



Name :

Roll No. :

Invigilator's Signature :

CS/M.Sc.(IS)/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.

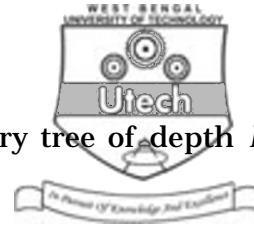
*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

- i) 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) The prefix notation is also know as
 - a) Polish notation
 - b) Reverse Police notation
 - c) Reverse Polish notation
 - d) none of these.
- iii) Complexity of binary search is
 - a) $O(n)$
 - b) $O(\log(n))$
 - c) $O(n \log n)$.
 - d) $O(1)$.



- iv) Number of nodes in a complete binary tree of depth k is
- a) 2^k b) $2k$
c) $2^k - 1$ d) none of these.
- v) In a BST
- a) each node is greater than every node to its left subtree
b) each node is greater than every node to its right subtree
c) each node is less than every node to its left subtree
d) none of these.
- vi) $f(n)$ is of the order of $g(n)$ if there exist positive integer a and b such that
- a) $f(n) \leq a * g(n)$ for all $n \geq b$
b) $f(n) \leq a * g(n)$ for all $n \leq b$
c) $g(n) \leq a * f(n)$ for all $n \geq b$
d) none of these.
- vii) To make a queue empty, elements can be deleted, till
- a) $\text{front} = \text{rear} + 1$ b) $\text{front} = \text{rear} - 1$
c) $\text{front} = \text{rear}$ d) none of these.
- viii) In linked list representation a node contains at least
- a) node address field
b) node number, data field
c) next address field, information field.
d) none of these.



- ix) Using DFS we can transverse a
- a) tree
 - b) graph
 - c) both (a) and (b)
 - d) none of these.
- x) 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.

GROUP - B

(Short Answer Type Questions)

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

2. Convert the following expression into postfix and prefix :

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

$$2 \times 2\frac{1}{2}$$
3. Write algorithm to add two polynomials.
4. What is hashing ? Briefly explain different commonly used hash function.
5. Compare and contrast iteration with recursion.
6. Distinguish between DFS and BFS. Indicate their time complexity. $4 + 1$

GROUP - C

(Long Answer Type Questions)

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

7. Write an algorithm to implement binary search tree. Also write the algorithm to delete an element from a binary search tree. construct an AVL tree with the following elements :

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



8. What is bubble sorting ? Explain with the help of a suitable example. Write down the algorithm of quick sort. Explain the selection sort with suitable example. What is time complexity of quick sort ? (average case & wastage case)
9. What are the differences between stack and queue ? Write down an algorithm for deletion operation in a circular single linked list.

Evaluate the postfix expression :

$623 + - 382 / + * 2 - 3 +$

Convert the following infix to postfix expression using

$(A + (B * C - (D / E - F) * G) * H)$ $2 + 3 + 5 + 5$

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

- a) De-queue
- b) B + tree
- c) In-order pre-order and post-order traversal
- d) Insertion sort
- e) ADT.

=====