

USN

--	--	--	--	--	--	--	--	--	--

10MCA23

Second Semester MCA Degree Examination, December 2012
Data Structures Using C

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1.
 - a. Write and explain the ADT for a natural number. (10 Marks)
 - b. What is dynamic memory allocation? Mention the characteristics and the functions that are supports dynamic memory allocation. (10 Marks)

2.
 - a. What is a structure? How does it differ from an array? Bring out the differences between a structure and a union. (10 Marks)
 - b. Show the output for the following block:


```
main( )
{
    int val [6] = {8, 9, 1, 2, 3, 4};
    int * l = val;
    int * m = val + 2;
    int * n = & val[1];
    printf("\n %d %d", val[2], * (val + 2));
    printf("\n %d %d", *l, * (l + 1));
    printf("\n %d %d", *m, * (m + 1));
    printf("\n %d %d", *n, *(n - 1));
}
```

 (04 Marks)
 - c. Write a function transpose() to transpose a sparse matrix. (06 Marks)

3.
 - a. What is a queue? List and implement the basic operations in a queue using C. (06 Marks)
 - b. Write an algorithm to evaluate postfix expression. Trace the stack contents for the expression $A + B * C$ translated into postfix expression. (10 Marks)
 - c. Bring out the differences between a stack and a queue. (04 Marks)

4.
 - a. What are linked lists? Write the functions to add and delete an element from the list. Also pictorially represent the insertion and deletion of an element from the front end of the list. (12 Marks)
 - b. Bring out the differences between a singly linked list and doubly linked list. (08 Marks)

5.
 - a. Explain the following: i) Tree; ii) Binary tree; iii) Winner tree; iv) Forests. (12 Marks)
 - b. Write a program to find an element using binary search. (08 Marks)

6.
 - a. Construct a binary tree for: $(8 + (4 - 3) * 7) \wedge 2 + 9$. (06 Marks)
 - b. Write the ADT for graph. (08 Marks)
 - c. Explain single and double ended priority queue. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8 = 50$, will be treated as malpractice.

- 7 a. Explain AVL trees with an example. (08 Marks)
 b. Pictorially represent the development of height – balanced binary search tree with insertions made in the following order: 3, 5, 11, 8, 4, 1, 12, 7. (12 Marks)
- 8 a. For the graph below, write in order, preorder and post order traversal. Also mention the traversal route for each. (06 Marks)

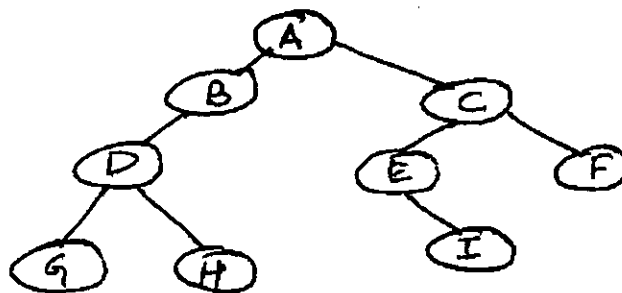


Fig.Q.8(a)

- b. Write a recursive program to solve tower of Hanoi problem. (10 Marks)
 c. Briefly describe any four applications of trees. (04 Marks)
