Subtraction by 2's complement

Subtraction of two binary numbers can be performed by 2's complement method. The operation is carried by means of the following steps:

i) At first, 2's complement of the subtrahend is found.

ii) Then it is added to the minuend.

iii) If the final carryover of the sum is 1, it is dropped and the result is positive.

iv) If there is no carryover, the 2's complement of the sum will be the result and it is negative.

The following example will make the procedure clear:

Ex - 110110 − 10110

Solution: The number of bits in the subtrahend is 5 while that of minuend is 6. We make the number of bits in the subtrahend equal to that of minuend by taking a '0' in the sixth place of the subtrahend.

Now, 2's complement of 010110 is (101001+1) i.e. 101010. Adding this with

the minuend, we have

	1 1 0 1 1 0	Minuend
	1 0 1 0 1 0	2's complement of subtrahend
carry over [1]	1 0 0 0 0 0	Result of addition

After dropping the carry over we get the result of subtraction to be 100000.

Subtraction by 1's complement

The subtraction of 2 binary numbers can be carried by 1's complement. The steps to be followed in this case are:

i) To write down 1's complement of the subtrahend.

ii) To add this with the minuend.

iii) If the result of addition has a carry over then it is dropped and an 1 is added in the last bit.

iv) If there is no carry over, then 1's complement of the result of addition is obtained to get the final result and it is negative.

Ex: 110101 - 100101

Solution: 1's complement of 100101 is 011010. Hence

Minuend	–	1 1 0 1 0 1
1's complement	=	0 1 1 0 1 0
Carry over	–	[1] 0 0 1 1 1 1
		1
		0 1 0 0 0 0

The required difference is 10000.

Assignment

1) Evaluate using 2's complement:

a) 10110 – 11010

b) 1010.11 – 1001.01

c) 10100.01 – 11011.10

2) Evaluate using 1's complement:

a) 101011 – 111001

b) 1011.001 – 110.10

c) 10110.01 – 11010.10