



Name :

Roll No. :

Invigilator's Signature :

**CS/M.Sc.(Info.Sc.)/SEM-1/MI-102/2012-13
2012**

DATA STRUCTURE WITH C/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) 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.
 - ii) The complexity of linear search algorithm is
 - a) $O(n)$
 - b) $O(\log n)$
 - c) $O(n^2)$
 - d) $O(n \log n)$.
 - iii) Which of the following data structures are not linear data structures ?
 - a) Arrays
 - b) Linked lists
 - c) Both of these
 - d) None of these.



- iv) Binary search algorithm cannot be applied to
- a) sorted linked list b) sorted binary trees
 - c) sorted linear array d) pointer array.
- v) The data structure which allows deletions at both ends of the list but insertion at only one end is
- a) input-restricted deque
 - b) output-restricted deque
 - c) priority queues
 - d) none of these.
- vi) A binary tree whose every node has either zero or two children is called
- a) complete binary tree b) binary search tree
 - c) extended binary tree d) none of these.
- vii) A binary tree can easily be converted into q 2-tree
- a) by replacing each empty sub-tree by a new internal node
 - b) by inserting an internal node for non-empty node
 - c) by inserting an external node for non-empty node
 - d) by replacing each empty sub-tree by a new external node.
- viii) The post order traversal of a binary tree is DEBFCA. Find out the pre-order traversal :
- a) ABFCDE b) ADBFEC
 - c) ABDECF d) ABDCEF.



- ix) The elements of an array are stored successively in memory cells because
- by this way computer can keep track only the address of the first element and the addresses of other elements can be calculated
 - the architecture of computer memory does not allow arrays to store other than serially
 - both of these
 - none of these.
- x) The situation when in a linked list $START = NULL$ is
- underflow
 - overflow
 - houseful
 - saturated.

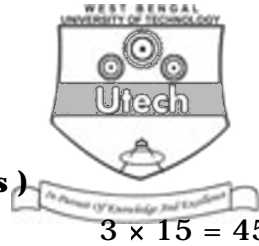
GROUP - B

(Short Answer Type Questions)

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

- What is BST ? Prove that the maximum number of nodes in a binary tree of depth k is $2^k - 1$.
- Compare linked list with array in respect of both advantages and disadvantages.
- What are the rules of deletion in BST ? Explain with examples.
- What is circular queue ? Write insertion algorithm for circular queue.
- Convert the following infix expression to postfix expression using stack.

$$(A + B) * C - (D - E) / (F + G)$$



GROUP – C
(Long Answer Type Questions)

Answer *all* of the following.

$3 \times 15 = 45$

7. Write short notes on any *three* of the following : 3×5
- a) Divide and conquer
 - b) ADT
 - c) Tower of Hanoi
 - d) Merge sort complexity
 - e) De-queue.
8. a) Create a binary tree using following traversal sequences :
- Inorder : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
- Preorder : 7, 1, 0, 3, 2, 5, 4, 6, 9, 8, 10
- b) What is threaded binary tree ?
- c) Delete 12 from the given tree and then draw threaded binary tree. $5 + 2 + 4 + 4$
9. a) How can a polynomial such as $6x^4 - 13x^2 + 7x + 3$ be represented by a linked list ?
- b) Arrange the following unsorted list using quick sort. Elements are : 42, 33, 23, 74, 44, 67, 49.
- c) Explain the complexity of Binary Search Algorithm.

$5 + 7 + 3$

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