# Logical Design Lecture 5

## 1's complement and 2's complement

Binary Number System is one the type of most popular Number Representation techniques that used in digital systems. In the Binary System, there are only two symbols or possible digit values, i.e., 0 (off) and 1 (on).

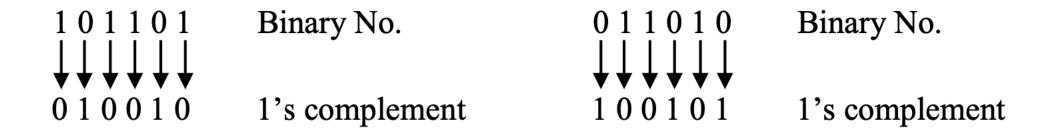
Generally, there are two types of complement of Binary number: 1's complement and 2's complement. To get 1's complement of a binary number, simply invert the given number.

For example, 1's complement of binary number 110010 is 001101.

To get 2's complement of binary number is 1's complement of given number plus 1 to the least significant bit (LSB). For example, 2's complement of binary number 10010 is (01101) + 1 = 01110.

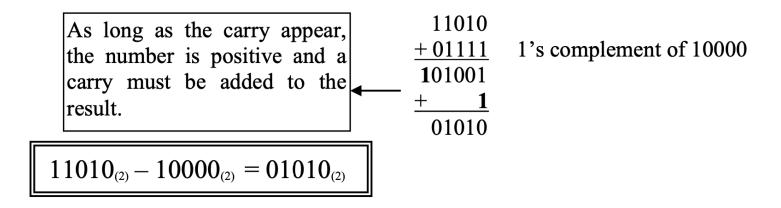
# 1's Complementation in Signed Binary number Representation:

1's complement: the 1's complement form of any binary number is obtained simply by changing each 0 in the number to a 1 and each 1 to a 0. In other word, change each bit to its complement. For example:

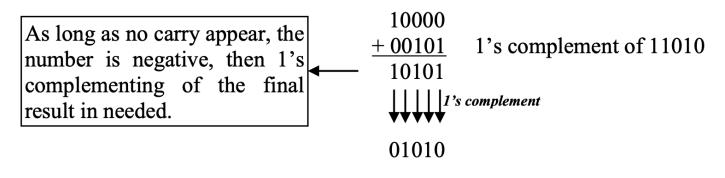


#### 1's Complementation Examples

**Example:** find  $11010_{(2)} - 10000_{(2)}$  using 1's complement method (Case 1).



**Example:** find  $10000_{(2)} - 11010_{(2)}$  using 1's complement method (Case 2).



$$10000_{\scriptscriptstyle (2)} - 11010_{\scriptscriptstyle (2)} = -01010_{\scriptscriptstyle (2)}$$

## 2's Complement

2's complement: the 2's complement form of a binary number is formed simply by taking the 1's complement of the number and adding 1 to the least significant bit position.

2's complement = (1's complement) +1

#### 2's Complement Example

**Example:** find 2's complement of 10110010.

