Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BCA/SEM-3/BCA-302/2012-13

2012

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 from the following : $10 \times 1 = 10$

   i) The memory address of the first element of an array is called
      a) floor address b) foundation address
      c) first address d) base address.

   ii) The memory address of fifth element of an array can be calculated by the formula
      a) LOC (Array [5] = Base (Array) + *w* (5 -lower bound), where *w* is the number of words per memory cell for the array.
      b) LOC (Array [5]) = Base (Array [5]) + (5-lower bound), where *w* is the number of words per memory cell for the array
      c) LOC (Array [5]) = Base (Array [4]) + (5-Upper bound), where *w* is the number of words per memory cell for the array
      d) None of these.

iii) Which of the following data structures are indexed structures ?

a) Linear arrays b) Linked lists

c) Both of above d) None of these.

iv) Which of the following is not a limitation of binary search algorithm ?

a) Must use a sorted array

b) Requirement of sorted array is expensive when a lot of insertion and deletions are needed

c) There must be a mechanism to access middle element directly

d) Binary search algorithm is not efficient when the data elements are more than 1000.

v) A variable *P* is called pointer if

a) *P* contains the address of an element in DATA

b) *P* points to the address of first element in DATA

c) *P* can store only memory addresses

d) *P* contain the DATA and the address of DATA.

vi) Which of the following data structure can't store the non-homogeneous data elements ?

a) Arrays b) Records

c) Pointers d) None of these.

vii) Which of the following statement is false ?

a) Arrays are dense lists and static data structure

b) Data elements in linked list need not be stored in adjacent space in memory

c) Pointers store the next data element of a list

d) Linked lists are collection of the nodes that contain information part and next pointer.

viii) The situation when in a linked list START = NULL is

a) Underflow b) Overflow

c) Saturated d) None of these.

ix) Which of the following is two way lists ?

a) Grounded header list

b) Circular header list

c) Linked list with header and trailer nodes

d) None of these.

x) When Inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return

a) FAEKCDBHG b) FAEKCDHGB

c) EAFKHDCBG d) FEAKDCHBG.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is Quicksort ? Explain with an example.
3. What are the advantages of linked list over array ? What are the disadvantages over array ?
4. Write a non recursive function to traverse a binary tree using inorder traversal.
5. What is B-tree ? What is the difference between a B-tree and a B+tree.
6. What is Dequeue ? What is the advantage of Dequeue over Circular queue ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Convert the following infix expression to corresponding postfix expression :

A + (B* C – (D/E$F)*G)*H. 7

b) Write a complete C program / algorithm for insertion sort. 8

8. a) Write algorithm of Push ( ) and Pop ( ) operation in STACK. 6
   b) What are the advantages of linked list over array ? 4
   c) What are the differences between normal queue and circular queue ? Mention the algorithm of factorial of any number by recursive method. 2 + 3
9. a) What is Extended Binary Tree ? 2
   b) Construct the Binary Search tree if the elements are in the order :
   60, 70, 30, 20, 55, 90, 95, 80, 55, 35, 45, 40, 50 4
   c) Insert the following nodes in order and show each step : 4
      i) Node with 25
      ii) Node with 65
   d) Consider the following sequence of a binary tree traversal :
   Inorder : $a + b - c * d - e / f + g - h$
   Postorder : $a\ b\ c - + de\ - fg + h\ - / *$ 5
10. a) Develop algorithm to add two polynomials in one variable. You must check polynomials containing a minimum of four terms. 7
   b) What are the overflow and underflow condition ? 3
   c) Write an algorithm of insert an item as the first node in the linked list. 5
11. a) what are the differences between general tree and a binary tree ? 3
   b) What is threaded trees ? What are the applications of binary search trees ? 2 + 2
   c) Construct an AVL tree for the following list of numbers :
   10, 5, 8, 12, 18, 22, 1, 4, 6, 30 8
   Show the all steps.