Number System

- Done ✓
- Decimal
- Binary
- Octal
- Hexadecimal

☑

Other Codes

- Classify the Binary Code
  - BCD
  - XS-3
  - Gray Code.
  - ⋮

BCD Code:

* Binary Coded decimal

number

→ It represent that 'n' bit binary digit is a group of 'n' bits that assumes '2^n' distinct Combinations of 0s & 1s.

↳ (अलग)

3 bits → Combinations = 2^3 = 8 Combinations

4 bits → 2^4 Combinations = 16 ← decimal

5 bits → 2^5 —"— = 32 ← decimal

⋮

n bits → 2^n Combinations ⇒ 2^n decimal

□ □ □ ← 3 bit

0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

BCD → 4 bit BCD

BCD → 8 bit BCD ← It use 8 bits to store one decimal digit of a decimal number

4 bits BCD → we represent the number within 4 bits only .

↳ 2^4 combinations = 16 numbers

[each digit of decimal number]

$[375] \rightarrow (x)_{BCD-4Bit}$

10

0011 0111 0101

$(0011\ 0111\ 0101)_{BCD}$

3 7 5

4 Bits 4bits 4bits = $\boxed{12 \text{ bits}}$

$$(74)_{10} \longrightarrow (x)_{BCD-4bit}$$

$$\begin{tikzcd}
7 \arrow[d] & 4 \arrow[d] & \\
0111 & 0100 \arrow[r, Rightarrow] & (01110100)_{BCD}
\end{tikzcd}$$

$$(55)_{10} \longrightarrow (x)_{BCD}$$

$$\begin{tikzcd}
5 \arrow[d] & 5 \arrow[d] & \\
0101 & 0101 \arrow[r, Rightarrow] & (0101\ 0101)_{BCD}
\end{tikzcd}$$

Number System

a) Weightage Number system

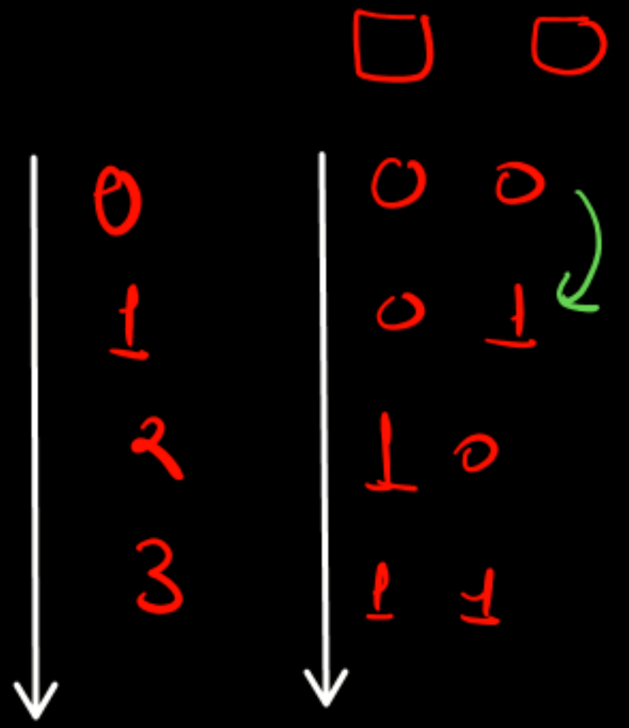
↳ Each position of digit have a weightage.

b) Non Weightage NS : [derived Code]

↳ No weightage assigned

Ex Excess 3, Excess -5 ... Excess - n

Gray Code



	□	○
0	0	0
1	0	1
2	1	0
3	1	1

Excess-3 Code : [XS-3]

↳ Non weightage number system represent the decimal number in Binary format

→ The number is represented by adding 3 with the decimal number and Converted to Binary

decimal + 3 = Excess 3 Code

$(0)_{10} \rightarrow (0)_2$

Represent '0' in XS-3 Code

$(0)_{10} \rightarrow (x)_{XS-3} \Rightarrow (0+3)_{10} \rightarrow (X)_2 = (3)_{10} \rightarrow (X)_2$

$\Rightarrow (0011)_{XS-3}$

$(0)_{10} \xrightarrow{Binary} (0)_2 \xrightarrow{XS-3} (0011)_{XS-3}$

decimal	Binary
0	0000
1	0001
2	0010
3	0011 —
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100

$$(7)_{10} \longrightarrow (x)_{XS-3}$$

$$(7)_{10} \xrightarrow{XS-3} (10)_{10} \longrightarrow (1010)_{XS-3}$$

$$(8)_{10} \longrightarrow (x)_{XS-3}$$

$$(8)_{10} \xrightarrow{XS-3} (11)_{10} \longrightarrow (1011)_{XS-3}$$

$$(1010)_2 \longrightarrow XS-3$$

$$(1010 + 0011) \longrightarrow (1101)_{XS-3}$$

$$\downarrow$$

$$10 + 3 = (13)_{10} \longrightarrow (1101)_{XS-3}$$

decimal	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100

waste

Gray Code :

└ Non weightage + Non Arithmetic ← we Can not use gray Code to perform arithmetic Operation.

खास बात : In every next Combination of bits, only 'one' bit at a time

Binary

	2 bits	
0	0 0	1bit
1	0 1	2bits shift
2	1 0	1 bit
3	1 1	

decimal	Binary	
0	0000	1 bit change
1	0001	2bit change
2	0010	1 bit Change
3	0011	3 bit Change
4	0100	1 bit -"-
5	0101	2bits -"-
6	0110	1 bit -"-
7	0111	4 bits -"-
8	1000	
9	1001	
10	1010	
11	1011	
12	11	

decimal	BCD	Gray Code	
0	0 0 0 0	0 0 0 0	0
1	0 0 0 1	0 0 0 1	1
2	0 0 1 0	0 0 1 1	3
3	0 0 1 1	0 0 1 0	2
4	0 1 0 0	0 1 1 0	6
5	0 1 0 1	0 1 1 1	7
6	0 1 1 0	0 1 0 1	5
7	0 1 1 1	0 1 0 0	4
8	1 0 0 0	1 1 0 0	12
9	1 0 0 1	1 1 0 1	13

* We use XoR Gate to Convert Binary to Gray Code