

Decimal to binary

eg: 23 $\rightarrow$ (i) div by 2

$$q = 11, r = 1$$

(ii) repeat dividing by 2

$$\begin{array}{r|l} 2 & 23 \\ \hline 2 & 11 \\ \hline 2 & 5 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

11101

$$\begin{array}{r} 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \\ 1 \quad 1 \quad 1 \quad 0 \quad 1 \end{array}$$

$$\begin{aligned} &= 16 + 8 + 4 + 0 + 1 \\ &= 29 \quad \text{--- Ans.} \end{aligned}$$

Q 35 to binary

$$\begin{array}{r|l} 2 & 35 \\ \hline 2 & 17 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline & 2 \\ \hline & 1 \end{array}$$

100011

$$\begin{array}{r} 2 \overline{) 2} \quad 0 \\ 1 \quad 0 \end{array}$$

2's Complement : negative to binary.

(i) Complement every bit : $0 \rightarrow 1$
 $1 \rightarrow 0$

(ii) Add 1 to final no.

Q/ 2's comp of 0100

$$0100 \rightarrow 1011 \xrightarrow{+1} 1100$$

Q Represent 5 in 2's comp system.

$$(5)_{10} = (0101)_2$$

2's Comp

(i) (+ve no.



(ii) (-ve no.



Represent in
binary

✓
Use 2's
complement

Most Significant Bit (MSB)

i) 0 $\Rightarrow$ positive

ii) 1 $\Rightarrow$ negative.

Q Represent -5 as 2's complement

Take 2's comp.

$$\therefore 5 \rightarrow 0101 \xrightarrow[\text{complement}]{2's} \begin{array}{r} 1010 \\ +1 \\ \hline 1011 \end{array}$$

MSB (left most) is 1.
So we know no. is $\leftarrow$ ve.

NOTE : 5 can not be represented in 3 bits in 2's comp system as it is 101.

And MSB here is 1. But 5 is $\leftarrow$ ve.
So we take 0101.

Q In 16-bit 2's complement representation, the decimal no. is -28.

$$(28)_{10} \Rightarrow (00000000000011100)_2$$

↓ 2's comp

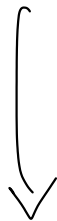
$$\begin{array}{r} 111111111100011 \\ + 1 \\ \hline 111111111100100 \end{array}$$

- Ans -

Q 43 in 2's comp representation.

$$(43)_{10} \Rightarrow (101011)_2 \leftarrow \text{Add a 0 in front}$$

∵ in 2's comp if there is 1 at MSB it represents (-)ve.



$$0101011$$

Q 2's comp representation of 15.

$$(15)_{10} \Rightarrow 1111 \xrightarrow[comp]{2's} 10000$$