

Name :

Roll No. :

Invigilator's Signature :

CS/BCA/SEM-3/BCA-302/2013-14

2013

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 :

10 × 1 = 10

i) Which of the following abstract data types can be used
to represent a many to many relation ?

- a) Tree
- b) Plex
- c) Graph
- d) Both (b) and (c).

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- ii) The average search time of hashing, with linear probing will be less if the load factor
- a) is less than one
 - b) equals to one
 - c) is greater than one
 - d) none of these.
- iii) Heap allocation is required for languages
- a) that support recursion
 - b) that support dynamic data structure
 - c) that use dynamic scope rules
 - d) all of these.
- iv) Which of the following need not to be a binary tree ?
- a) Search tree
 - b) Heap
 - c) AVL-tree
 - d) B-tree.
- v) Consider a linked list of n elements with which pointed by an external pointer. What is the time taken to delete the element which is successor of the element pointed to by a given pointer ?
- a) $O(1)$
 - b) $O(\log 2n)$
 - c) $O(n)$
 - d) $O(n \log 2n)$.

- vi) In a linear collection of data element the linear node is given by mean of pointer which is called
- a) Linked list
 - b) Node list
 - c) Primitive list
 - d) none of these.
- vii) Which of the following is a collection of items into which items can be inserted arbitrarily and from which only the smallest item can be removed ?
- a) Descending priority queue
 - b) Ascending priority queue
 - c) Fifo queue
 - d) None of these.
- viii) A search begins the search with the element that is located in the middle of the array.
- a) serial
 - b) random
 - c) parallel
 - d) none of these.
- ix) Which of the following data structures may give overflow 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.

x) The time complexity of linear search algorithm over an array of n elements is

- a) $O(\log 2n)$
- b) $O(n)$
- c) $O(n \log 2n)$
- d) $O(n^2)$.

xi) A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is called

- a) full binary tree
- b) binary search tree
- c) threaded tree
- d) complete binary tree.

xii) Which of the following sorting algorithms does not have a worst case running time of $O(n^2)$?

- a) Insertion sort
- b) Merge sort
- c) Quick sort
- d) Bubble sort.

GROUP - B

(Short Answer Type Questions)

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

2. a) How do AVL trees differ from binary search trees ?
b) Insert the following keys in the order given below to build them into an AVL tree :

8 12 9 11 7 6

Clearly mention different rotations used and balance factor of each node. $2 + 3$

3. Show the stages in growth of 4 order B-tree when the following keys are inserted in the given order :

74 72 19 87 51 10 35 18 39 60 76 58 19 45.

4. Write an algorithm to push an element into a queue.
5. What is hashing ? How is collision problem solved in hashing ? $2 + 3$

6. How many different traversals are possible for a binary tree ? Which ones you need to reconstruct the tree ? $2 + 3$

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What is a linked list ? What are its advantages over arrays ? Also state its disadvantage over array.
- b) Write a C function to delete a node from a given linked list.
- c) What are the advantages of doubly linked list over singly linked list ? $(2 + 2 + 2) + 6 + 3$
8. a) Write a C function to implement 'push' and 'pop' operations in a stack.
- b) What is queue ? How is it different from circular queue ? What advantage do we get from circular queue over ordinary queue ? $(4 + 4) + (2 + 2 + 3)$
9. a) Convert the following infix expression to corresponding postfix expression :
- $4 + 3 * 10 / 6 + 7 - 4 / 2 + 5 ^ 3$
- b) Write a complete C program for insertion sort. $7 + 8$

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10. a) What is binary search tree ?
- b) Construct the binary search tree if the elements are in the order
60, 75, 25, 66, 50, 55, 45, 40, 35, 57, 30.
- c) Delete the following nodes in order and show each step :
- i) Node with 55
 - ii) Node with 66
 - iii) Node with 50.
- d) Consider the following sequence of a binary tree traversals :
- Inorder : *B C E D F A G H*
- Preorder : *A B C D E F G H*
- and reconstruct the tree. $2 + 4 + (2 + 2 + 2) + 3$

11. Write short notes on any *three* of the following : 3×5
- a) Graph and their representation in computer
 - b) Non-linear data structure
 - c) Quick sort
 - d) Breadth first search
 - e) Prim's Algorithm.

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