Registration No. :

Total number of printed pages – 3

Second Semester Examination – 2013

DATA STRUCTURE USING 'C'

QUESTION CODE : A 433

Full Marks – 70

Time : 3 Hours

Answer Question No. **1** *which is compulsory and any* **five** *from the rest.*
*The figures in the right-hand margin indicate marks.*

1. Answer the following questions :   2 ×10

    (a) If the base address of a two dimensional array is 1000H, find the address
        of the following elements:

        (i)   (3,4)th element of the array assuming the array is storing integer type
              data in row major order.

        (ii) (2,5)th element of the array assuming the array is storing floating point
              type data in column major order.

    (b) Define a sparse matrix. What is the best way to represent a sparse matrix ?

    (c) Write the advantage of circular list over single linked list. Mention its
        applications.

    (d) Convert the following infix expression to its equivalent postfix expression

        $A*B/C \wedge 4*(D*(E + 5) \wedge 2)$

    (e) The inorder traversal of a binary tree produced sequence DBEAFC and the
        postorder traversal of the same binary tree produced the sequence DEBFCA.
        Find the sequence corresponding to the preorder traversal of this binary tree.

    (f) Construct the binary tree from the following expression :

        $E = a*b – c/d + f$

                                                                                    P.T.O.

(g) Define an AVL tree. Compare the searching operation in binary search tree and AVL tree.

(h) If d_i is the degree of vertex i in a graph with n vertices and e edges, then find the number of edges of that graph.

(i) What is topological sorting ? Give an example of it.

(j) Define collision. Name a collision resolution technique.

2. (a) Define a circular queue. Implement the insertion operation of a circular queue using C.   5

    (b) Write a function in C for inserting a new node into a double linked list.   5

3. (a) Represent a stack using linked list. Write algorithm for insertion and deletion operation for this stack.   5

    (b) Mention the best way to represent a single linked list in C ? Write an algorithm to delete a particular item from this list.   5

4. (a) How can you represent a node of a binary tree in C ? Write a C program for creating a binary tree.   5

    (b) Define a binary search tree. Construct a binary search tree from the following set of input data   5

         10, 5, 25, 8, 29, 3, 30

5. (a) Mention the relative advantages of a B⁺ tree over other search trees. Write an algorithm to insert a new element into an existing B⁺ tree.   5

    (b) Give a stepwise illustration to delete a node from an existing AVL tree.   5

6. (a) Outline the important steps of Quick sort by taking a suitable example. Mention its running time.   5

    (b) Mention the different ways to traverse a graph. How can you represent a graph ? Write an algorithm to traverse a graph.   5

7. (a) For the following graph, find its path matrix using Warshall's algorithm. 5
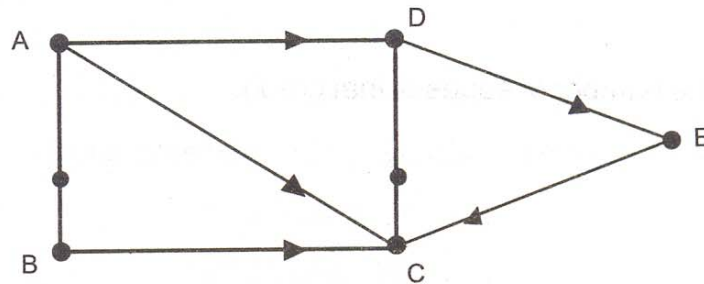
(b) Define Hashing. Mention the criteria to select a hash function. Explain the different hash function to generate hash key. 5

8. Write short notes on any **two** from the followings : 5×2

(a) Garbage collection

(b) Insertion sort

(c) Operations on polynomials.

———