

## Topics to discuss

Addition and subtraction of  
binary number.

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## Addition of binary number

$$0 + 0 \rightarrow 0$$

$$0 + 1 \rightarrow 1$$

$$1 + 0 \rightarrow 1$$

$$1 + 1 \rightarrow 0 \text{ (but carry 1)}$$

$$1 + 1 + 1 \rightarrow 1 \text{ (but carry 1)}$$

Q:- Add the binary numbers.

$$x = 101$$

$$y = 1010$$

Ans :

$$\begin{array}{r} x = 0101 \approx 5 \\ + y = 1010 \approx 10 \\ \hline \phantom{+} \phantom{y} = 1111 \approx 15 \end{array}$$

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Q: Add the binary numbers.

$$x = 1010$$

$$y = 1111$$

Ans :  $x = 1010 = 10$

$$y = 1111 = 15$$

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$$11001 = 25$$

$$\begin{array}{r} 11 \\ + 1 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 11 \\ + 11 \\ \hline 11 \end{array}$$

## Subtraction of two binary numbers

It can be done by adding 2's complement of 2<sup>nd</sup> second number to the first number.

$$\begin{aligned} \text{eg:- } & x - y \\ & = x + (-y) \end{aligned}$$

We know, 2's complement of  $y = -y$

step to find 2's complement of binary no.

- 1) Find 1's complement by flipping all bits.
- 2) Add 1 in 1's complement.

Q: Subtract the numbers using binary representation.

$x = 10$  and  $y = 5$  , 8 bit binary

Ans:-  $10 - 5 = ?$

$$10 + (-5) = ?$$

10  $\rightarrow$  00001 0 10

5  $\rightarrow$  00000101

Now,

$$\begin{array}{r} 10 \rightarrow 00001010 \\ -5 \rightarrow 11111011 \\ \hline \text{Ans} = 00000101 \end{array} +$$

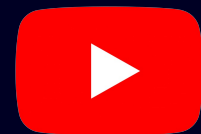
we need to find 2's complement of 5

5  $\rightarrow$  00000101

1's  $\rightarrow$  1 1 1 1 1 0 1 0

2's  $\rightarrow 11111011 = -5$

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