USN | | | | | | | | | | 10CS35

Third Semester B.E. Degree Examination, June/July 2014
Data Structures with C

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1   a. What is pointer? How pointers are declared and initialized in C?   (03 Marks)
    b. What is dangling pointer reference and how to avoid it?   (04 Marks)
    c. Estimate the space complexity of a recursive function for summing a list of numbers.
                                                                                          (05 Marks)
    d. Define the term "space and time complexity". Apply program step counter method to estimate the time complexity of a function to add two matrices.   (08 Marks)

2   a. With a suitable example, explain dynamic memory allocation for 2-d arrays.   (04 Marks)
    b. Define a structure for the employee with the following fields :
        Emp_Id(integer), Emp_Name(string), Emp_Basic(float), Emp_Dept(string) and Emp_Age(integer). Write the following functions to process the employee data :
        i) Function to read an employee record
        ii) Function to print an employee record.   (08 Marks)
    c. Write the "fast transpose" algorithm of a sparse matrix. Why the name "fast transpose"?
                                                                                          (08 Marks)

3   a. What is the advantage of circular queue over linear queue? Write the insert and delete functions for circular implementation of queues.   (08 Marks)
    b. Explain infix to postfix expression algorithm and trace it for an expression "a * (b + c) * d".
                                                                                          (08 Marks)
    c. How multiple stacks implemented using one dimensional array? Explain with a suitable example.   (04 Marks)

4   a. Write the following functions for singly linked list :
        i) Reverse the list   ii) Concatenate two lists.   (08 Marks)
    b. Write the node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked lists.   (08 Marks)
    c. What is the advantage of doubly linked list over singly linked list? Illustrate with an example.   (04 Marks)

PART – B

5   a. Illustrate with a suitable example define :
        i)   Binary tree
        ii) Degree of a binary tree
        iii) Level of a binary tree
        iv) Sibling.   (08 Marks)
    b. For any nonempty binary tree, T, if n_0 is the number of leaf nodes and n_2 the number of nodes of degree 2, then prove that $n_0 = n_2 + 1$.   (04 Marks)
    c. What is the advantage of threaded binary tree over binary tree? Explain threaded binary tree construction with a suitable example.   (08 Marks)

6   a.   What is binary search tree? Write a recursive search routine for a binary search tree.
                                                                                (08 Marks)

     b.   Explain selection trees, with suitable example.   **(06 Marks)**

     c.   What is a forest? With a suitable example illustrate how you transform a forest into a binary tree.   **(06 Marks)**

7   a.   Define priority queue. List the single – ended and double-ended priority queue operations.
                                                                                (06 Marks)

     b.   Define the following :
           i)   Leftist trees
           ii) Min leftist trees and
           iii) Weighted leftist trees.   **(06 Marks)**

     c.   What is binomial heap? Explain the following associated with binomial heap :
           i)   Insertion into a binomial heap
           ii) Melding two binomial heaps and
           iii) Deletion of min element.   **(08 Marks)**

8   Write short notes on :
     a.   Optimal binary search trees
     b.   AVL trees
     c.   Red – black trees
     d.   Splay trees.   **(20 Marks)**

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