IT 101 : Problem Solving and Computer Programming

Answer ANY TWO questions out of THREE
Each question carries 7.5 marks

Note: If you answer more than two, ONLY THE FIRST TWO in sequence will be evaluated.

Q1:

It is desired to count the number of '0' bits and the number of '1' bits in the binary equivalent of a given integer of data type *int*. For example, if the given integer is 17 and the machine assigns one byte for data type *int,* we say that there are SIX '0' bits and TWO '1' bits because $17_{10} = 00010001_2$. Note that the size of *int* varies from processor to processor.

Write a single C program to perform the following tasks in sequence:

- Read an integer of data type *int* through the keyboard and determine the number of bytes assigned to the data type.
- Display the integer read and the number of bytes assigned to *int*
- Count the number of '0' bits and '1' bits using "for" loop statement
- Display the results with appropriate messages.

Q2:

The following data concerning the marks obtained by five students in different exams is stored in a file called "marks.txt", which is already stored in the directory /iiitv/IT101 in the D drive of a computer.

Student Id	Quiz1	Quiz2	Midterm	Final
2001	18	12	22	20
2002	21	24	10	19
2003	9	15	17	11
2004	25	22	21	24
2005	8	2	12	15

Write a C program to read the above data into a 2D array using file processing commands. The program should determine the smallest and largest number in each column (except the Student Id column) and print the results in an appropriate form with proper headings.

Write a C program to print the following triangular pattern of size N, where N is the number of rows. The pattern obtained for N = 6 is as shown below.

```
1
1    1
1    2    1
1    3    3    1
1    4    6    4    1
1    5    10   10   5    1
```

Each element in the 1st and 2nd rows is fixed as 1. The elements of the "third row and downward" are calculated as the sum of the element directly above it and the element to the left of the element directly above it.
For example:
    In the 5th row 2nd element is : 4 = 3 (element directly above) + 1(left of the element directly above)
    In the 5th row 3rd element is : 6 = 3 (element directly above) + 3(left of the element directly above)

Solve this problem using a two-dimensional (2D) array named "**pattern[row][col]**".

The program should perform the following tasks:
- Read the size N of 2D array through the keyboard
- Calculate the individual elements of the array based on the above mentioned logic.
- Display the elements in each row of the array in an appropriate form

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