

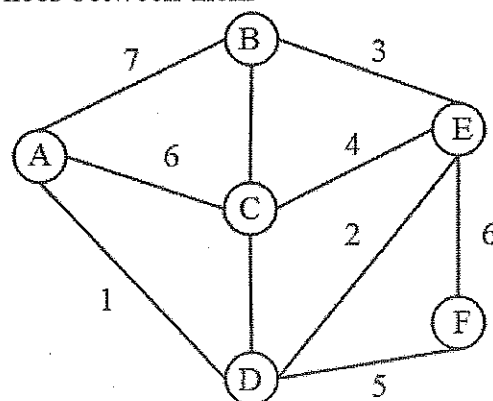
31. a. Construct the binary search tree for the following input list 25, 30, 12, 45, 60, 75, 35. Design an algorithm to insert the node 15 and 65 into the list.

(OR)

- b. Illustrate the different types of rotations on AVL tree with suitable examples.
32. a. Demonstrate the Dijkstra algorithm to find the shortest path from the source to the destination node in a graph.

(OR)

- b. Construct the minimum spanning tree using Prim's and Kruskals algorithm for the following graph. Compare the differences between them



Reg. No.

B.Tech. DEGREE EXAMINATION, JUNE 2019

1st to 7th 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

- Which is the build-in data type?
(A) Array (B) Stack
(C) Primitive (D) Non-primitive
- The data structure has fixed size memory.
(A) Array (B) Linked list
(C) Integer linked list (D) Tree
- Which of the following uses FIFO method?
(A) Stack (B) Queue
(C) Tree (D) Hash table
- If $f(n) \leq c.g(n), c > 0, \forall n \geq n_0$ then $f(n)$ is
(A) $O(g(n))$ (B) $\Omega(g(n))$
(C) $\theta(g(n))$ (D) $\psi(g(n))$
- Identify the address of $A[I][J]$, if the array elements are stored in column major order. Note M-number of row, N-number of column, W-number of bytes and B-base address.
(A) $B + W(N(I-1) + (J-1))$ (B) $B + W(N(J-1) + (I-1))$
(C) $B + W(M(I-1) + (J-1))$ (D) $B + W(M(J-1) + (I-1))$
- If an array is declared as $\text{arr}[] = \{1, 2, 3\}$, then what is the value of $\text{arr}[2]$?
(A) 1 (B) 2
(C) 3 (D) 0
- Deleting a node from the end of a circular linked list needs to modify _____ pointers.
(A) 1 (B) 2
(C) 3 (D) 4
- Which one of the following linked list contain a pointer in the last node to the first node of the list?
(A) Circular linked list (B) Singly linked list
(C) Doubly linked list (D) Header linked list

9. The data structure required to check whether an expression contains balanced parenthesis is?

- (A) Array (B) Stack
(C) Queue (D) Tree

10. A _____ does not keep track of address of every element in the list.

- (A) Stack (B) Queue
(C) Linear array (D) String

11. The time taken for adding an element in queue is

- (A) $O(1)$ (B) $O(n)$
(C) $O(\log n)$ (D) $O(n \log n)$

12. The head-tail linked list is also known as

- (A) Dequeue (B) Double linked list
(C) Priority queue (D) Header linked list

13. _____ of a node is the number of edges leaving that node.

- (A) Depth (B) Height
(C) In-degree (D) Out-degree

14. The time complexity of insert operation in AVL tree is

- (A) $O(n)$ (B) $O(n^2)$
(C) $O(\log n)$ (D) $O(n \log n)$

15. The inorder traversal of the tree is given as DBEAFCG. Which is the post order traversal?

- (A) ABCDEFG (B) BCA FEDG
(C) DEBGFAC (D) DEBFGCA

16. When a node in a splay tree is accessed, it is rotated to the _____ node, thereby changing the structure of the tree.

- (A) Root (B) Child
(C) Left child (D) Right child

17. A path P is known as a _____ if the edges have the same end points in graph.

- (A) Open path (B) Closed path
(C) Same path (D) Connected path

18. Which is the graph search algorithm that begins at the root node and explores all the neighboring nodes?

- (A) Kruskal's algorithm (B) Prim's algorithm
(C) Breadth-first algorithm (D) Depth-first algorithm

19. What are the properties of a good hash function?

- (A) Identity, fast and less memory (B) Low cost, determinism and uniformity
(C) Speed, availability and check (D) Space complexity, uniform and less interface

20. In quadratic probing, if a value is already stored at a location generated by $n(k)$, the following hash function is used to resolve the collision

- (A) $h(k, i) = [h'(k) + c_1 i + c_2 i^2] \bmod m$ (B) $h(k, i) = [h'(k) + i] \bmod m$
(C) $h(k, i) = [h_1(k) + i h_2(k)] \bmod m$ (D) $h(k, i) = [h'(k) + c_1 i + i h_2(k)] \bmod m$

PART – B ($5 \times 4 = 20$ Marks)

Answer ANY FIVE Questions

21. Write an algorithm to implement binary search.

22. Categorize the 3 types of sparse matrices with example.

23. Mention about the Josephus problem for 10 persons and 3 skips using linked list.

24. Write an algorithm to evaluate the postfix expression and show the result for the following expression $527 * 3 / -$.

25. Draw a neat diagram of circular queue with 4 elements and give any four advantages of circular queue.

26. List the five properties of red-black trees.

27. Compare the linear and quadratic probing.

PART – C ($5 \times 12 = 60$ Marks)

Answer ALL Questions

28. a.i. Brief about the various classification of data structures.

ii. Discuss the five asymptotic notations used to analysis the complexity of an algorithm.

(OR)

b. Analyse the time complexity of the following algorithm

- (i) Bubble sort
(ii) Insertion sort

29. a. Design an algorithm to perform addition and subtraction for the following polynomial expressions

$$P(x) = 5x^2 + 2x - 5$$

$$Q(x) = x^3 + 3x + 7$$

Sketch the linked list representation of the expressions.

(OR)

b. Discuss the following operations of singly linked list with an example

- (i) Insert a node at the beginning
(ii) Delete a node after the given node
(iii) Count the total number of nodes

30. a. Write an algorithm to implement the conversion of infix expression into post fix expression. Explain in detail the steps involved in the process of conversion.

(OR)

b. Write short note on

- (i) Priority queue
(ii) Dequeue