

Combinational Multiplier

Multiplicand = 5

Multiplier = -7

5 \Rightarrow 0101

-7 \Rightarrow 1001

7 \Rightarrow 0111

7 \Rightarrow 0111

1's complement

0101
x 1001 \rightarrow Signed number

1000

2's complement

00000101

0000000x

000000xx

10001xxx

1101101

product = -35

1000

+1

-7 \Rightarrow 1001

MSB is 1, so
last partial

Product will be
2's complemented

check \Rightarrow Taking its 2's
complement, if it's 35

we have the correct
answer.

1101101

0010000

+1

1's complement

2's complement

$$\boxed{00100011} \Rightarrow 35$$

So answer is correct.

We have used method of
MSB extension for each
partial product till $2n$ bits

where n is the number
of bits of multiplier.

We can also perform
NAND on MSBs of each partial
product instead of AND
and we don't have to sign

extend it anymore.

$$\begin{array}{r}
 0101 \\
 1001 \\
 \hline
 10101 \\
 0000x \\
 0000xx \\
 0000xxx \rightarrow \text{MSB won't become} \\
 \text{NOT but LSBs} \\
 \text{will.}
 \end{array}$$

$$\boxed{1011101} \Rightarrow \text{Same } -35$$