Lab Sheet- 4

DIVISION OF TWO UNSIGNED INTEGER BINARY NUMBERS

Objective:
To implement restoring division algorithm in digital computer.

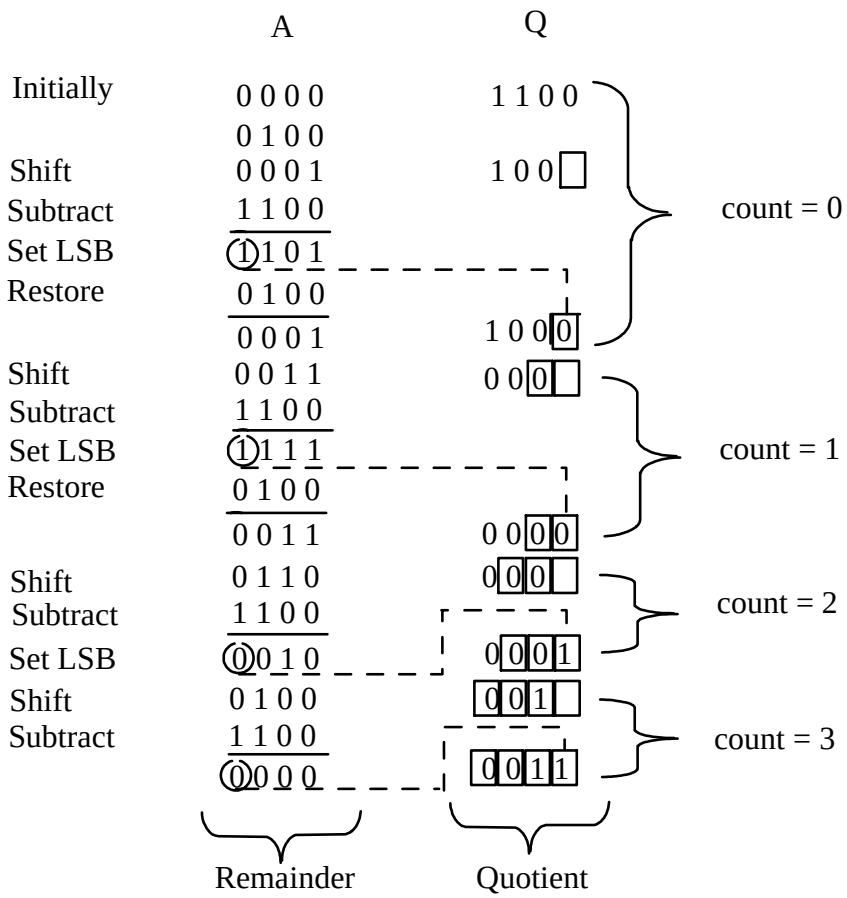
When the division is implemented in a digital computer, restoring and non- restoring algorithms are frequently used. In this lab session we are dealing with first. Here division process requires controlled subtract-restore operations. Whether the next operation is a subtraction or restoration, is controlled by the result of the current operation. Consider two binary numbers A and B. A is the dividend, B the divisor and Q = A / B the quotient. We assume that A>B and B! =0. The flow chart of the algorithm used, is given in figure 4.1.

Let us take examples:

1)

Dividend (Register - A) = 12 Equivalent binary representation is 1100 and
divisor (Register - B) = 4 Equivalent binary representation is 0100.

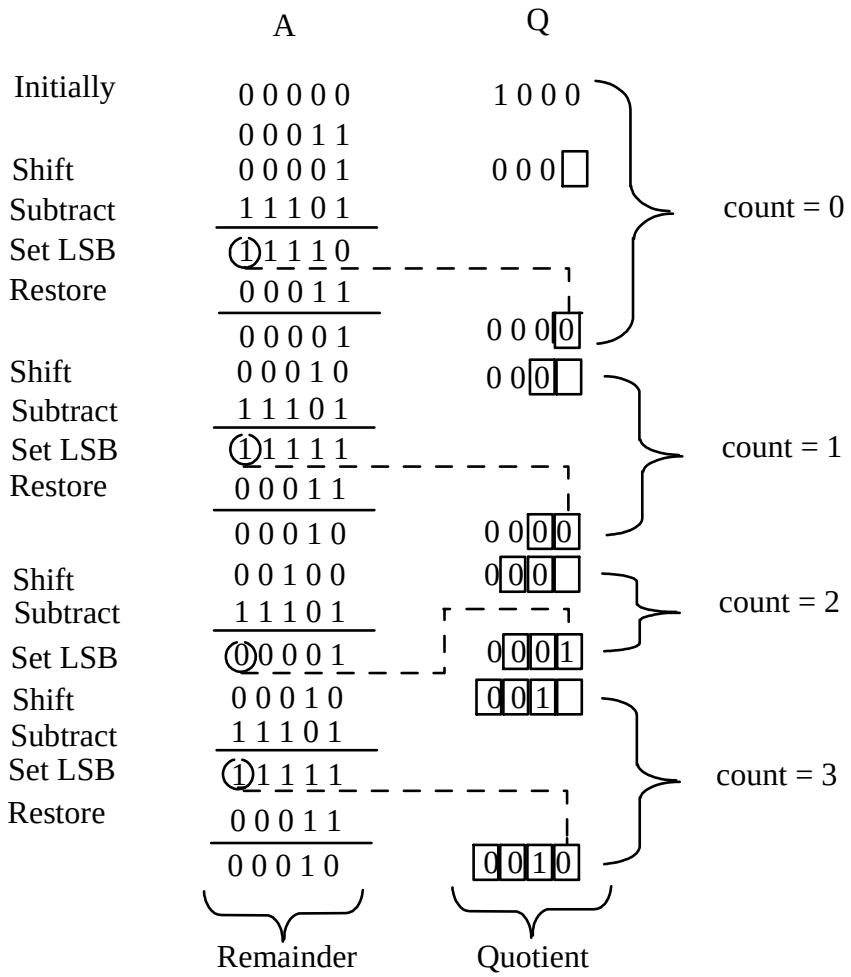
Subtraction may be achieved by adding 2's complement of B as we have done in lab 3 and here it is 1100. Double length dividend is stored in registers AQ.



2)

Dividend (Register - A) = 8 Equivalent binary representation is 1000 and
divisor (Register - B) = 3 Equivalent binary representation is 00011.

Subtraction may be achieved by adding 2's complement of B as we have done in lab 3 and here it is 11101. Dividend is stored in registers AQ.



Let the number of bits stored in register Q is n Registers AQ is now shifted to the left with zero insertion into Q_{LSB} . Initialize the counter to zero value. And divisor is subtracted by adding 2's complement value. If A_{MSB} =1,set Q_{LSB} with value 0 and then increment the counter value by 1.The value of B is added to restore the partial remainder in A to its previous value. The partial remainder is shifted to the left and process is repeated until count = n-1 i.e. all quotient bits are formed. While the partial remainder is shifted left, the quotient bits are also shifted. Finally Quotient is in Q and the final remainder is in A.

The flow chart for restoring division is shown below.

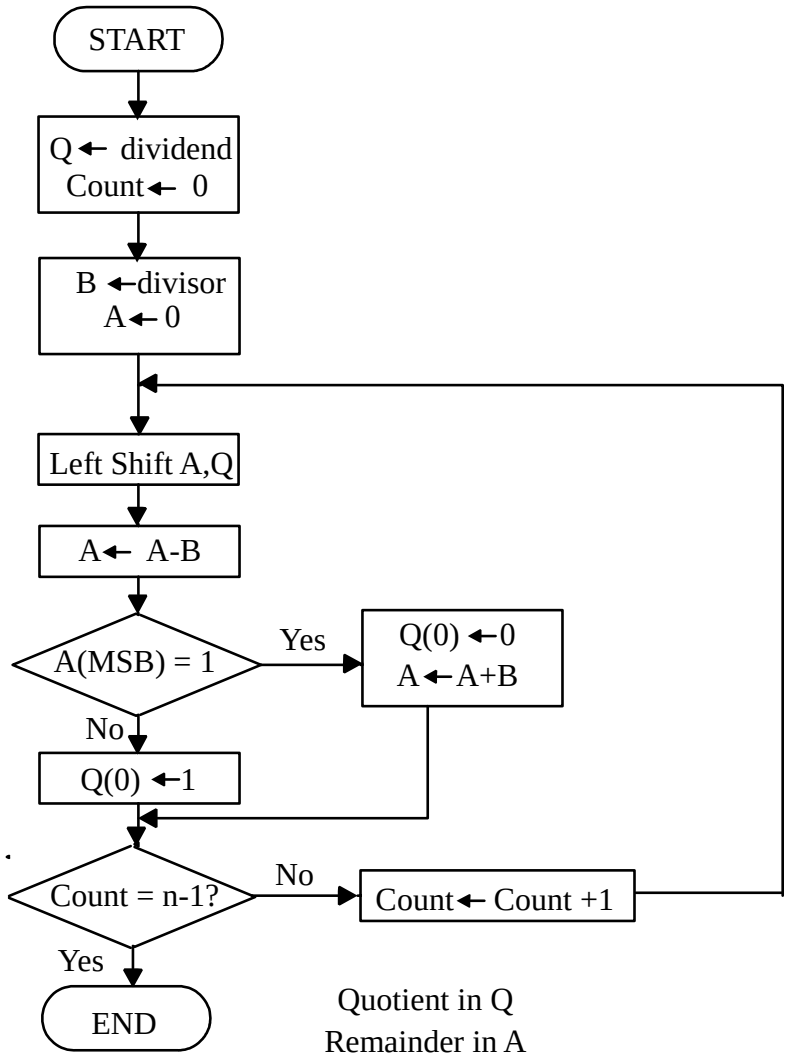


Figure 4.1