

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 : $10 \times 1 = 10$

- 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.

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[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.

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- x) When an element is inserted in queue, the position of front
- a) increments
 - b) decrements
 - c) unchanged
 - d) none of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

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. $3 \times 15 = 45$

7. Write short notes on any *three* of the following : 3×5
 - a) ADT
 - b) DEQUE
 - c) Threaded binary tree
 - d) Circular queue.

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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 x 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 t of a binary tree is $2^{t-1}, t \geq 1$. 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
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