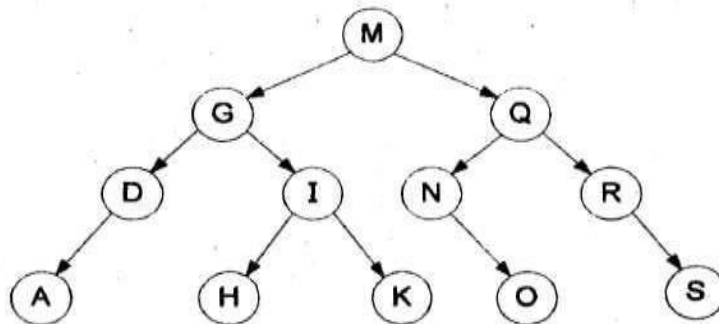


CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
Faculty of Technology and Engineering
Devang Patel of Institute of Advance Technology and Research
IT256 Data Structure & Algorithms
Academic year: 2021-2022

Questions

- 1 What is Data Structure? Explain types of Data Structure.
- 2 List out differences between Linear search and Binary search.
- 3 For given 3D array A[-2:0,1:4,6:9]. Find the total number of elements. Arrange in column major order. Base address is 1000. Also find address of A[-1,3,8] element.
- 4 Show complete tracing of following data using Bubble sort and Insertion sort. 25, 16, 23, 64, 31, 86, 28, 88
- 5 Write an algorithm for deleting a node after specified information field for singly link list. And give an example.
- 6 For given tree, write all tree traversal:



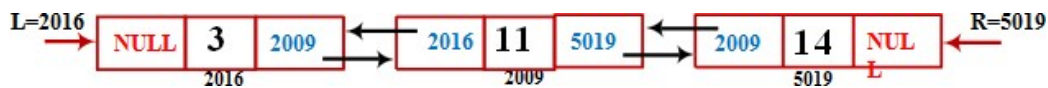
- 7 Draw Tree for given preorder and inorder traversal.
Preorder : abcdfge
Inorder : cfgdbea
- 8 Differentiate
 - 1) Binary Tree and Complete Binary Tree
 - 2) Stack and Array
 - 3) Stack and Queue
 - 4) Singly Link List and Doubly Link list
- 9 Evaluate following expression using stack
 $53 + 2 * 697 - / -$
- 10 Convert following expression into postfix and prefix using stack
 $A + ((B - C) * (D - E) + F) / G \$ (H - J)$
- 11 Explain Tower of Hanoi for $n=3$.
- 12 What is linear and non-linear data structure? Explain with a suitable example
- 13 What is searching? Differentiate Linear Search and Binary Search.

- 14 What is recursion? Write a recursive algorithm to find out the factorial of a given number
- 15 Given a two dimensional array A(3:10, 10:20) stored in row-major order with base address of 200 and size of each element of 4 bytes, find address of element A(5, 15).
- 16 Explain memory representation for 2D array
- 17 Define Graph. Explain Graph Representation Techniques with example
- 18 Explain Singly linked list and Doubly Linked List.
- 19 What is Hashing? Explain different Hashing techniques with example
- 20 Explain Circular Queue
- 21



For the given linked list, if M contains 6011, insert a new node with data 11 and node address 2002. Draw the final linked list with all details.

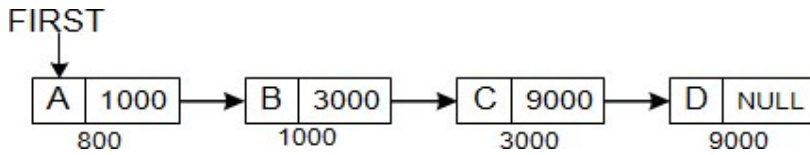
- 22 Write the step to delete node x from given singly linked list. (Delete operation contains two parameter Delete(x, head) where x=5).
- 23 For the given doubly linked list perform the following operations such that it maintain ascending order of data. Draw linked list after each operation.



1. Insert 10 having node address 4092.
 2. Insert 15 having node address 3014.
 3. Delete 14.
- 24 Create a Doubly linked list using following data that arranges data in descending order. Show list after each insertion.

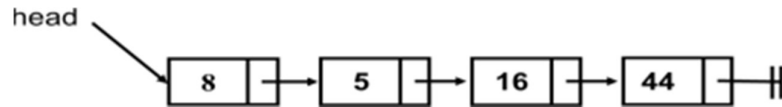
Addresses: 9020, 6110, 8990, 5011, 6229. Elements : 15,11,9,13,18

- 25 A faculty stored data of 50 students of a class having ID from 1 to 50 in ascending order and the faculty allows all students sit in the class randomly. Each student has two information: ID and location of next present student of the class.
- (1) Which data structure is appropriate for this application?
 - (2) In the class, all the students are present accept ID 12 and 25. After 10 minutes, ID 12 arrives. He sits at random in the class. Write an algorithm such that data of ID 12 is arranged in ascending order.
- 26 Following Link list is given: Write only steps to perform following operations

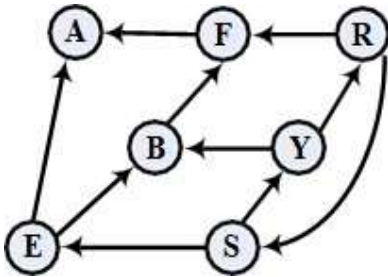


- (i) Delete node after node whose address 1000.
- (ii) Delete first node

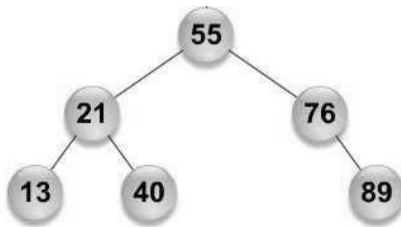
27 Write the step to delete node x from given singly linked list. (Delete operation contains two parameter Delete(x, head) where x=5).



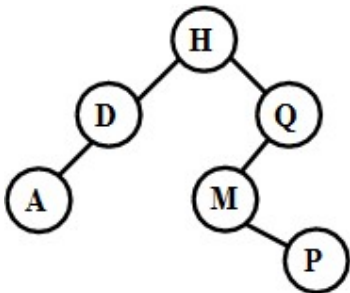
28 Represent the following graph using three graph representation techniques. Traverse the following graph using Depth First Search strategy. First visit S



29 In the given Height Balanced Tree, insert 37, 29 and 82 successively. Draw the tree after each insertion with other details.



30 Prepare the inorder binary tree for the given tree.



- 31 What is the maximum and minimum height of a binary tree with 12 nodes? What is the Drawback of binary search tree?
- 32 Create the Max Heap tree for the following data. Draw the tree after each insertion

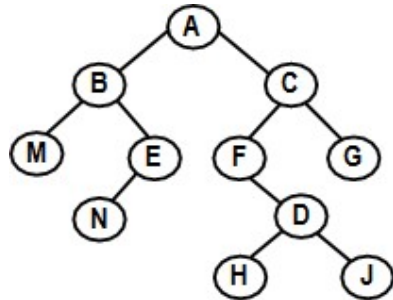
25, 11, 50 , 9 , 71, 35, 95, 30

- 33 Create the Binary search tree for the following data.

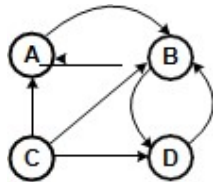
N, R, X, G, P, J, H, V, I

After creation of entire tree, delete R node and draw final tree.

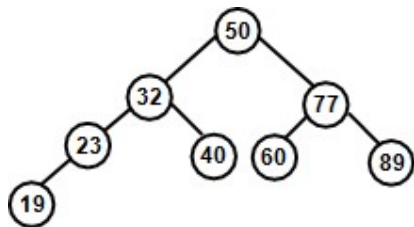
- 34 Assign the threads to the NULL links of given binary tree for inorder traversal. Redraw the tree with head node using following structure of a node.



- 35 Draw the adjacency matrix of the following graph and find A2 from it.



- 36 Insert 45, 12, 25 and 39 into the following AVL Tree. Draw balanced tree after each insertion with balance factor and pivot node



- 37 Construct a binary search tree (using Alphabetic order) for the following data.

K, O, X, C, A, B, F, P, U, G, J, Z

Show its Preorder, Inorder and Postorder traversing sequences.

- 38 Generate index for each data using hash function and arrange them into an array A[10] .

Use linear probing to resolve collision.

Data: 1104, 806, 1288, 697, 1087, 835, 533, 1407

Hash function $H(x) = (x \bmod 23) + 2$.

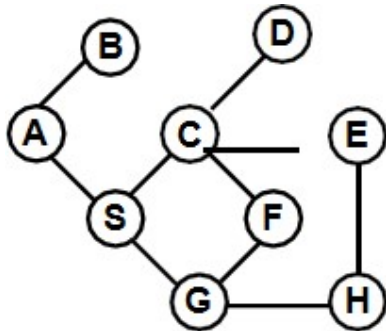
- 39 Using following adjacency matrix, draw the weighted graph

0	4	0	2	0
0	0	0	7	0
0	5	0	0	0
0	0	0	0	3
0	0	1	0	0

- 40 Using binary search technique, show the values of middle, low and high for searching element 8 from given array having index from [0] to [7].

8, 11, 20, 26, 28, 32, 34, 40

- 41 Give the sequence of traversal for the given graph using breadth first search and depth first search algorithms. For both the searching, show the appropriate data structure with vertice for complete traversal individually. Starting vertex is S.



- 42 Explain the insert at front and insert at end operation of singly linked list with diagram.
- 43 Sort the following data using Radix sort.
100, 11, 155, 1410, 142, 1452, 133, 1046
- 44 Translate following infix expression into postfix expression using a stack
 $(A^B) / D * E / (F + A) * (D * E) - C$
- 45 Define Queue. Explain the circular queue and priority queue.
- 46 Create binary search tree for following value
15, 25, 39, 5, 10, 832, 34, 7, 6, 28
- 47 Explain circular queue. How it differs from simple queue?
- 48 What is quick sort and what is worst case time complexity of quick sort? Sort the following using quick sort:
24, 56, 47, 35, 10, 90, 82, 31
- 49 Show the tracing of selection sort on the following:
33, 965, 82, 75, 88, 92, 4, 12, 41,
- 50 Trace the following using insertion sort.
9, 1106, 6, 7101, 990, 15, 99, 10