CS/BCA(H)/Odd/Sem-3rd/BCA-302/2015-16

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BCA-302

DATA STRUCTURE WITH C

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as
practicable. All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1.   Answer any *ten* questions. $10 \times 1 = 10$

   (i)   The most appropriate matching for the following pairs

X. Bubble Sort	1. $O(\log_2 n)$
Y. Linear Search	2. $O(n^2)$
Z. Binary Search	3. $O(n)$

   (A) X-1, Y-2, Z-3   (B) X-3, Y-1, Z-2
   (C) X-3, Y-2, Z-1   (D) X-2, Y-3, Z-1

   (ii) The best data structure to evaluate an arithmetic expression
         (in postfix form) is

   (A) queue   (B) stack
   (C) tree   (D) linked list

3080   1   Turn Over

(iii) The tree traversal technique in which the root is traversed after its children is known as

    (A) post-order traversal   (B) pre-order traversal

    (C) in-order traversal   (D) none of these

(iv) Let "q" be the queue of integers defined as follows

#define MAX 10

struct queue

{ int data[MAX];

  int rear, front;

}q;

To insert an element into the queue, we may write operation

    (A) ++q.data[q.rear]=x;   (B) q.data[q.rear]++=x;

    (C) q.data[++q.rear]=x;   (D) none of these

(v) A linear collection of data elements where the linear node is given by means of pointer is called

    (A) linked list   (B) node list

    (C) tree   (D) none of these

(vi) Adjacency matrix for an undirected graph is

    (A) unit matrix   (B) symmetric matrix

    (C) asymmetric matrix   (D) none of these

(vii) An adjacency matrix representation of a graph cannot contain information of

    (A) Nodes   (B) Edges

    (C) Direction of edges   (D) Parallel edges

(viii) Which of the following data structure 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) stack   (D) none of these

(ix) Number of possible binary tree with 4 node is

(A) 14   (B) 34

(C) 24   (D) none of these

(x) Number of nodes in a complete binary tree of depth k is

(A) 2k   (B) 2^k

(C) $2^k - 1$ (D) none of these

(xi) Time complexity of insertion sort algorithm in the best case is

(A) O(n)   (B) $O(nlog_2 n)$

(C) $O(n^2)$ (D) none of these

(xii) 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 values are

(A) 2,2,1,2,1   (B) 2,2,1,1,2

(C) 2,1,2,2,1   (D) 2,1,2,2,2

(xiii) Which of the following traversal techniques lists the nodes of binary search tree in ascending order?

(A) post-order   (B) in-order

(C) pre-order   (D) none of these

(xiv) The most appropriate matching for the following pairs

X. First In First Out	1. Tree
Y. Depth First Search	2. Queue
Z. In-order Traversal	3. Graph

(A) X-1, Y-2, Z-3   (B) X-3, Y-1, Z-2

(C) X-3, Y-2, Z-1   (D) X-2, Y-3, Z-1

(xv) "p" is a pointer to a structure. A member "x" of that structure is referenced by

(A) (*p).x   (B) p -> x

(C) *(p.x)   (D) none of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2. What do you mean by 'Abstract Data Type'? Explain with an example.   3+2

3. What are the advantages of linked list over array?   5

4. What is a circular queue? What are its advantages?   2+3

5. How a binary tree is different from binary search tree?   5

6. Write an algorithm/C-function for preorder traversal of a binary tree.   5

7.   How is binary search more beneficial than linear search?   5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.   3×15 = 45

8. (a) Write an algorithm for conversion of an infix arithmetic   6
        expression in its corresponding postfix form.

    (b) What is Stack? Explain various operations performed using   6
        stack with examples.

    (c) What is recursion? How does it differ from iteration?   3

9. (a) Convert the following infix expression to corresponding   7
        postfix expression :
        (A+B)/C*E+F$G–H/(I*J)

    (b) Write a program to implement queue using linked list.   8

10. (a) Write a function to return the maximum number in a linked   5+7+3
        list.

    (b) Write and explain an algorithm to add a node to a doubly
        linked list.

    (c) Consider the following sequence of binary tree traversals:
            Inorder : Q, B, K, C, F, A, G, P, E, D, H, R
            Preorder : G, B, Q, A, C, K, F, P, D, E, R, H
        Hence, construct the binary tree.

11. (a) Define the following terminologies   4
        (1) Node (2) Root (3) Siblings (4) level (5) leaf node.

    (b) Write a recursive algorithm for Preorder and Postorder   8
        traversals of a binary tree.

    (c) What is graph? Explain different types of graph.   3

12. (a) Write and explain an algorithm to search a list of numbers using binary search method.   6

(b) Show the bubble sort steps for the following numbers.   6
25 10 72 18 40 11 32 9

(c) What is a circular queue? How it differs from linear queue?   3

14.   Write short notes (any *three*) :   5×3

(a) Sparse matrix

(b) Hashing

(c) Circular list

(d) B-tree

(e) Quick sort