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Third Semester B.E. Degree Examination, December 2010
Data Structures with C

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. What is a pointer? How do you declare and initialize the pointers? How do you access the value pointed to by a pointer? **(05 Marks)**

 b. What is static and dynamic memory allocation? Explain with examples, the dynamic memory allocation functions. **(10 Marks)**

 c. What is the output of the following code?
```
int num[5] = { 3, 4, 6, 2, 1 };
int *p = num;
int *q = num + 2;
int *r = &num[1];
Printf("%d %d", num[2], *(num + 2));
Printf("%d %d", *p, *(p + 1));
Printf("%d %d", *q, *(q + 1));
Printf("%d %d", *r, *(r + 1));
```
(05 Marks)

2 a. Explain the following string functions, with examples:
 i) STRTOK ii) STRCMP iii) STRTOL iv) STRSTR **(12 Marks)**

 b. Write a C program to represent a complex number, using structure and multiply 2 complex numbers. **(08 Marks)**

3 a. Define stack. List the operations on stack. Write the C implementation of these operations. **(12 Marks)**

 b. Implement reversing a string, using a stack in C. **(08 Marks)**

4 a. Write an algorithm for evaluating a valid postfix expression. Trace the same on
   1 2 3 + * 3 2 1 – + * **(10 Marks)**

 b. What is the advantage of circular queue over linear queue? Write C routines for inserting and deleting an element from the circular queue. **(10 Marks)**

PART – B

5 a. What is recursion? Write recursion function for finding maximum of n numbers. **(08 Marks)**

 b. Briefly explain the structures of different types of linked lists. Write a C function to count number of elements present in a singly linked list. **(12 Marks)**

6 a. How can an ordinary queue be represented, using a singly linked list? Write C functions for linked implementation of ordinary queue insertion and deletion. **(10 Marks)**

b. Write a C program to perform the following operations on doubly linked list:
   i) Insert a node
   ii) Delete a node. **(10 Marks)**

7 a. What are binary trees? Mention different types of binary trees and explain briefly. **(06 Marks)**

b. Write C functions for the following tree traversals:
   i) Inorder
   ii) Preorder
   iii) Postorder. **(06 Marks)**

c. Write an algorithm to construct a binary tree for the inputs
   14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5
   indicating a message for duplicate members. Draw the tree constructed by the above program. **(08 Marks)**

8 Write short notes on:
a. Unions
b. Circular lists
c. Threaded binary tree
d. Types of files. **(20 Marks)**

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