SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 23ECB201 – Analog and Digital Electronics

II YEAR / III SEMESTER

Unit IV- **COMBINATIONAL CIRCUITS**
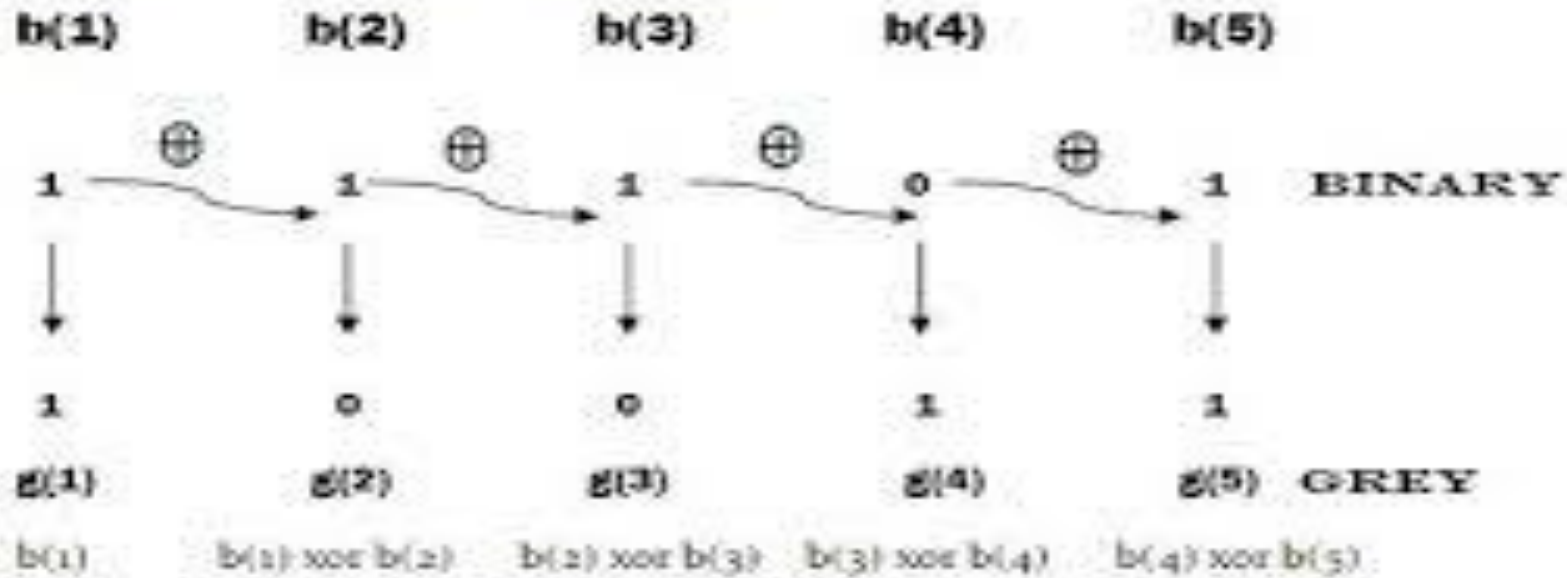Topic : Code converter

Purpose of code converter

➤A converter is needed to convert the information in to the code which we need.

➤These are basically encoders and decoders which converts the data in to an encoded form.

➤ Coding is the process of translating the input information which can be understandable by the machine or a particular device.

➤ Coding can be used for security purpose to protect the information from steeling or interrupting.

Types of Code Conversion

- Binary to Gray code
- Gray to Binary code
- BCD to Excess-3 code
- Excess-3 to BCD
- BCD to Gray code
- Gray to BCD code

Binary to Grey Code Conversion

Convert the binary 11101_2 to its equivalent Grey code

b(1)	b(2)	b(3)	b(4)	b(5)

1	1	1	0	1	BINARY

1	0	0	1	1	

g(1)	g(2)	g(3)	g(4)	g(5)	GREY
b(1)	b(1) xor b(2)	b(2) xor b(3)	b(3) xor b(4)	b(4) xor b(5)	

Natural-binary code				Gray code			
B3	B2	B1	B0	G3	G2	G1	G0
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	1
0	1	1	1	0	1	0	0
1	0	0	0	1	1	0	0
1	0	0	1	1	1	0	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	0
1	1	0	0	1	0	1	0
1	1	0	1	1	0	1	1
1	1	1	0	1	0	0	1
1	1	1	1	1	0	0	0

K-map for G_0

$B_1 B_0$ $B_3 B_2$	00	01	11	10
00	0	1	0	1
01	0	1	0	1
11	0	1	0	1
10	0	1	0	1

K-map for G_1

$B_1 B_0$ $B_3 B_2$	00	01	11	10
00	0	0	1	1
01	1	1	0	0
11	1	1	0	0
10	0	0	1	1

$$G_0 = B_1' B_0 + B_1 B_0'$$

$$G_0 = B_0 \oplus B_1$$

$$G_1 = B_1' B_2 + B_1 B_2'$$

$$G_2 = B_1 \oplus B_2$$

K-map for G_2

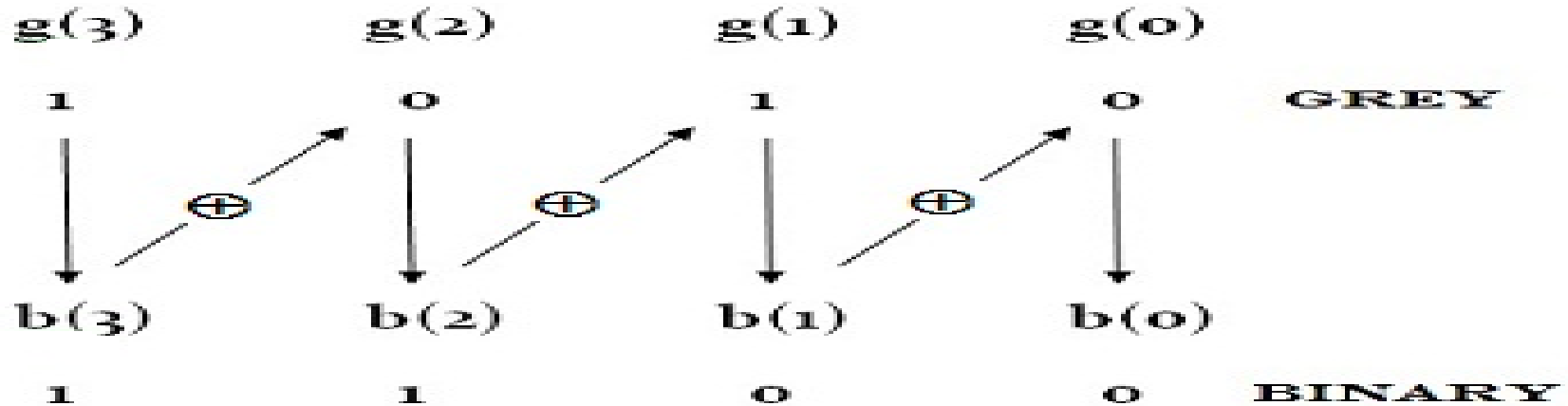| $B_3 B_2$ \ $B_1 B_0$	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	0	0
10	1	1	1	1

$$G_2 = B_3' B_2 + B_3 B_2'$$

$$G_2 = B_2 \oplus B_3$$

Binary to Gray Converter
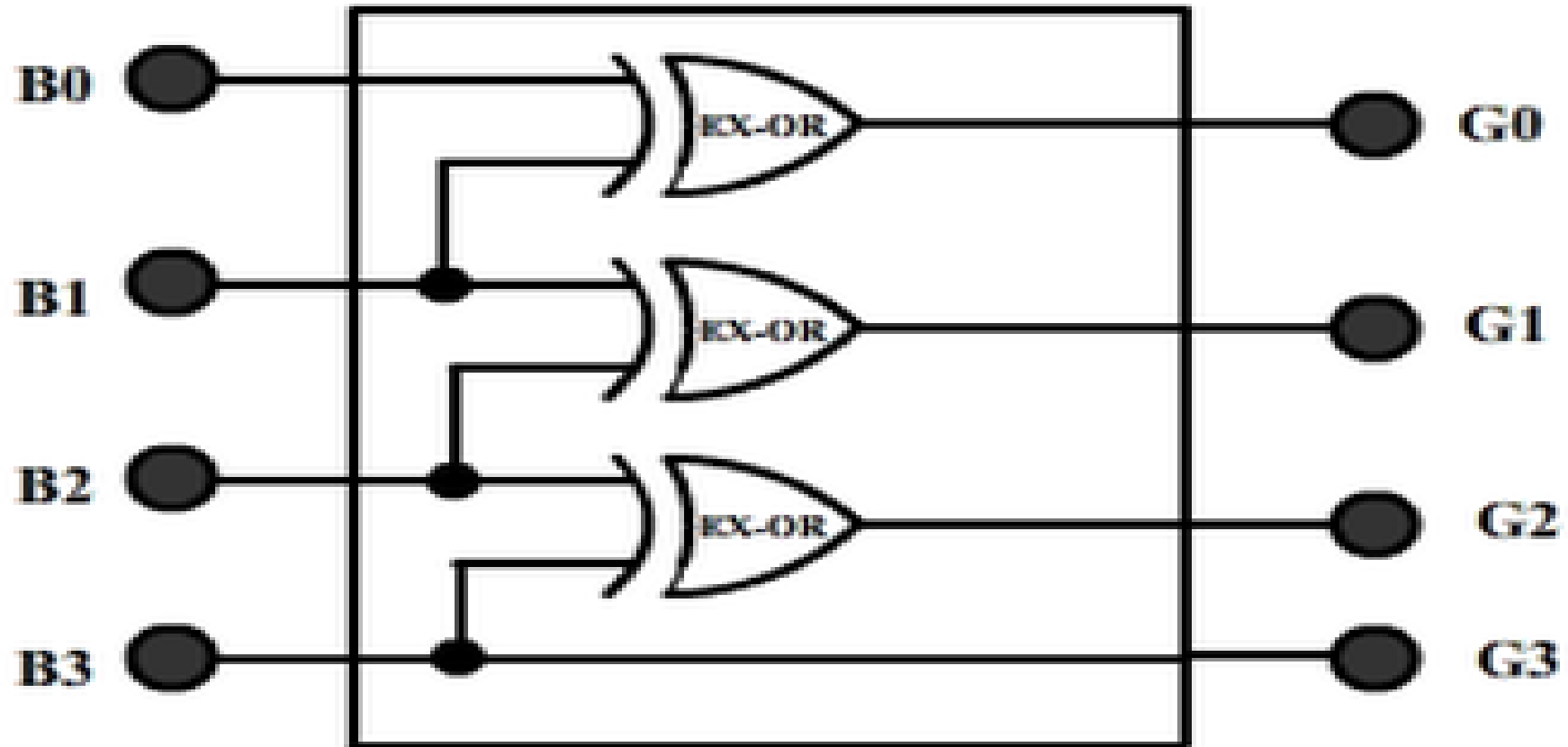
Grey Code to Binary Conversion

Convert the Grey code 1010 to its equivalent Binary

g(3)	g(2)	g(1)	g(0)	
1	0	1	0	GREY
b(3)	b(2)	b(1)	b(0)	
1	1	0	0	BINARY

i.e

$$b(3) = g(3)$$

$$b(2) = b(3) \oplus g(2)$$

$$b(1) = b(2) \oplus g(1)$$

$$b(0) = b(1) \oplus g(0)$$

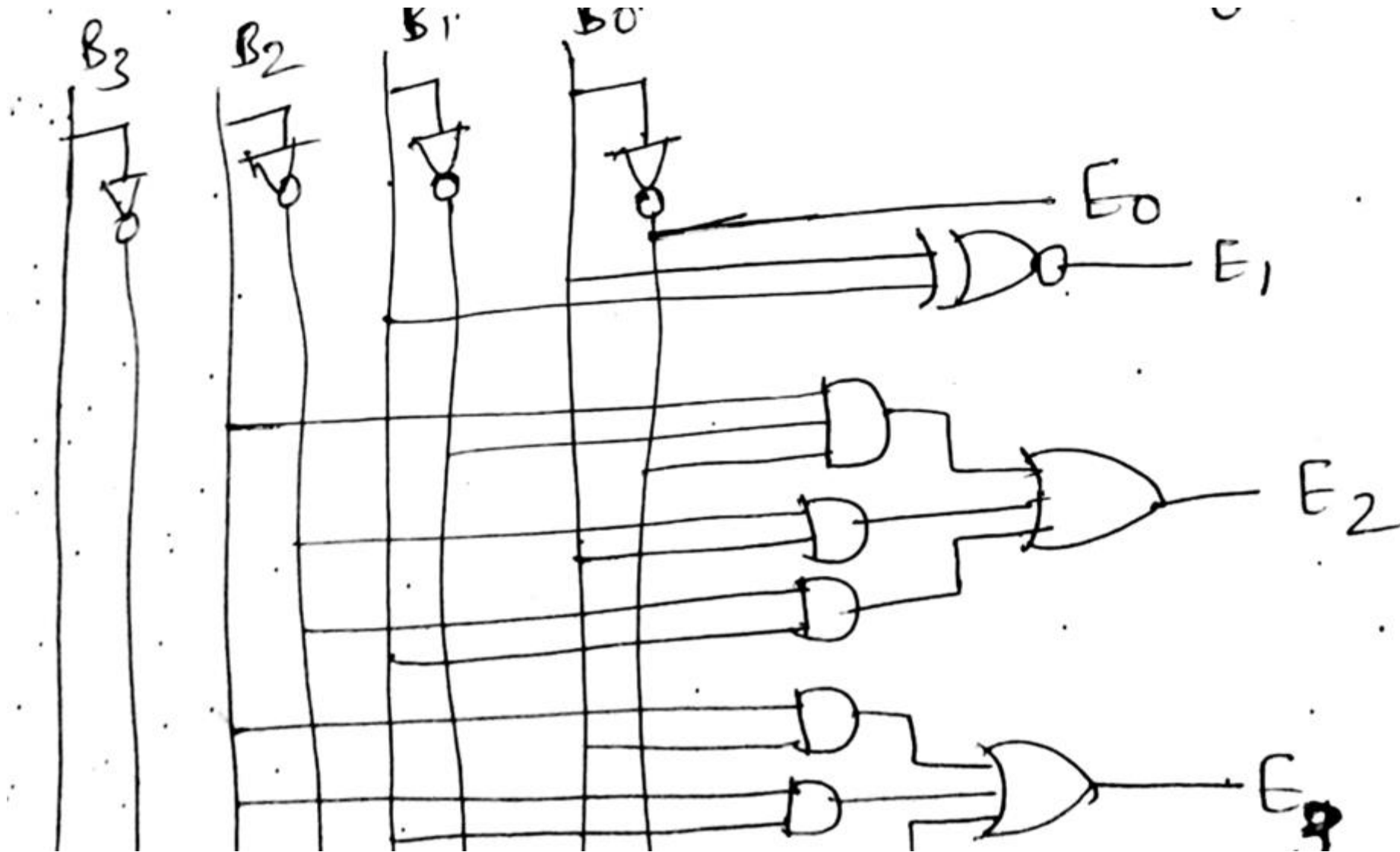| GRAY CODE INPUT				BINARY OUTPUT			
G3	G2	G1	G0	B3	B2	B1	B0
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	1	0	0	1	0
0	0	1	0	0	0	1	1
0	1	1	0	0	1	0	0
0	1	1	1	0	1	0	1
0	1	0	1	0	1	1	0
0	1	0	0	0	1	1	1
1	1	0	0	1	0	0	0
1	1	0	1	1	0	0	1
1	1	1	1	1	0	1	0
1	1	1	0	1	0	1	1
1	0	1	0	1	1	0	0
1	0	1	1	1	1	0	1
1	0	0	1	1	1	1	0
1	0	0	0	1	1	1	1

Gray to Binary Converter

BCD TO EXCESS-3 CODE

➢ The Excess-3 code can be derived from the natural BCD code by adding 3 to each coded number

BCD INPUT				EXCESS-3 OUPUT			
B3	B2	B1	B0	E3	E2	E1	E0
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0
1	0	1	0	X	X	X	X
1	0	1	1	X	X	X	X
1	1	0	0	X	X	X	X
1	1	0	1	X	X	X	X
1	1	1	0	X	X	X	X
1	1	1	1	X	X	X	X

Any Query????

Thank you……

Code converter / 19EC306/ Digital circuits/Mr.S.HARIBABU/ECE/SNSCE