Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/BCA/SEM-3/BCA-302/2009-10
2009
DATA STRUCTURE WITH C

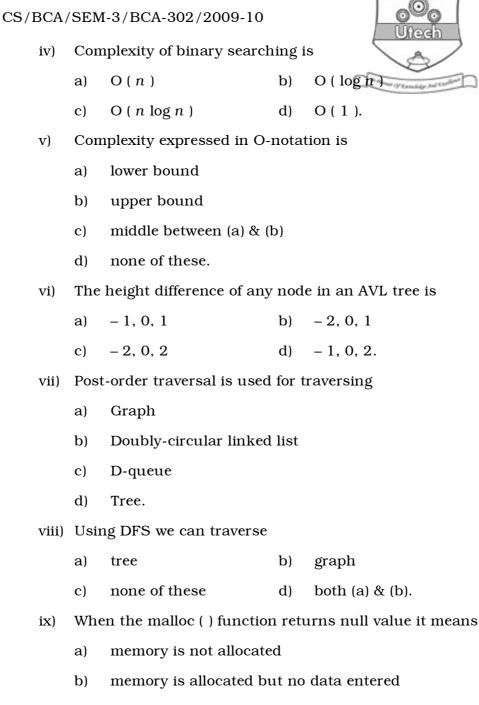*Time Allotted* : 3 Hours   Full Marks : 70

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 the following :   10 × 1 = 10

    i)   The sparse matrix is a matrix whose

        a)   most of the elements are non-zero

        b)   most of the elements are zero

        c)   half of the elements are zero and half are non-zero

        d)   none of these.

    ii) How many leaf nodes are there in a complete binary tree
         of highest level 'n' ?

        a) 2^n b) 2^{n-1}

        c) $2^n - 1$ d)   none of these.

    iii) The prefix notation is also known as

        a)   Polish notation   b)   reverse Polish notation

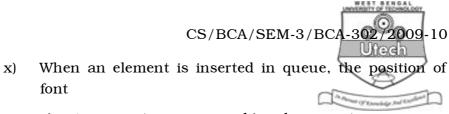   c)   reverse notation   d)   none of these.

33525   [Turn over

iv) Complexity of binary searching is

a) $O(n)$

b) $O(\log n)$

c) $O(n \log n)$

d) $O(1)$.

v) Complexity expressed in O-notation is

a) lower bound

b) upper bound

c) middle between (a) & (b)

d) none of these.

vi) The height difference of any node in an AVL tree is

a) $-1, 0, 1$

b) $-2, 0, 1$

c) $-2, 0, 2$

d) $-1, 0, 2$.

vii) Post-order traversal is used for traversing

a) Graph

b) Doubly-circular linked list

c) D-queue

d) Tree.

viii) Using DFS we can traverse

a) tree

b) graph

c) none of these

d) both (a) & (b).

ix) When the malloc ( ) function returns null value it means

a) memory is not allocated

b) memory is allocated but no data entered

c) both (a) & (b)

d) none of these.

x) When an element is inserted in queue, the position of font

   a) increments   b) decrements

   c) unchanged   d) none of these.

GROUP – B
(Short Answer Type Questions)

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

2. What are B tree and B+ tree ? Give the difference between them.

3. Convert the following into postfix :

$a + b \times c \ \$ \ d - (e - f \times g) / h.$

4. Write an algorithm to add two polynomials.

5. What is hashing ? Briefly explain different commonly used hash functions.

6. Write a short note on AVL tree.

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following.   3 × 15 = 45

7. Write short notes on any *three* of the following :   3 × 5

   a) ADT

   b) DEQUE

   c) Threaded binary tree

   d) Circular queue.

8. a) Write a function to delete any node from a binary search tree.   10

    b) Give the advantages of using linked list over array.   5

9. a) Explain with an example the heap sort algorithm.   5

    b) Write an algorithm for this heap sort.   5

    c) Find the time complexity of the above algorithm.   5

10. Write the functions for the following :   3 × 5

    a) Insert a node after a particular node in single linked list.

    b) Reverse display of the list in doubly linked list.

    c) Physically reverse the single linked list.

11. a) What is an adjacency matrix representation of a graph ?   5

    b) Prove that maximum number of nodes on level i of a binary tree is $2^{i-1}, i \geq 1$.   3

    c) What is the difference between recursion and iteration ?

                                                                    2

    d) What will be the complexity for the following operations ?

        Quick sort, Binary search, selection sort.   5