**Complements :**

 Complements are used in digital computer for simplifying the subtraction operation and for logical manipulation . There are two types of complement for each base (R) system :

1-The R´s complement

2-the (R-1)´s complement

For binary number 1´s and 2´s complement

For decimal number 9´s and 10´s complement

For octal number 7's and 8's complement

For hexadecimal number 15's and 16's complement

**The 1´s and 2´s complement :**

 The 1´s complement of a binary number is the no. we get when we change each (0) to (1) and each (1) to (0) (or subtracting each binary no. from 1 )

***EX***: 1´s comp. of 1001 0110

 1´s comp. of 110010 001101

 2´s comp. = 1´s comp. + 1

 2´s comp. of 1011 is 0100 + 1 = 0101

 2´s comp. of 1110 is 0001 + 1= 0010

**Using 2´s complement in subtraction :**

 Instead of subtraction a number , we can add it’s$ $2's comp, and disregard the last carry.

***EX***: decimal

 7 111 111

 -5 -101 1´s 010 2´s 011

 2 1+ 1 010 + ve. No.

 X carry 011

***EX***: 13 1101 1101

 -10 1010 1´s 0101 2´s 0110

 3 1+ 1 0011 +ve. No.

 0110 X carry

***EX***: 4 100 100

 -7 -111 1´s 000 2´s 001+

 -3 1+ 101

 001 No carry -ve. No.

 So 101 100 011