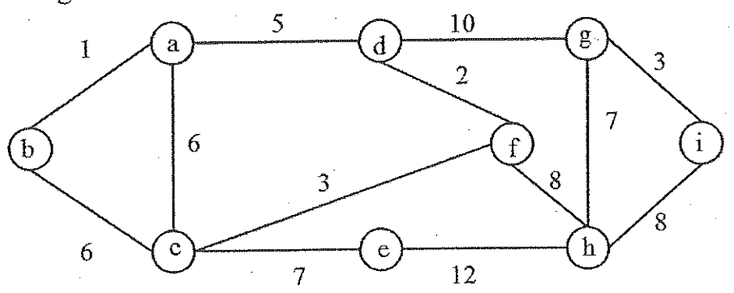
b.i. Show the result of inserting 3, 1, 4, 6, 9, 2, 5, 7 into an initially empty binary search tree.

ii. Show the result of deleting the root.

32. a. For the undirected, weighted graph given below, execute prim's algorithm to construct a minimum spanning tree.



(OR)

b. A hash function h defined by h (key) = key mod 17, with linear probing and quadratic probing to insert the keys 44, 45, 79, 55, 91, 18, 63, 81, 47, 92, 108, 51 into a table. What will be the location of keys in the hash table? Illustrate.

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2019
3rd to 8th 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 of the following case does not exist in complexity theory
   (A) Best case (B) Worst case
   (C) Average case (D) Null case

2. The space factor when determining the efficiency of algorithm is measured by
   (A) Counting the maximum memory needed by the algorithm (B) Counting the minimum memory needed by the algorithm
   (C) Counting the average memory needed by the algorithm (D) Counting the maximum disk space needed by the algorithm

3. 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 is not there at all

4. The operation of processing each element in the list is known as
   (A) Sorting (B) Merging
   (C) Inserting (D) Traversal

5. A variant of linked list in which last node of the list points to the first node of the list is
   (A) Singly linked list (B) Doubly linked list
   (C) Circular linked list (D) Multiple linked list

6. In doubly linked lists, traversal can be performed
   (A) Only in forward direction (B) Only in reverse direction
   (C) In both direction (D) Not in any direction

7. In a linked list with n nodes, the time taken to insert an element after an element pointed by some pointer is
   (A) O (1) (B) O (log n)
   (C) O (n) (D) O (n log n)

8. In a singly linked list, how many field does each node consists of?
   (A) One (B) Two
   (C) Three (D) Zero

9. If queue is implemented using arrays, what would be the worst run time complexity of enqueue and dequeue operations?
   (A) O(n), O(n) (B) O(n), O(1)
   (C) O(1), O(n) (D) O(1), O(1)

10. _____ is a linear data structure in which an element can be added or removed only at one end.
   (A) Stack (B) Queue
   (C) Linked list (D) String

11. Stack can be implemented using _____ and _____.
   (A) Array and linked list (B) Queue and graphs
   (C) Trees and linked list (D) Array and graphs

12. Postfix form of $A+(B*C)$ is
   (A) $AB*C+$ (B) $ABC*+$
   (C) $AB+C*$ (D) $ABC+*$

13. The following formula is of left-subtree (keys) ≤ node (key) ≤ right-subtree (keys)
   (A) Binary tree (B) Complete binary tree
   (C) Binary search tree (D) AVL tree

14. In the deletion operation max heap, the root is replaced by
   (A) Next available value in the left sub tree (B) Next available value in the right sub tree
   (C) Any random value from the heap (D) Last element of the last level

15. A binary search tree is traversed in right, root, left order recursively. The output sequence will be in
   (A) Ascending order (B) Descending order
   (C) Bitomic sequence (D) No specific order

16. The node belonging to the same parent node are known as
   (A) Sibling node (B) Child node
   (C) Parent node (D) Root node

17. Graphs are represented using
   (A) Adjacency tree (B) Adjacency linked list
   (C) Adjacency graph (D) Adjacency queue

18. Time complexity of breadth first search is? (V-number of vertices, E-number of edges)
   (A) O (V + E) (B) O (V)
   (C) O (E) (D) O (VE)

19. Which of the following algorithms solves all pair shortest path problem?
   (A) Floyd's algorithm (B) Prims algorithm
   (C) Dijkstra's algorithm (D) Warshall's algorithm

20. Which of the following is useful in traversing a given graph by breadth first search?
   (A) Set (B) List
   (C) Stack (D) Queue

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

21. Define data structure. Represent the classification of data structure with a diagram.

22. Write a short note on abstract data type.

23. Briefly explain sparse matrix with its triplet representation.

24. List the properties of priority queue.

25. Evaluate postfix expression 2 4 * 2 / 1 – 9 +

26. Write the pseudocode for pre-order traversal of a tree.

27. List the types of graph representation with an example.

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

28. a. Develop an algorithm to sort the elements in such a way you get a partially sorted array even if you stop the iteration at middle. Illustrate with an example and mention its best, average and worst case time complexity.

(OR)

b. Develop a sequential search algorithm for unordered data. Illustrate with an example and mention its best, average and worst case time complexity.

29. a. Describe the following operations of circular linked list with an example
   (i) Insert a node at the beginning
   (ii) Insert a node at end
   (iii) Delete a node at end

(OR)

b. Explain a cursor based implementation of linked list with suitable example.

30. a. Illustrate the enqueue and dequeue operations performed in circular queue with suitable algorithms.

(OR)

b. Develop a routine to perform push and pop operations in stack using
   (i) Array implementation
   (ii) Linked list implementation

31. a. Construct an AVL tree for the given data 42, 81, 47, 52, 11, 18, 63, 46, 88. Also illustrate the deletion of data 47, 63.

(OR)