DATA STRUCTURE
MULITIPLE CHOICE QUESTION AND ANSWER

1. The no of external nodes in a full binary tree with n internal nodes is?
A. n
B. n+1
C. 2n
D. 2n + 1
Ans : B

2. Which of the following is a true about Binary Trees?
A. Every binary tree is either complete or full.
B. Every complete binary tree is also a full binary tree.
C. Every full binary tree is also a complete binary tree.
D. No binary tree is both complete and full.
E. None of the above
Ans : E

3. A Binary Tree can have
A. Can have 2 children
B. Can have 1 children
C. Can have 0 children
D. All of the above
Ans : D

4.Which of the following is not an advantage of trees?
A. Hierarchical structure
B. Faster search
C. Router algorithms
D. Undo/Redo operations in a notepad
Ans : D

5.The difference between the external path length and the internal path length of a binary tree with n internal nodes is?
A. 1
B. n
C. n + 1
D. 2n
Ans : D

6. In a complete k-ary tree, every internal node has exactly k children or no child. The number of leaves in such a tree with n internal nodes is:
A. nk
B. (n – 1) k+ 1
C. n(k – 1) + 1
D. n(k – 1)

Ans : C

7.Height of Height of a binary tree is
A. MAX(Height of left Subtree, Height of right subtree)+1
B. MAX(Height of left Subtree, Height of right subtree)
C. MAX(Height of left Subtree, Height of right subtree)-1
D. None of the above
Ans : A

8. Which of the following options is an application of splay trees ?
A. cache Implementation
B. networks
C. send values
D. receive values
Ans : A

9. Suppose a complete binary tree has height h>0. The minimum no of leaf nodes possible in term of h is?
A. 2h -1
B. 2h -1 + 1
C. 2h -1
D. 2h +1
Ans : C

10. A weight-balanced tree is a binary tree in which for each node. The number of nodes in the left sub tree is at least half and at most twice the number of nodes in the right sub tree. The maximum possible height (number of nodes on the path from the root to the farthest leaf) of such a tree on n nodes is best described by which of the following?
A. $\log_2 n$
B. $\log_{4/3} n$
C. $\log_3 n$
D. $\log_{3/2} n$
Ans : D

11. The number of edges from the root to the node is called _____ of the tree.
a) Height
b) Depth
c) Length
d) Width
Answer: b

12. The number of edges from the node to the deepest leaf is called _____ of the tree.
a) Height
b) Depth
c) Length

d) Width
Answer: a

13. 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
Answer: a

14. 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
Answer: c

15. What is the average case time complexity for finding the height of the binary tree?
a) $h = O(loglogn)$
b) $h = O(nlogn)$
c) $h = O(n)$
d) $h = O(\log n)$
Answer: d

16. Which of the following is not an advantage of trees?
a) Hierarchical structure
b) Faster search
c) Router algorithms
d) Undo/Redo operations in a notepad
Answer: d

17. 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) $L = 2*I - 1$
Answer: b

18. 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) $N = 2*I + 1$
Answer: d

19. 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
Answer: d

20. Which of the following is incorrect with respect to binary trees?
a) Let T be a binary tree. For every k ≥ 0, there are no more than 2k nodes in level k
b) Let T be a binary tree with λ levels. Then T has no more than 2λ – 1 nodes
c) Let T be a binary tree with N nodes. Then the number of levels is at least ceil(log (N + 1))
d) Let T be a binary tree with N nodes. Then the number of levels is at least floor(log (N + 1))
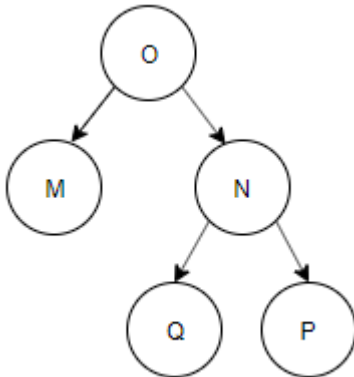**Answer: d**

21. Construct a binary tree by using postorder and inorder sequences given below.
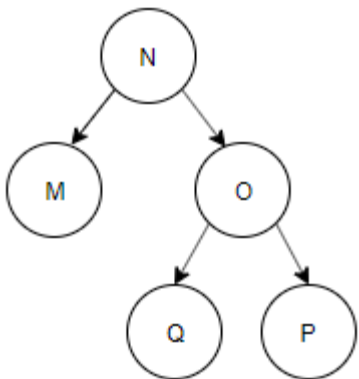Inorder: N, M, P, O, Q
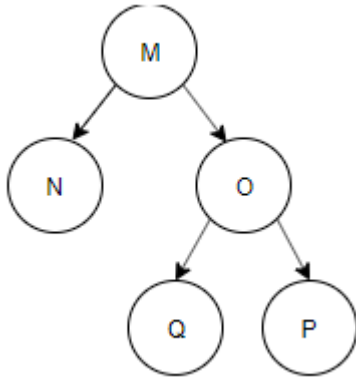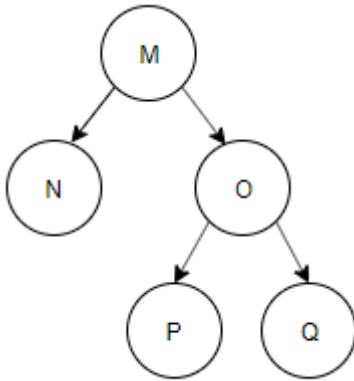Postorder: N, P, Q, O, M
Postorder: N, P, Q, O, M

a)

b)

c)

d)

Answer: d

22. The height of a BST is given as h. Consider the height of the tree as the no. of edges in the longest path from root to the leaf. The maximum no. of nodes possible in the tree is?
a) $2^{h-1} -1$
b) $2^{h+1} -1$
c) $2^h +1$
d) $2^{h-1} +1$
Ans: b

23. The no of external nodes in a full binary tree with n internal nodes is?
a) n
b) n+1
c) 2n
d) 2n + 1
Ans: b

24. The difference between the external path length and the internal path length of a binary tree with n internal nodes is?
a) 1
b) n
c) n + 1
d) 2n

Ans: d

25. Suppose a binary tree is constructed with n nodes, such that each node has exactly either zero or two children. The maximum height of the tree will be**?**
a) (n+1)/2
b) (n-1)/2
c) n/2 -1
d) (n+1)/2 -1
ANSWER: B

26. Which of the following statement about binary tree is CORRECT?
a) Every binary tree is either complete or full
b) Every complete binary tree is also a full binary tree
c) Every full binary tree is also a complete binary tree
d) A binary tree cannot be both complete and full
ANSWER: C

27. Suppose we have numbers between 1 and 1000 in a binary search tree and want to search for the number 363. Which of the following sequence could not be the sequence of the node examined?
a) 2, 252, 401, 398, 330, 344, 397, 363
b) 924, 220, 911, 244, 898, 258, 362, 363
c) 925, 202, 911, 240, 912, 245, 258, 363
d) 2, 399, 387, 219, 266, 382, 381, 278, 363
ANSWER: C

28. In full binary search tree every internal node has exactly two children. If there are 100 leaf nodes in the tree, how many internal nodes are there in the tree?
a) 25
b) 49
c) 99
d) 101
ANSWER: C

29. Which type of traversal of binary search tree outputs the value in sorted order?
a) Pre-order
b) In-order
c) Post-order
d) None
ANSWER: B

30. Suppose a complete binary tree has height h>0. The minimum no of leaf nodes possible in term of h is?
a) $2^h -1$
b) $2^{h-1} + 1$
c) 2^{h-1}

d) $2^h + 1$
ANSWER: C

31. Which of the following statements for a simple graph is correct?
a) Every path is a trail
b) Every trail is a path
c) Every trail is a path as well as every path is a trail
d) Path and trail have no relation
Answer: a

32. In a simple graph, the number of edges is equal to twice the sum of the degrees of the vertices.
a) True
b) False
Answer: b

33. The degree of any vertex of the graph is known as?
(A) Number of edges in a graph
(B) Number of a vertex in a graph
(C) Number of vertices adjacent to that vertex
(D) The number of edges incident with the vertex
Answer: D

34. The Empty graph is also known as?
(A) Bipartite graph
(B) Regular graph
(C) Trivial graph
(D) both a and b
(E) None of these
Answer:C

35. The graph is a tree if and only if
(A) Is minimally
(B) Contains a circuit
(C) Is planar
(D) Is completely connected
Answer: A

36. . What is the average case complexity of bubble sort?
a) O(nlogn)
b) O(logn)
c) O(n)
d) $O(n^2)$
Answer: d

37. The worst-case occur in linear search algorithm when …….
A. Item is somewhere in the middle of the array

B. Item is not in the array at all

C. Item is the last element in the array

D. Item is the last element in the array or item is not there at all

Ans: D

38. If the number of records to be sorted is small, then …… sorting can be efficient.
A.Merge
B.Heap
C.Selection
D. Bubble

Ans: C

39. Which of the following sorting algorithm is of divide and conquer type?
A.Bubble sort
B. Insertion sort
C. Merge sort
D. Selection sort

Ans: C

40. Which of these best describes an array?
a) A data structure that shows a hierarchical behavior
b) Container of objects of similar types
c) Arrays are immutable once initialised
d) Array is not a data structure

Answer: b

41. Assuming int is of 4bytes, what is the size of int arr[15];?
a) 15
b) 19
c) 11
d) 60

Answer: d

41. The postfix form of the expression (A+ B)*(C*D- E)*F / G is?
a) AB+ CD*E - FG /**
b) AB + CD* E - F **G /
c) AB + CD* E - *F *G /
d) AB + CDE * - * F *G /

ANSWER: a

42. The data structure required to check whether an expression contains balanced parenthesis is?
a) Stack
b) Queue
c) Array

d) Tree
ANSWER: a

43. Which data structure is needed to convert infix notation to postfix notation?
a) Branch
b) Tree
c) Queue
d) Stack
ANSWER: d

44. Which data structure is used for implementing recursion?
a) Queue
b) Stack
c) Array
d) List
ANSWER: b

45. What is the result of the following operation
Top (Push (S, X))
a) X
b) Null
c) S
d) None
ANSWER: a)

46. A linear list of elements in which deletion can be done from one end (front) and insertion can take place only at the other end (rear) is known as a ?
a) Queue
b) Stack
c) Tree
d) Linked list
ANSWER: a)

47. The data structure required for Breadth First Traversal on a graph is?
a) Stack
b) Array
c) Queue
d) Tree
ANSWER: c)

48. Let the following circular queue can accommodate maximum six elements with the following data front = 2 rear = 4 queue = _____; L, M, N, ___, ___ What will happen after ADD O operation takes place?
a) front = 2 rear = 5

queue = _____; L, M, N, O, ___
b) front = 3 rear = 5
queue = L, M, N, O, ___
c) front = 3 rear = 4
queue = _____; L, M, N, O, ___
d) front = 2 rear = 4
queue = L, M, N, O, ___

49. A queue is a ?
a) FIFO (First In First Out) list
b) LIFO (Last In First Out) list.
c) Ordered array
d) Linear tree
ANSWER: a

50. In Breadth First Search of Graph, which of the following data structure is used?
a) Stack
b) Queue
c) Linked list
d) None
ANSWER: b

51. If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, in what order will they be removed?
a) ABCD
b) DCBA
c) DCAB
d) ABCD
ANSWER: a

52. In linked list implementation of a queue, where does a new element be inserted?
a) At the head of link list
b) At the tail of the link list
c) At the centre position in the link list
d) None
ANSWER: b

53. If the MAX_SIZE is the size of the array used in the implementation of circular queue. How is rear manipulated while inserting an element in the queue?
a) rear=(rear%1)+MAX_SIZE
b) rear=rear%(MAX_SIZE+1)
c) rear=(rear+1)%MAX_SIZE
d) rear=rear+(1%MAX_SIZE)
ANSWER: c

54. A data structure in which elements can be inserted or deleted at/from both the ends but not in the middle is?
a) Queue
b) Circular queue
c) Dequeue
d) Priority queue
ANSWER: c

55. A normal queue, if implemented using an array of size MAX_SIZE, gets full when
a) Rear=MAX_SIZE-1
b) Front=(rear+1)mod MAX_SIZE
c) Front=rear+1
d) Rear=front
ANSWER: a

56. In a circular linked list
a) Components are all linked together in some sequential manner.
b) There is no beginning and no end.
c) Components are arranged hierarchically.
d) Forward and backward traversal within the list is permitted.
ANSWER: B

57. A linear collection of data elements where the linear node is given by means of pointer is called?
a) Linked list
b) Node list
c) Primitive list
d) None
ANSWER: A

58. Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?
a) Deleting a node whose location in given
b) Searching of an unsorted list for a given item
c) Inverting a node after the node with given location
d) Traversing a list to process each node
ANSWER: A

59. What is the time complexity to count the number of elements in the linked list?
a) O(1)
b) O(n)
c) O(logn)
d) O(n2)
Answer: b

60. The data structure required for Breadth First Traversal on a graph is?
a) Stack
b) Array
c) Queue
d) Tree
Answer: c

61. Queues serve major role in _____
a) Simulation of recursion
b) Simulation of arbitrary linked list
c) Simulation of limited resource allocation
d) Simulation of heap sort
Answer: c

62. Which of the following is not the type of queue?
a) Ordinary queue
b) Single ended queue
c) Circular queue
d) Priority queue
Answer: b

63. In general, the index of the first element in an array is _____
a) 0
b) -1
c) 2
d) 1
Answer: a

64. What are the disadvantages of arrays?
a) Data structure like queue or stack cannot be implemented
b) There are chances of wastage of memory space if elements inserted in an array are lesser than the allocated size
c) Index value of an array can be negative
d) Elements are sequentially accessed
Answer: b

65. When does the Array Index Out Of Bounds Exception occur?
a) Compile-time
b) Run-time
c) Not an error
d) Not an exception at all
Answer: b

66. The result of evaluating the postfix expression 5, 4, 6, +, *, 4, 9, 3, /, +, * is?
a) 600
b) 350

c) 650
d) 588
Answer: b

67. With what data structure can a priority queue be implemented?
a) Array
b) List
c) Heap
d) Tree
Answer: d

68. Linked list is considered as an example of _____ type of memory allocation.
a) Dynamic
b) Static
c) Compile time
d) Heap
Answer: a

69. In Linked List implementation, a node carries information regarding _____
a) Data
b) Link
c) Data and Link
d) Node
Answer: c

70.Which of the following is an application of stack?
A. finding factorial
B. tower of Hanoi
C. infix to postfix
D. all of the above
Ans. D

71.The situation when in a linked list START=NULL is ….
A. Underflow
B. Overflow
C. Houseful
D. Saturated
Ans. A

72.A graph is a tree if and only if graph is
(A) Directed graph
(B) Contains no cycles
(C) Planar
(D) Completely connected
Ans: B

73.A parentheses checker program would be best implemented using

(A) List
(B) Queue
(C) Stack
(D) Any of the above
Ans: C

74.Finding the location of a given item in a collection of items is called ……
A. Discovering
B. Finding
C. Searching
D. Mining
Ans. C

75.The time complexity of quicksort is ……..
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)
Ans. D

76. The complexity of merge sort algorithm is
A. O(n)
B. O(log n)
C. O(n2)
D. O(n log n)
View Answer
Ans : D

77. To measure Time complexity of an algorithm Big O notation is used which:
A. describes limiting behaviour of the function
B. characterises a function based on growth of function
C. upper bound on growth rate of the function
D. all of the mentioned
View Answer
Ans : D

78. If for an algorithm time complexity is given by O(1) then complexityof it is:
A. constant
B. polynomial
C. exponential
D. none of the mentioned
View Answer
Ans : A

79. The complexity of linear search algorithm is
A. O(n)

B. O(log n)
C. O(n2)
D. O(n log n)
View Answer
Ans : A

80. Which of the following statements for a simple graph is correct?
a) Every path is a trail
b) Every trail is a path
c) Every trail is a path as well as every path is a trail
d) Path and trail have no
Ans: a

81. In a simple graph, the number of edges is equal to twice the sum of the degrees of the vertices.
a) True
b) False
Ans:b

82. A connected planar graph having 6 vertices, 7 edges contains _____ regions.
a) 15
b) 3
c) 1
d) 11
Ans: b

83. Which of the following properties does a simple graph not hold?
a) Must be connected
b) Must be unweighted
c) Must have no loops or multiple edges
d) Must have no multiple edges
Ans: a

84. Which of the following is true?
a) A graph may contain no edges and many vertices
b) A graph may contain many edges and no vertices
c) A graph may contain no edges and no vertices
d) A graph may contain no vertices and many edges
Ans: b

85. A graph with all vertices having equal degree is known as a _____
a) Multi Graph
b) Regular Graph
c) Simple Graph
d) Complete Graph
Ans: b

86. Which of the following ways can be used to represent a graph?
a) Adjacency List and Adjacency Matrix
b) Incidence Matrix
c) Adjacency List, Adjacency Matrix as well as Incidence Matrix
d) No way to represent
Ans: c

87. Adjacency matrix of all graphs are symmetric.
a) False
b) True
Ans: a

88. The number of elements in the adjacency matrix of a graph having 7 vertices is _____
a) 7
b) 14
c) 36
d) 49
Ans: d

89. The number of edges from the root to the node is called _____ of the tree.
a) Height
b) Depth
c) Length
d) Width
Ans: b

90. The number of edges from the node to the deepest leaf is called _____ of the tree.
a) Height
b) Depth
c) Length
d) Width
Ans: a

91. 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
Ans: a

92. Which of the following is not an advantage of trees?
a) Hierarchical structure
b) Faster search
c) Router algorithms
d) Undo/Redo operations in a notepad

Ans: d

93. 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
Ans: b

94. 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
Ans: d

95. 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
Ans: b

96. What are the worst case and average case complexities of a binary search tree?
a) O(n), O(n)
b) O(logn), O(logn)
c) O(logn), O(n)
d) O(n), O(logn)
Ans: d

97. What will be the height of a balanced full binary tree with 8 leaves?
a) 8
b) 5
c) 6
d) 4
Ans: d

98. The balance factor of a node in a binary tree is defined as _____
a) addition of heights of left and right subtrees
b) height of right subtree minus height of left subtree
c) height of left subtree minus height of right subtree
d) height of right subtree minus one
Ans: c

99. Which of the following tree data structures is not a balanced binary tree?
a) AVL tree

b) Red-black tree
c) Splay tree
d) B-tree
Ans: d

100. A binary tree is balanced if the difference between left and right subtree of every node is not more than ____
a) 1
b) 3
c) 2
d) 0
Ans: a