CS1303: Introduction to Programming
Assignment 12:
Bitwise Operators

Submission Deadline:
Thursday, 21st November 2019, 9:00 PM

Problem Statement:

Hamming distance for a pair of numbers is defined as the number of corresponding bit positions where the two numbers are different in their equivalent binary representation. Let us denote the Hamming distance function for two numbers A, B as H(A,B).

For example,
H(2,7) = H(010,111)
= 2

In the above example, note that the 1st and the 3rd bit differs. Hence, the Hamming distance turns out to be 2.

You have to develop a function that takes two decimal numbers as parameters and return the Hamming distance between them. The above problem has to be solved with the help of bitwise operators. You have to consider the numbers in their binary representation and then use appropriate operators to detect the differing bit positions in every pair.

Notes:

1) Each input should be positive and less than 1024.
2) You may need to pad necessary number of 0s in the MSB region of the smaller number, if the binary representation is of unequal length.

Sample Test Cases:

1) Input: Enter two numbers : 9 15

   Output: The Hamming distance is 2

2) Input: Enter two numbers : 35 18

   Output: The Hamming distance is 3

Submission Details:

Please submit the following information:

- **Source Code:** Your source program. The name of your file should be in this format: **Bitwise-roll no.c** where you replace "roll no" with your roll number.

- **Readme.txt:** In this file, you should explain how to compile and run your program. The name of your file should be in this format: **Bitwise-Readme-roll no.txt** where you replace "roll no" with your roll number.

- **Design.txt:** In this file, you explain the design of your program (control flow of your program). Your objective should be such that the TA reading this file should easily understand the working of your program. Please add details about how you have handled corner cases - i.e. for what inputs you have printed "Error". The name of your file should be in this format: **Bitwise-Design-roll no.txt** where you replace "roll no" with your roll number.

Zip all these files and name it as **Bitwise-roll no.zip**. **Please follow the naming convention strictly. Otherwise, your program will not be evaluated.** Then, submit it on google classroom for this assignment by the above-mentioned deadline.

Plagiarism policy: If we find a case of plagiarism in your assignment (i.e. copying of code from each other, in part or whole), you will be awarded **zero marks**. **Note** that we will not distinguish between a person who has copied, or has allowed his/her code to be copied; both will be equally awarded **zero** marks for the submission. Follow the link below for more information about plagiarism policy: **https://cse.iith.ac.in/academics/plagiarism-policy.html**

Evaluation Policy:

The TAs will use the following evaluation policy:

- Design: 30%
- Execution: 60%

- Indentation and Documentation (with comments): 10%

Late Submission Penalty:
For each day after the deadline, your submission will be penalized by 10 marks.

Please Note: You are free to take any design decision you think is appropriate for solving any problem in the assignment. The assumptions should be **reasonable** and clearly stated in the "**design.txt**" file that you are supposed to upload. Please refrain from commenting on Google classroom asking for clarifications on such issues. Do not expect any reply to questions asking if it is okay to use scanf/gets, and other similar kind of trivial enquiry. Other reasonable doubts can be clarified at the **lab session** or mailed directly to your allocated TA, so that your query is resolved at the earliest.