MAULANA ABUL KALAM AZAD
UNIVERSITY OF TECHNOLOGY
WEST BENGAL

Utech

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : BCA-302

DATA STRUCTURE WITH C

Time Allotted: 3 Hours   *Full Marks*: 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for *any ten* of the following: 1×10=10

   (i) Complexity of Binary Searching is

      (a) O(n)   (b) O(nlogn)

      (c) O(logn)   (d) None of these

   (ii) How many links need to be adjusted when a node is inserted into Doubly Linked list?

      (a) 1   (b) 2

      (c) 3   (d) 4

   (iii) The balance factor of a node in an AVL tree can be either

      (a) –1, 0, 1   (b) 0, 1, 2

      (c) –2, –1, 0   (d) None of these

   (iv) Which of the following data structures may give over flow error, even though the current number of elements in it is less than its size?

      (a) Simple queue   (b) Circular queue

      (c) Priority queue   (d) None of these

   (v) Two main measures for the efficiency of an algorithm are

      (a) Processor and Memory   (b) Complexity and Capacity

      (c) Time and Space   (d) Data and Space

(vi) Number of possible binary trees with 4 nodes is

(a) 14

(b) 34

(c) 24

(d) None of these

(vii) Which of the following traversal techniques lists the nodes of binary search tree in ascending order?

(a) Post-order

(b) In-order

(c) Pre-order

(d) None of these

(viii) Which of the following need not to be a binary tree?

(a) AVL tree

(b) Heap

(c) B-tree

(d) Search tree

(ix) The worst case time complexity of Quick sort is

(a) $O(n^2)$

(b) $O(n\log n)$

(c) $O(\log n)$

(d) $O(n!)$

(x) An adjacency matrix representation of a graph cannot contain information of

(a) Nodes

(b) Edges

(c) Direction of edges

(d) Parallel edges

(xi) Which of the following is a hash function?

(a) Open addressing

(b) Quadratic probing

(c) Chaining

(d) Folding

Group – B

(Short Answer Type Questions)

Answer *any three* of the following.   5×3=15

2. Convert the following infix expression into postfix form by using stack:

A + B * C $ D – (E – F * G) / H

3. Write a non-recursive function to traverse a binary tree using inorder traversal.

4. (a) Construct a binary search tree with the following nodes and do inorder, preorder, postorder traversal of this tree:

24, 35, 9, 2, 29, 41, 50

(b) Delete node with value 35 from this tree.   4+1=5

5. What do you mean by Abstract Data Type? Explain with an example.   2+3=5

6. What is hashing? How is collision problem solved in hashing?   2+3=5

2
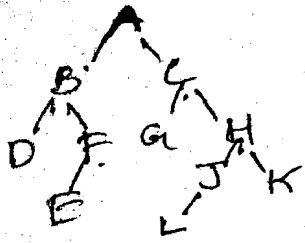
Group – C

(Long Answer Type Questions)

Answer *any three* of the following. 15×3=45

7. (a) What are the advantages of linked list over array? What are the disadvantages over array?

   (b) What is complexity of an algorithm?

   (c) What is the advantage of double linked list over single linked list?

   (d) Create a B-Tree of order 4 using following nodes:

   84, 82, 29, 99, 65, 12, 50, 28, 58, 71, 92, 75, 79, 19, 55. (2+2)+2+2+7=15

8. (a) Construct the binary tree if its preorder and inorder traversals are as follows:

   Preorder traversal— A B D E F C G H J L K

   Inorder traversal — D B F E A G C L J H K

   (b) Differentiate between binary search tree and AVL tree.

   (c) Construct an AVL tree with the following nodes—

   34, 67, 4, 56, 44, 55, 671, 345, 567, 2, 5, 89, 93, 23.

   Show all the steps. 5+2+8=15

9. (a) Explain Quick sort algorithm with the help of an example. Calculate the time-complexity of Quick sort.

   (b) Write a C function for Insertion sort. (5+5)+5=15

10. (a) What is the advantage of Binary search over Linear search? Write a C function for Binary search.

    (b) Write the following functions for a linked list—

    (i) Physically reverse a singly linked list.

    (ii) Delete a node with a given item from a Doubly linked list. (3+4)+(4+4)=15

11. Write short notes on *any three* of the following: 5×3=15

    (a) Radix sort

    (b) Linked representation of Stack and Queue

    (c) Graph and their representation in computer

    (d) DFS and BFS

    (e) Index sequential file ordering