversal will be \_\_\_\_\_\_\_\_  
   a) T Q R S O P b) T O Q R P S c) T Q O P S R d) T Q O S P R
4. A binary search tree contains values 7, 8, 13, 26, 35, 40, 70, 75. Which one of the following is a valid post-order sequence of the tree provided the pre-order sequence as 35, 13, 7, 8, 26, 70, 40 and 75?  
   a) 7, 8, 26, 13, 75, 40, 70, 35 b) 26, 13, 7, 8, 70, 75, 40, 35  
   c) 7, 8, 13, 26, 35, 40, 70, 75 d) 8, 7, 26, 13, 40, 75, 70, 35
5. Which of the following pair’s traversals on a binary tree can build the tree uniquely?  
   a) post-order and pre-order b) post-order and in-order  
   c) post-order and level order d) level order and preorder
6. A full binary tree can be generated using \_\_\_\_\_\_  
   a) post-order and pre-order traversal b) pre-order traversal  
   c) post-order traversal d) in-order traversal
7. The maximum number of nodes in a tree for which post-order and pre-order traversals may be equal is \_\_\_\_\_\_  
   a) 3 b) 1 c) 2 d) any number
8. The steps for finding post-order traversal are traverse the right subtree, traverse the left subtree or visit the current node.  
   a) True b) False
9. In a binary search tree, which of the following traversals would print the numbers in the ascending order?  
   a) Level-order traversal b) Pre-order traversal  
   c) Post-order traversal d) In-order traversal
10. The number of edges from the root to the node is called \_\_\_\_\_\_\_\_\_\_ of the tree.  
    a) Height b) Depth c) Length d) Width
11. The number of edges from the node to the deepest leaf is called \_\_\_\_\_\_\_\_\_ of the tree.  
    a) Height b) Depth c) Length d) Width
12. What is a full binary tree?  
    a) Each node has exactly zero or two children b) Each node has exactly two children  
    c) All the leaves are at the same level d) Each node has exactly one or two children
13. What is a complete binary tree?  
    a) Each node has exactly zero or two children  
    b) A binary tree, which is completely filled, with the possible exception of the bottom level, which is filled from right to left  
    c) A binary tree, which is completely filled, with the possible exception of the bottom level, which is filled from left to right  
    d) A tree In which all nodes have degree 2
14. In a full binary tree if number of internal nodes is I, then number of leaves L are?  
    a) L = 2\*I b) L = I + 1 c) L = I – 1 d) L = 2\*I – 1
15. In a full binary tree if number of internal nodes is I, then number of nodes N are?  
    a) N = 2\*I b) N = I + 1 c) N = I – 1 d) N = 2\*I + 1
16. In a full binary tree if there are L leaves, then total number of nodes N are?  
    a) N = 2\*L b) N = L + 1 c) N = L – 1 d) N = 2\*L – 1
17. Which of the following is false about a binary search tree?  
    a) The left child is always lesser than its parent  
    b) The right child is always greater than its parent  
    c) The left and right sub-trees should also be binary search trees  
    d) In order sequence gives decreasing order of elements
18. What is the specialty about the in order traversal of a binary search tree?  
    a) It traverses in a non increasing order  
    b) It traverses in an increasing order  
    c) It traverses in a random fashion  
    d) It traverses based on priority of the node
19. What is an AVL tree?  
    a) a tree which is balanced and is a height balanced tree  
    b) a tree which is unbalanced and is a height balanced tree  
    c) a tree with three children  
    d) a tree with atmost 3 children
20. What is the maximum height of an AVL tree with p nodes?  
    a) p b) log(p) c) log(p)/2 d) p/2
21. To restore the AVL property after inserting a element, we start at the insertion point and move towards root of that tree. is this statement true?  
    a) true b) false
22. Given an empty AVL tree, how would you construct AVL tree when a set of numbers are given without performing any rotations?  
    a) just build the tree with the given input  
    b) find the median of the set of elements given, make it as root and construct the tree  
    c) use trial and error  
    d) use dynamic programming to build the tree
23. What maximum difference in heights between the leafs of a AVL tree is possible?  
    a) log(n) where n is the number of nodes b) n where n is the number of nodes  
    c) 0 or 1 d) atmost 1
24. In a max-heap, element with the greatest key is always in the which node?  
    a) Leaf node b) First node of left sub tree c) root node d) First node of right sub tree
25. Heap exhibits the property of a binary tree?  
    a) True b) False
26. What is the complexity of adding an element to the heap.  
    a) O(log n) b) O(h) c) O(log n) & O(h) d) O(n)
27. The worst case complexity of deleting any arbitrary node value element from heap is \_\_\_\_\_\_\_\_\_\_  
    a) O(logn) b) O(n) c) O(nlogn) d) O(n2)
28. Heap can be used as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
    a) Priority queue b) Stack c) A decreasing order array d) Normal Array
29. If we implement heap as min-heap, deleting root node (value 1)from the heap. What would be the value of root node after second iteration if leaf node (value 100) is chosen to replace the root at start.  
    [](https://www.sanfoundry.com/wp-content/uploads/2017/08/data-structure-questions-answers-heap-q6.png)  
    a) 2 b) 100 c) 17 d) 3
30. If we implement heap as maximum heap , adding a new node of value 15 to the left most node of right subtree. What value will be at leaf nodes of the right subtree of the heap.  
    [](https://www.sanfoundry.com/wp-content/uploads/2017/08/data-structure-questions-answers-heap-q7.png)  
    a) 15 and 1 b) 25 and 1 c) 3 and 1 d) 2 and 3
31. What is the best case complexity in building a heap?  
    a) O(nlogn) b) O(n2) c) O(n\*longn \*logn) d) O(n)
32. Given an array of element 5, 7, 9, 1, 3, 10, 8, 4. Which of the following are the correct sequences of elements after inserting all the elements in a min-heap?  
    a) 1,3,4,5,7,8,9,10 b) 1,4,3,9,8,5,7,10 c) 1,3,4,5,8,7,9,10 d) 1,3,7,4,8,5,9,10
33. Which of the following data structure is more appropriate to represent a heap?

(A) Two-dimensional array (B) Doubly linked list

(C) Linear Array (D) Linked list

1. A vertex of in-degree zero in a directed graph is called a/an

(A) Root vertex (B) Isolated vertex

(C) Sink (D) Articulation point