Assignment => 2.

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(1) Explain 1's Compliment Number System.

(A)

In the one's compliment number System, negative numbers are represented by taking the bitwise complement (inverting) of the positive number's binary representation. The bitwise complement means flipping all the bits, changing of 0s to 1s And 1s to 0s.

Eg:- Suppose to represent the decimal number 5 using four bits in the one's complement system:

**★)** Represent the absolute value of the number in binary: 5 in binary is 0101.

**★)** Take the bitwise complement (invert all the bits): 0101 (original) → 1010 (complement).

**★)** The result is 1010. Since the most significant bit (leftmost bit) is 1, this indicates a negative number.

One's Complement number System is symmetric, meaning if you take the one's Complement of a number and then take the one's complement of the result, you will get back the original number.

Eg:- Take the one's complement of -5 (1010):

1010 (original) → 0101 (complement)

Take the one's complement of 0101:

0101 (complement) → 1010 (original) = -5.

Despite its symmetry, one's complement has some drawbacks, especially when performing arithmetic operations like addition and Substraction.

② Explain 2's Complement Number System.

Ⓐ The two's Complement number system is a method used to represent both positive and negative integer in binary form. It is the most commonly used representation for signed integer in digital computing systems due to its simplicity and efficiency in arithmetic operations.

→ In the two's Complement System, the most significant Bit (MSB) is used as the sign bit, where 0 represents a positive number and 1 represents a negative number. The remaining bits represents the magnitude of the number in standard binary form.

→ The System relies on the Concept of taking the Complement of a number and then adding 1 to Obtain the negative representation.

→ To represent a positive number in two's Complement:

✳) Convert the positive decimal number to its binary representation using the standard binary conversion rules.

✳) If needed, pad the binary number with leading zeros to match the desired bit size.

✳) The binary representation is now the two's complement representation of the positive number.

→ Eg:- The binary representation of 5 is 00000101.
So, the two's complement of 5 is 00000101.

→ To represent Negative number in two's Complement:

✳) Take the absolute value of the decimal number.

✳) Convert the positive decimal number to its binary representation using the standard binary conversion rules.

✳) If needed pad the binary number with leading zeros to match the desired bit size.

✳) Invert (flip) all the bits of the binary number.

✳) Add "1" to the resulting binary number.