

Very Imp.

PAGE NO.	
DATE	

X

Bit Manipulation

int = 4 bytes

4 byte = 32 bits

1 byte = 8 bits

1 int = 32 bits

$$(.) \rightarrow 4 \text{ bit} \rightarrow \begin{array}{cccc} 0/1 & 0/1 & 0/1 & 0/1 \\ 3 & 2 & 1 & 0 \\ 2 & 2 & 2 & 2 \end{array}$$

$$2^4 \rightarrow 16$$

$$0 - 15$$

(.) [If m bits]

Then I can store $2^m - 1$

$$[0 \leftrightarrow [2^m - 1]]$$

if we'll take $m = 4$

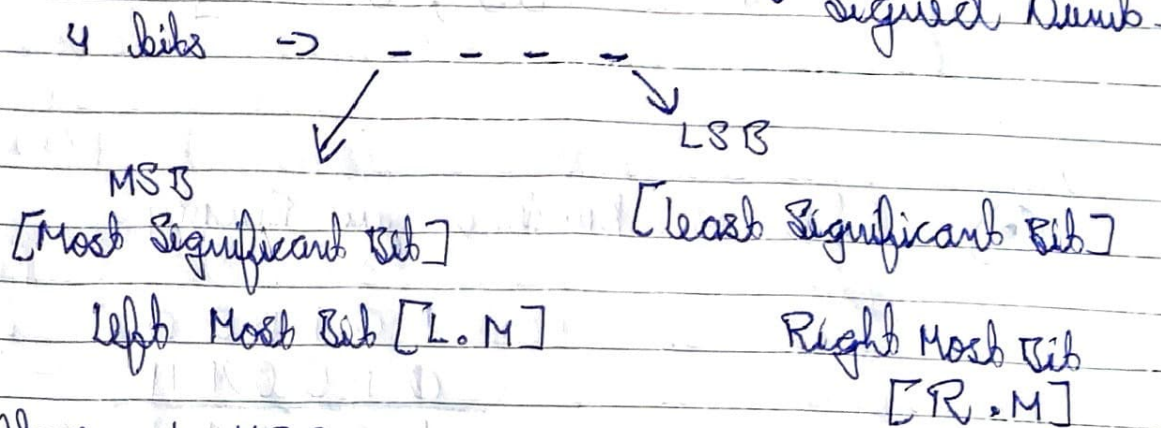
Then the range will be

$$\rightarrow [0 \leftrightarrow [2^4 - 1]]$$

$$\rightarrow [0 \leftrightarrow [16 - 1]]$$

Range will be $\rightarrow [0 \rightarrow 15]$

(•) Bits names



Where \pm MSB

0 \rightarrow +ve Num

1 \rightarrow -ve Num.

\rightarrow Ex.

Positive and Negative Num.

	MSB		LSB	
+ve Num	0	0	0	+0
	0	0	1	+1
	0	1	0	+2
	0	1	1	+3

-ve Num.	1	0	0	-0
	1	0	1	-1
	1	1	0	-2
	1	1	1	-3

• Signed:

$w = 3$

$[-3, 3]$

$$[-2^{w-1} + 1, 2^{w-1} - 1]$$

Range of Signed Num.

Minimum Value

Maximum Value.

• Unsigned Range $[0, 2^m - 1]$

(c) Add 2 Numbers in Binary.

$$\begin{array}{r} 101100 \\ 010011 \\ \hline 111111 \end{array}$$

1's complement [-ve represent]

8 bits
52 \rightarrow 00110100

\rightarrow 1's complement \rightarrow 11001011

\rightarrow 2's complement

[-52]

11001100

Now represent $100 + (-52)$

$$\begin{array}{r} 100 \rightarrow 01100100 \\ -52 \rightarrow 11001100 \\ + \\ \hline [48] \quad 00110000 \end{array}$$

(.) Bit Manipulation

(.)

a	b	And &	OR 	XOR ^
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	1	0

Here 0 → False
1 - True

↓
Both
True

↓
One
True

↓
Only
One
True

Here & , | , ^ are Operators.

(.) '~' This will reverse the number

Like

~ (0 1 0 1 1 1)
(1 0 1 0 0 0) Ans.

Shift Operators

(.)

RS
[Right Shift]

LS
[Left Shift]

a >> b

a << b

1 0 1 >> 1

1 0 1 << 1

Ans 0 1 0

1 0 1 0 → 1 0