C-19 ⇒ Operators in C - Part 7 (Bitwise Operators -II)

<< (Left shift operator)

LV   R.V

Var << ②

↓

No/- of shift.
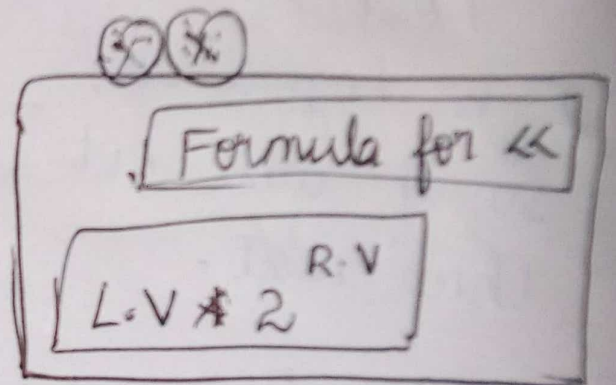
Formula for <<

$$L.V * 2^{R.V}$$

$2-1 \Rightarrow 255$ (8 above)

Ex① int a=10;

C = a << 2;

C = 40

```
      128 64 32 16 8  4  2  1
left ← [0][0][0][0][1][0][1][0]  ⇒ 10

      [0][0][1][0][1][0][0][0]  ⇒ 40
```

Empty are filled with zeros.

Ex ②

int a = 10;

c = a << 4;

c = 10 << 4

$C = 160$

$$\boxed{\begin{array}{c} 10 * 2^4 \\ 10 * 16 \\ \Rightarrow 160 \end{array}}$$

128	64	32	16	8	4	2	1
0	0	0	0	1	0	1	0

1	0	1	0	0	0	0	0

filled with zero.

$\begin{array}{r} 128 \\ 32 \\ \hline 160 \end{array}$
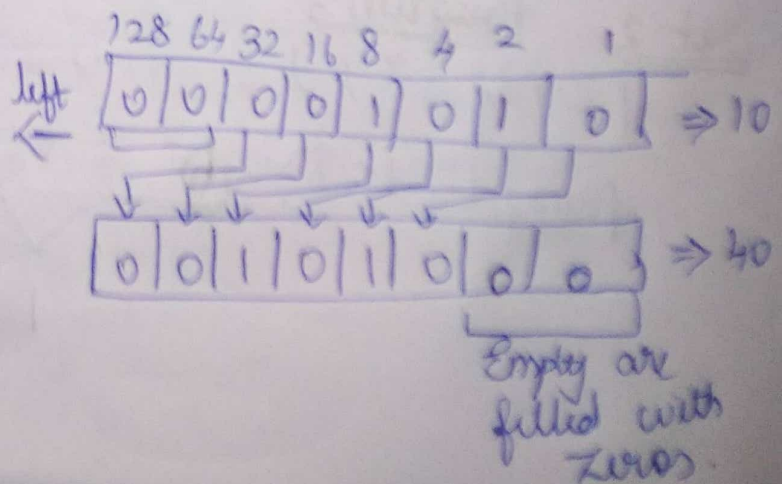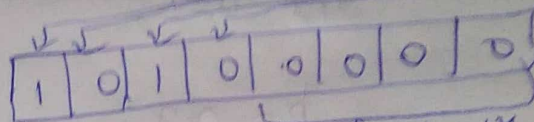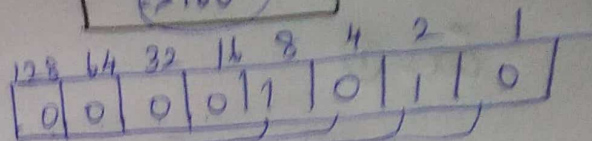
>> (Right shift operator)

| Formula for >> |

L.V   R.V

var >> ②

↓

No of shift.

$$\frac{L.V}{2^{R.V}}$$

Ex ① int a = 10;

c = a >> 2;

c = 10 >> 2;

$C = 4$

128	64	32	16	8	4	2	1
0	0	0	0	1	0	1	0	right

		0	0	0	0	1	0

Empty are zero.

$\begin{array}{r} 16\sqrt{100} \\ 0 \\ \hline 0 \end{array}$
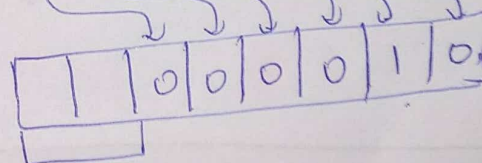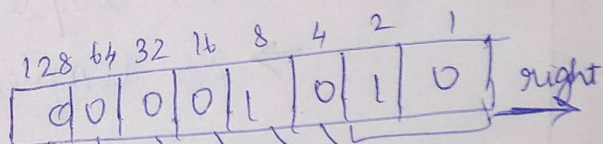
Ex ② int a = 10;

c = a >> 4;

c = 10 >> 4;

$C = 0$

$$\frac{10}{2^4} \Rightarrow \frac{10}{16} \Rightarrow 0$$

0	0	0	0	1	0	1	0

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ⟹ 0
|-----|-----|-----|-----|-----|-----|-----|-----|
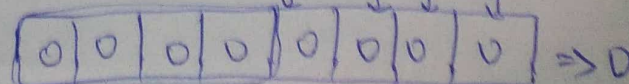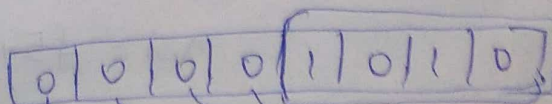
~ (Bitwise NOT)

$$\sim \text{0. operand} = -(0.0+1)$$

performs NOT operation bitwise

Ex: ①

int a=5;

b = ~a;

| b = 10 | (-b) |

8 4 2 1

0 1 0 1 ⇒ 5

| 1 0 1 0 | ⇒ ~5

⇓ 10 but (-ve) value
in Computer

Note (Negative Numbers)

* when we run this is a computer; we get negative numbers.

* In computer negative numbers are stored in 3 method.

→ sign magnitude ⎤
→ 1's complement ⎦ has drawback

→ 2's complement → Standard method to store -ve nos.

int a = 5;

b = ~a

| Formula |
| ~a = -(a+1) |

~a = -(5+1)

~a = -6   (b = -6)

Ex ② :

int a = 10;

b = ~a;

$$\boxed{b = -(a+1)}$$

$$= -(10+1)$$

$$\boxed{b \Rightarrow -11}$$

Ex ③ :

int b

b = ~5;

$$b = -(b+1)$$

$$= -(5+1)$$

$$\boxed{b \Rightarrow -6}$$

```c
1    #include <stdio.h>
2    #include <stdlib.h>
3
4    int main()
5    {
6        int a=5,b;
7        b=~a;
8        printf("%d",b);
9    }
10
```

```
-6
Process returned 0 (0x0)   execution time : 0.016 s
Press any key to continue.
```

```c
1    #include <stdio.h>
2    #include <stdlib.h>
3
4    int main()
5    {
6        int a=10,b;
7        b=~a;
8        printf("%d",b);
9    }
10
```

```
-11
Process returned 0 (0x0)   execution time : 0.041 s
Press any key to continue.
```

```c
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int b;
    b=~5;
    printf("%d",b);
}
```

```
-6
Process returned 0 (0x0)   execution time : 0.018 s
Press any key to continue.
```