Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/BCA/SEM-3/BCA-302/2010-11
2010-11
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 prefix expression for the infix expression

    $a^* (b + c) /e - f$ is

    a) $/ ^* a + bc - ef$ b) $-/ ^* + abc\ ef$

    c) $-/ ^* a + bcef$ d)   none of these.

    ii)   In linked list representation, a node contains at least

    a)   node address field

    b)   node number, data field

    c)   next address field, information field.

    iii)   Number of nods in a complete binary tree of depth k is

    a) 2^k b) $2k$

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

[Turn over

iv) The following sequence of operations is performed on a stack push(1), push (2), pop, push(1), push(2), pop, pop, pop, push(2), pop. The sequence of popped out values is

a) 2, 2, 1, 2, 1

b) 2, 2, 1, 1, 2

c) 2, 1, 2, 2, 1

d) 2, 1, 2, 2, 2.

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) To make a queue empty, elements can be deleted, till

a) front = rear + 1

b) front = rear − 1

c) front = rear

d) none of these.

vii) For any non-empty binary tree T, if n_0 is the no of terminal nodes and n_2 the no of nodes of degree 2, the relation between n_2 & n_0 is

a) $n_2 = n_0 + 1$

b) $n_0 = n_2 + 1$

c) $n_0 = n_2$

d) none of these.

viii) Which of the following is a hash function ?

a) Quadratic probing

b) Chaining

c) Open addressing

d) Folding.

ix) $f(n)$ is of the order of $g(n)$ if there exist positive integers "a" and "b" such that

a) $f(n) <= a * g(n)$ for all $n >= b$

b) $f(n) <= a * g(n)$ for all $n <= b$

c) $g(n) <= a * f(n)$ for all $n >= b$

d) none of these.

x) What is the time complexity if insert an element into stack implemented by linked list ?

a) $O(n)$ b) $O(1)$

c) $O(n^2)$ d) none of these.

GROUP – B

(Short Answer Type Questions)
Answer any *three* of the following. $3 \times 5 = 15$

2. What are the advantages of doubly linked list compared to the singly linked list ?

3. Insert the following keys into a *B* tree of order 3 :

    A, f, b, k, h, m

4. Compare iteration and recession with suitable example.

5. What is double ended queue ? What are the advantages of circular queue over simple queue ?

6. Write down the quicksort algorithm.

GROUP – C

(Long Answer Type Questions)
Answer any *three* of the following. $3 \times 15 = 45$

7. a) What is Stack ? Write the algorithm of PUSH() & POP() operations associated to a Stack.

    b) Write the algorithm to insert a node beginning of the list. $2 + 6 + 7$

8. a) What is hashing ? Why do we need hashing ?

   b) Write down binary search algorithm.

   c) Compare linear search and binary search.

   d) Write down the recursive function of "Tower of Hanoi" problem. $\qquad$ 1 + 1 + 4 + 4 + 5

9. a) Write the structure of a node for linked implementation of a polynomial. Write a function in 'C' to create a linked list for a polynomial.

   b) What do you mean by circular queues ? Give the array implementation of it. Write an algorithm for insertion and deletion of elements from the circular queue. 7 + 8

10. a) Use the bubble sort to put the numbers 3, 2, 4, 1, 5 into increasing order. Illustrate the output returned in each pass clearly. Also write the pseudo algorithm to it.

    b) Modify bubble sort algorithm in more efficient form so that it stops when no interchanges are needed. 8 + 7

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

    a) Tree Traversal Algorithm

    b) Abstract Data Type

    c) Depth First Search Graph Traversal Algorithm

    d) Breadth First Search Graph Traversal Algorithm

    e) Threaded Binary Tree.

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