

b. Explain the classification of data structure with an example.

29. a. Discuss the following operations of doubly linked list with example

- (i) Insert a node at the beginning
- (ii) Insert a node at the end
- (iii) Insert a node after a given node

(OR)

b. Narrate the following operations of array

- (i) Traversing
- (ii) Merge two unsorted array

30. a. Convert the given expression to postfix expression and write the pseudo code for the same
 $a + b * c + (d * e + f) * g$.

(OR)

b. Write down the pseudo code for inserting and deleting an element from the circular queue.

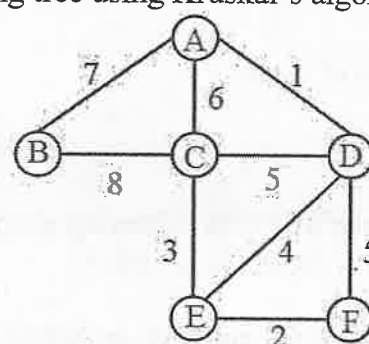
31. a. Draw the binary search tree and explain with an algorithm for the following operations

- (i) Insertion
- (ii) Deletion

(OR)

b. Construct B-tree of order 3. Elements ranges from 1 to 10. Write down the steps for the same.

32. a. Construct the minimum spanning tree using Kruskal's algorithm for the following graph.



(OR)

b. Consider hash table of size 10. Using linear probing method insert the keys
 72, 27, 36, 24, 63, 81, 92, 101

Reg. No.

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

Third to Seventh Semester

15CS201J – DATA STRUCTURES

(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) **Part - B and Part - C** should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. Which one of the following is non-primitive data type?
 (A) Integer (B) Linked list
 (C) Char (D) Boolean
2. What is the time complexity for the following statements?
 $\text{for } (i=0; i<100; i++)$
 $\{ \text{print ("HI");}$
 $\}$
 (A) $f(n) = n$ (B) $f(n) = n / 2$
 (C) $f(n) = \log n$ (D) $f(n) = n \log n$
3. The worst case time complexity of insertion sort algorithm is
 (A) $O(n)$ (B) $O(n^2)$
 (C) $O(\log n)$ (D) $O(n \log n)$
4. Which of the following cases occur when searching an array using binary search the value to be searched is equal to the middle element of the array?
 (A) Worst case (B) Average case
 (C) Best case (D) Amortized case
5. Which of these best describes an array?
 (A) A data structure that shows a hierarchical behaviour
 (B) Arrays are immutable once initialized
 (C) Container of objects of similar types (D) Array is not a data structure
6. How do you initialize an array?
 (A) $\text{int } a[3] = (1,2,3);$ (B) $\text{int } a(3) = \{1,2,3\};$
 (C) $\text{int } a[3] = \{1,2,3\};$ (D) $\text{int } a(3) = (1,2,3);$
7. What is the time complexity to count the number of elements in the singly linked list?
 (A) $O(1)$ (B) $O(n)$
 (C) $O(\log n)$ (D) $O(n^2)$

8. Which of the following is false about a doubly linked list?
- (A) We can navigate in both the directions
(B) It requires more space than a singly linked list
(C) The insertion and deletion of a node is not possible at beginning of the list
(D) Implementing a doubly linked list is difficult than singly linked list

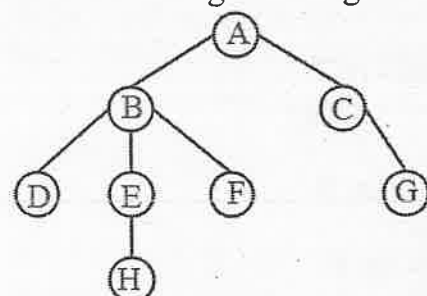
9. Convert the infix expression to postfix expression $(A + B) / (C - D)$
- (A) $AB + CD - /$
(B) $ABCD - / +$
(C) $AB / + CD -$
(D) $AB + / CD -$

10. What is the result of the function top (push (S, X))?
- (A) S
(B) X
(C) Error
(D) Null

11. A data structure in which elements can be inserted or deleted at both the ends but not in middle is?
- (A) Queue
(B) Circular queue
(C) Deque
(D) Priority queue

12. Which data structure is used for implementing recursion?
- (A) Queue
(B) Array
(C) List
(D) Stack

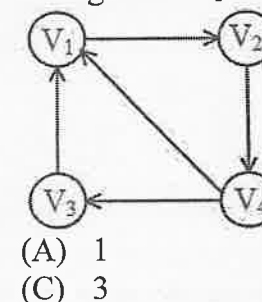
13. What is the height of the given tree?



- (A) 2
(B) 1
(C) 3
(D) 4
14. Every node in binary tree has at most _____ children.
- (A) 2
(B) M
(C) M-1
(D) M+1
15. What may be the content of a node in threaded binary tree?
- (A) Left child_pointer, left_tag, data, right_tag, right child_pointer
(B) Left child_pointer, left_tag, right_tag, right child_pointer
(C) Right child_pointer, right_tag
(D) Data
16. Which of the following tree can store more than one key value?
- (A) Binary tree
(B) Binary search tree
(C) AVL tree
(D) B-tress
17. _____ is a path in which the first and last vertices are same?
- (A) Cycle
(B) Clique
(C) Multigraph
(D) Graph

18. If there is no cycle in a graph, it is referred as _____.
- (A) Cycle graph
(B) Directed acyclic graph
(C) Weighted graph
(D) Complete graph

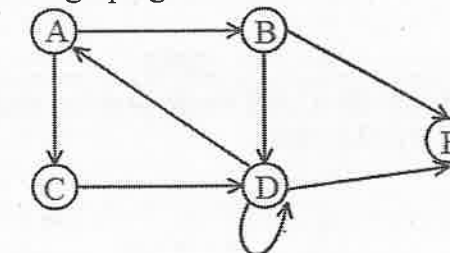
19. In degree of V_1 in the following graph is



- (A) 1
(B) 2
(C) 3
(D) 0
20. How many number of edges present in a complete graph having 'n' vertices?
- (A) $\frac{n(n-1)}{2}$
(B) $\frac{n(n+1)}{2}$
(C) n
(D) 2n

PART - B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. Mention the various data structure operations and its uses.
22. Define ADT. How do you find the complexity and time-space trade off of an algorithm?
23. Write an algorithm for inserting an element at the beginning of the singly linked list.
24. List any four applications of stack.
25. Compare full binary tree and complete binary tree with an example.
26. Construct the binary search tree with following elements:
46, 35, 56, 10, 33, 72, 30, 9, 90, 55, 68, 81
27. Find the adjacency matrix of the graph given below.



PART - C (5 × 12 = 60 Marks)
Answer ALL Questions

28. a. Illustrate insertion sort with an algorithm. Find its time complexity.

(OR)