Roll No. .....

National Institute of Technology, Delhi

Name of the Examination: **B. Tech**

Branch : CSE / ECE / EEE Semester: II

Title of the Course : Data Structures Course Code : CSB102

Time : 2 Hours Maximum Marks : 25

Note: Attempt all Questions. Answer each question according to the weightage of marks.

1. What is asymptotic analysis? Explain the following asymptotic notations in brief.
   i) Big-Oh notations ii) Theta notations iii) Omega notations (2.5 M)
2. Write a C program to find out the duplicate elements in array and print the respective index/position of those elements.
   (2M)
3. Each element of an array DATA [30][50] requires 4 bytes of storage. Base address is 1000. Determine the location of DATA[15][35] when the array is stored as (a) row major and (b) column major. Assume that the array index starts from 0. (3 M)
4. Write an algorithm for converting infix expression to postfix expression. (4 M)
5. The following C function takes a singly linked list of integers as a parameter and rearranges the elements of the list. The list is represented as pointer to structure. The function is called with the list containing integers 1, 2, 3, 4, 5, 6, 7 in the given order. What will be the contents of the list after the function completes? (2.5 M)

```
struct node {int value; struct node *next;};
void rearrange(struct node *list)
{
        struct node *p, *q; int temp;
        if(!list || !list → next) return;
        p = list; q = list → next;
        while(q)
                {
                        temp = p → value; p → value = q → value;
                        q → value = temp; p = q → next;
                        q = p? p → next : 0;
                }
}
```

6. What is a circular Queue? Write the algorithms for the insertion and deletion operations on the circular queues. (1+1.5+1.5M)
7. Write an algorithm for the recursive call of Towers of Hanoi problem. (3M)
8. Write an algorithm to insert a node in the doubly linked list at n^{th} position. (4M)