Second Semester MCA Degree Examination, June/July 2015
Data Structures using C

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a. What is an abstract data type? Write the ADT for an array.   **(06 Marks)**
    b. What are the different data types in C? Explain with examples.   **(07 Marks)**
    c. What is a string? What are the different character string operations in C? Discuss.   **(07 Marks)**

2   a. Define stack. Explain the implementation of push and pop operations (using structure). Give atleast one major application of stack.   **(07 Marks)**
    b. Convert the following infix expression to postfix expression through tracing and evaluate:
$5 + (3 * 2) / (2 - 1)$.   **(07 Marks)**
    c. Write a 'C' program to evaluate the postfix expression.   **(06 Marks)**

3   a. What is recursion? Demonstrate recursion by solving tower of Hanoi problem using C.   **(10 Marks)**
    b. What is a queue? Represent a queue as an ADT.   **(06 Marks)**
    c. Briefly explain queue as a circular list.   **(04 Marks)**

4   a. What is a linked test? What is a doubly linked list? Bring out the advantages of doubly linked list over singly linked list.   **(04 Marks)**
    b. Simulate the working of a linked list providing insert at any given position, insertion before an element and display the updated list.   **(10 Marks)**
    c. Discuss array implementation of lists and its limitations.   **(06 Marks)**

5   a. Write the function to perform bubble sort and trace the same for the input values:
25 57 48 37 12 92 86 33.   **(10 Marks)**
    b. Which are the different sorting algorithms? Discuss.   **(10 Marks)**

6   a. Write a 'C' program to traverse a tree in inorder, preorder and postorder.   **(10 Marks)**
    b. Explain binary search and write a program for searching an element in a given list of integers using binary search.   **(10 Marks)**

7   a. Define: Binary tree, strictly binary tree, level of a node, depth of a tree, complete binary tree.   **(05 Marks)**
    b. Give the binary tree representation of the expression:
$A + (B - C) * D\$ (E * F)$ and $((A + B * C) \$ (A + B) * C)$.   **(05 Marks)**
    c. What are balanced trees? Explain insertion into AVL trees.   **(10 Marks)**

8   Write short notes on:
    a. Information and meaning
    b. Implementing recursive functions
    c. Getnode and freenode operations in lists
    d. Threaded binary tree.   **(20 Marks)**

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