Introduction to Gray

Reflective Binary Code (RBC)

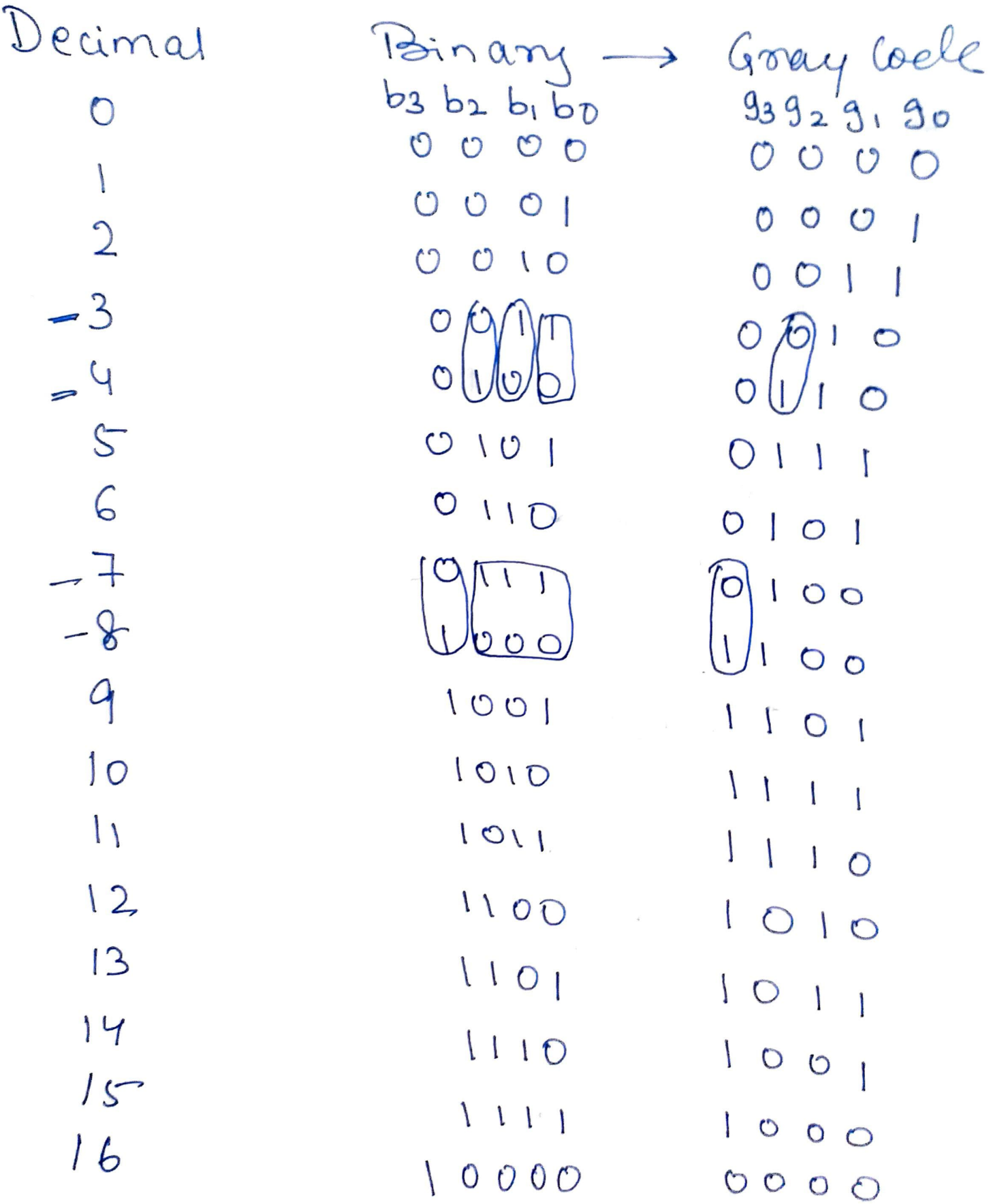
We call Gray Code after Frank Gray

* Binary numerial system where sucessive Systems or values differ only in one bit.

Imp

* Binary number is converted to Gray Code to reduce Switching opn.

* Error Correction in Cable TV System
* Unweighted Code.
* Unit distance Code & Minimum Error Code
* Cyclic Code.

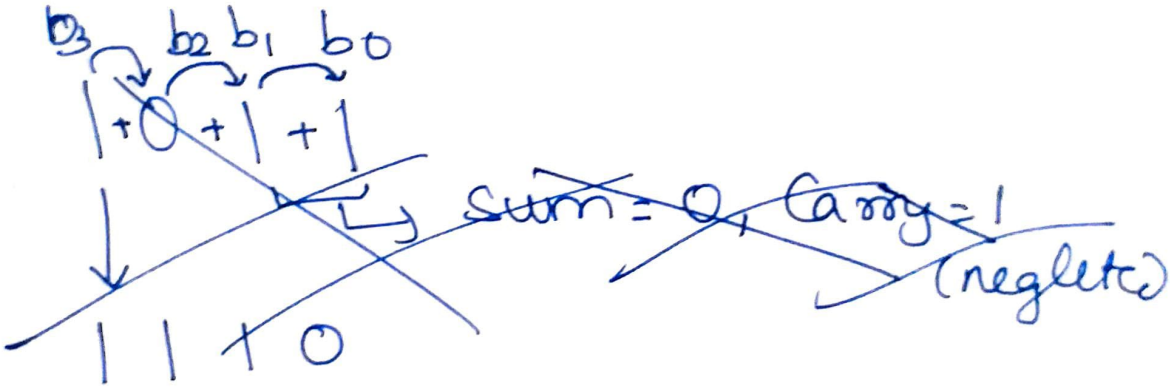

Decimal
Binary → Gray code
b3 b2 b1 b0
g3 g2 g1 g0
0 0 0 0 0 0 0 0
1 0 0 0 1 0 0 0 1
2 0 0 1 0 0 0 1 1
-3 0 0 1 1 0 0 1 0
-4 0 1 0 0 0 1 1 0
5 0 1 0 1 0 1 1 1
6 0 1 1 0 0 1 0 1
-7 0 1 1 1 0 1 0 0
-8 1 0 0 0 1 1 0 0
9 1 0 0 1 1 1 0 1
10 1 0 1 0 1 1 1 1
11 1 0 1 1 1 1 1 0
12 1 1 0 0 1 0 1 0
13 1 1 0 1 1 0 1 1
14 1 1 1 0 1 0 0 1
15 1 1 1 1 1 0 0 0
16 1 0 0 0 0 0 0 0 0

Binary to Gray Code

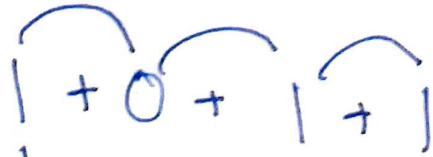
Step 1:- Record the MSB as it is.

Step 2:- Add the MSB to next bit, record the sum & neglect the carry. (X-OR)

Step 3:- Repeat the process.



Convert 1011 to Gray Code



1 1 1 0 (Sum = 1+1 = 0

Carry = 1

(neglect)

XOR

A	B	$Y = \bar{A}B + A\bar{B}$
0	0	0
0	1	1
1	0	1
1	1	0

(odd 1's detected)

Binary to Gray

MSB is same

- $g_3 = b_3$

$g_2 = b_3 \oplus b_2$

$g_1 = b_1 \oplus b_2$

$g_0 = b_0 \oplus b_1$

Ex2:-

$1 \oplus 1 \oplus 1 \oplus 0$

↓

1 0 0 1

H.W

1) 1001
2) 1010
3) 1111

} Convert to Gray code.

Also make the gate representation of the binary to gray conversion.

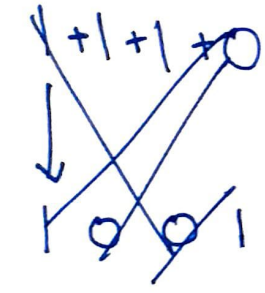
Gray Code to Binary

Step 1:- Record the MSB as it is

Step 2:- Add MSB to the next bit of the Gray Code, record the sum 2 neglect the carry. (X-OR)

Step 3:- Repeat the process.

Ex1:-



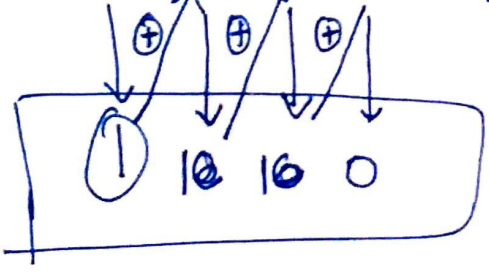
g_3 g_2 g_1 g_0

1 1 1 0

1 0 1 1 binary no.

Ex2:-

1 0 0 1 Gray Code



$$b_3 = g_3$$
$$b_2 = b_3 \oplus g_2$$
$$b_1 = b_2 \oplus g_1$$
$$b_0 = b_1 \oplus g_0$$

} generalized

H.W

i) 1100

2) 1011

3) 1000

Make the gate representation of generalized terms