

NOTE: 1) All Questions are compulsory.
2) Figures to the right indicate full marks.

Q.1. Attempt any three

[15]

- Describe various operation that can be performed on data structure.
- What do you mean by abstract data type? How it is different from primitive data type?
- Consider 2-dimensional array $D[5:7, -3:6]$. If the base address of D is 1500 and each element of array occupies 4 memory cells then find the address of $d_{6,0}$ element using row major order and column major order.
- Write an algorithm for sorting an array using Bubble Sort algorithm.
- Explain advantages and limitations of array.
- Explain importance of algorithm analysis.

Q. 2. Attempt any three

[15]

- Explain applications of Linked List.
- Write an algorithm to traverse One-Way Linked List.
- Write an algorithm to delete a node at beginning of Linked List along with representation.
- Write an algorithm for splitting a Linked List into two Linked List with list pointer variables 'Begin' and 'Begin2' respectively.
- Write a short note on Doubly Linked List.
- Explain Header Linked List and categories of it.

Q. 3. Attempt any three

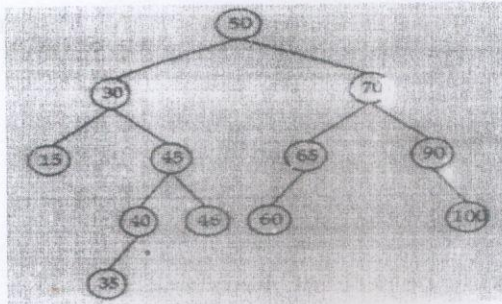
[15]

- Write an algorithm for push and pop operation of the Stack using Linked List representation.
- Write short note on Deque.
- Transform the given expression I into its equivalent postfix expression P using algorithm. $I = (5 + 6) * 7 - (3 * 2) - 8$
- Explain the applications of Stack in detail.
- Convert following expressions:
 - infix to prefix $((a+b)/d^{((e-f)+g))}$
 - infix to postfix $(x*y)+(z+((a+b-c)*d))$
- Explain the applications of i) Priority Queue ii) Queue.

Q. 4. Attempt any three

[15]

- Explain the following terms regarding Binary Tree:
 - Similar Binary Trees
 - Equivalent Binary Trees
 - Complete Binary Tree
 - Almost Complete Binary Tree
 - Strictly Binary Tree
- Consider the Binary Search Tree T given below. Draw the separate Binary Search Tree for each operation after performing it given below:

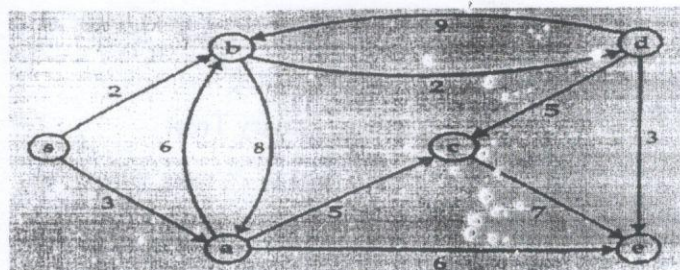


- i) Add an element 10 into T
 - ii) Add an element 44 into T
 - iii) Delete an element 35 from T
 - iv) Delete an element 40 from T
 - v) Delete an element 45 from T
- c) Examine the technique to produce Huffman Tree and Huffman Codes for the given text- ACAEBCABEABADFCBD
- d) Write an algorithm to traverse Binary tree recursively in -
- i) Preorder manner
 - ii) Inorder manner
- e) Reconstruct the Binary Tree T having 10 nodes according to Inorder and Postorder of tree.
- Inorder d c k e a h b q j i
- Postorder : d k e c h q j i b a
- f) Draw the Max Heap with following elements
- 70 80 50 45 95 25 30 100 90 85 15 10.

Q. 5. Attempt any three

[15]

- a) Explain Adjacency List representation of graph.
- b) Explain following graph terminology:
 - i. Hamiltonian path
 - ii. Weighted graph
 - iii. Multigraph
 - iv. Connected graph
 - v. Directed graph
- c). Explain the following hashing:
 - i) Double hashing
 - ii) Bucket hashing.
- d) Using Dijkstra Algorithm find the shortest distance of all the nodes from source node using following tree:



- e) Write Warshall's algorithm for finding the path matrix for graph 'G'.
- f) Write short note on hash function.