

Number System

① Binary number system

- Number system using base 2
- It uses only two digit 0 & 1

② Decimal number system

- This system uses the base 10
- It uses digits from 0 to 9
- base: It is number of symbols used in number system.

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Total 10 symbols that's why
base 10

Decimal to binary conversion :-

① Division Method

- Divide number by 2
- Store the remainder
- Repeat the above steps with Quotient until quotient is less than 2.
- Reverse the bits so obtained

eg:- $N \rightarrow 10$

<u>Division</u>	<u>Remainder</u>
$10/2 \rightarrow 5$	0
$5/2 \rightarrow 2$	1
$2/2 \rightarrow 1$	0
$1/2 \rightarrow 1$	1

$N \rightarrow 10 \rightarrow 1010$

② Bitwise Method:

- Obtain bit with bitwise AND operation
i.e. $(N \& 1)$
- Right shift N by 1 ($N = N >> 1$)
- Repeat until $N > 0$.
- Reverse the bits so obtained

Code :-

// Division method

```
int division method (int n) {
```

```
    int binary = 0;
```

```
    int i = 0;
```

```
    while (n > 0) {
```

int bits = n % 2 ;

binary = bits * pow(10, i++) + binary ;

n = n / 2 ;

}

return binary ;

}

// Bitwise Method

int bitwisemethod (int n) {

int binary = 0 ;

int i = 0 ;

while (n > 0) {

int bits = (n & 1) ;

binary = bits * pow(10, i++) + binary ;

n = n >> 1 ;

}

return binary ;

}

Binary to Decimal Conversion :-

- (i) Multiply each digit with its place value
- (ii) Add up all place values.
- (iii) Sum is the decimal number.

Code:

```
int binarytodecimal (int n) {  
    int digits = 0;  
    int i = 0;  
    while (n) {  
        int bits = n % 10;  
        digits = bits * pow(2, i++) + digits;  
        n = n / 10;  
    }  
    return digits;  
}
```