UVA WELLASSA UNIVERSITY

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

END SEMESTER EXAMINATION – SEMESTER I – 2007/2008

CST 202-3 – DATA STRUCTURES AND ALGORITHMS - PART B

Time Allowed: **1 HOUR**

Number of questions: Two (02)
Number of pages: Two (02)

Instructions:

Answer **all** questions.

Clearly state any assumptions made.

Q1: A librarian wants a software package to maintain Title, Author, ISBN, Publisher and Date of all the books available in the library. The software should keep the above information in the computer memory to provide quick response to queries.

a) Suggest a suitable data structure to keep the above information in the computer memory. Justify your answer. (4 marks)

b) Define a "structure" (use struct keyword available in C programming language) to keep the above information of a book. (4 marks)

c) Discuss the necessary operations required for the above application and define C function prototypes for them. (7 marks)

d) Write algorithms to describe the functionality of operations identified in the section c). (10 marks)

Q2: Any basic sorting algorithm which uses comparison of elements involves a number of inversions to be made to the given array to sort it. The Pseudo Code for such a sorting algorithm is given below:

```
void Sort(int A[],int N)
{   int pos,i;
    int temp;
    for(pos=1; pos < n; pos++>
    {
        temp=A[pos];
        for(j=pos;j>0;j--)
        {
            if(A[j-1] > temp)
            {
                A[j]=A[j-1];
            }
            else
            {
                break;
            }
            A[j]=temp;
        }
    }
}
```

a) What is the running time of the above algorithm if all the elements in the array are equal? (10 Marks)

b) Modify the above Sorting algorithm to check whether an array is sorted or not? Give also the complexity analysis (15 marks)