

EXPERIMENT: 4 BINARY TO GRAY CODE CONVERTER

AIM: To realize Binary to Gray code converter and vice versa.

LEARNING OBJECTIVE:

- To learn the importance of non-weighted code
- To learn to generate gray code

COMPONENTS REQUIRED:

IC 7400, IC 7486, and IC 7408, Patch Cords

THEORY :

I) BINARY TO GRAY CONVERSION

0	0	1	1
0	0	1	1
0	0	1	1
0	0	1	1

$$G3 = B3$$

0	1	0	1
0	1	0	1
0	1	0	1
0	1	0	1

$$G2 = B3 \oplus B2$$

0	1	1	0
0	1	1	0
1	0	0	1
1	0	0	1

$$G1 = B1 \oplus B2$$

0	0	0	0
1	1	1	1
0	0	0	0
1	1	1	1

$$G0 = B1 \oplus B0$$

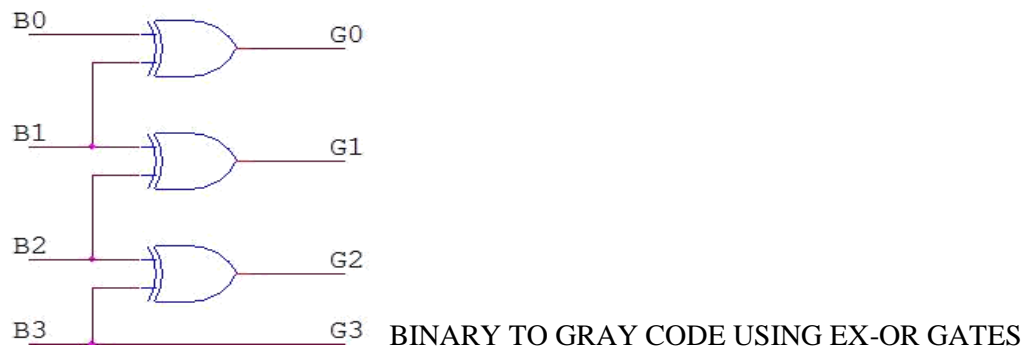
Binary				Gray			
B3	B2	B1	B0	G3	G2	G1	G0
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	1
0	1	1	1	0	1	0	0
1	0	0	0	1	1	0	0
1	0	0	1	1	1	0	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	0
1	1	0	0	1	0	1	0
1	1	0	1	1	0	1	1
1	1	1	0	1	0	0	1
1	1	1	1	1	0	0	0

BOOLEAN EXPRESSIONS:

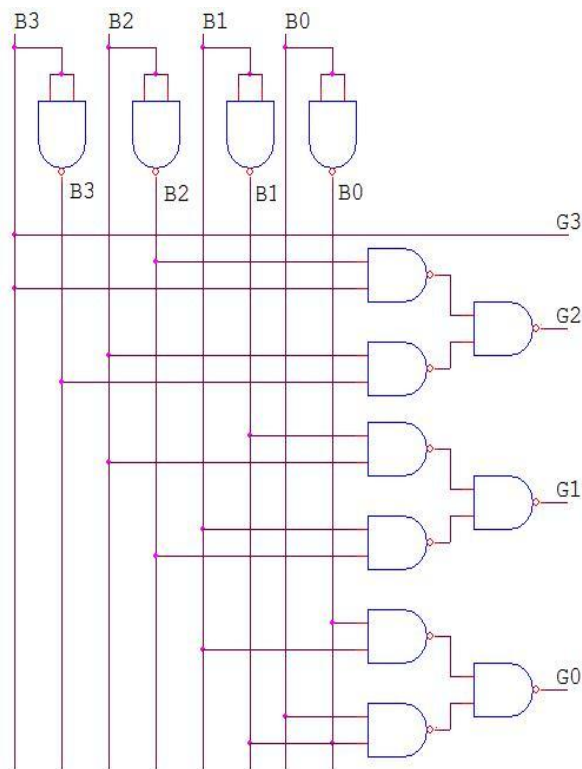
$$G3 = B3$$

$$G2 = B3 \oplus B2$$

$$G1 = B1 \oplus B2; \quad G0 = B1 \oplus B0$$



REALIZATION USING NAND GATES:



II) GRAY TO BINARY CONVERSION

0	0	1	1
0	0	1	1
0	0	1	1
0	0	1	1

$$B_3 = G_3$$

0	1	0	1
0	1	0	1
0	1	0	1
0	1	0	1

$$B2 = G3 \oplus G2$$

0	1	0	1
0	1	0	1
1	0	1	0
1	0	1	0

$$B1 = G3 \oplus G2 \oplus G1$$

0	1	0	1
1	0	1	0
0	1	0	1
1	0	1	0

$$B0 = G3 \oplus G2 \oplus G1 \oplus G0$$

BOOLEAN EXPRESSIONS:

$$B3 = G3$$

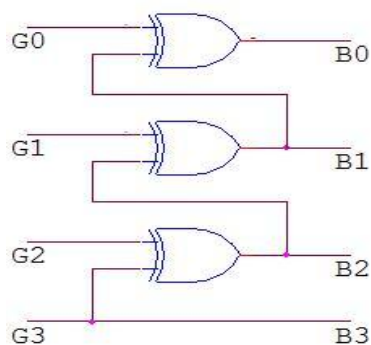
$$B2 = G3 \oplus G2$$

$$B1 = G3 \oplus G2 \oplus G1$$

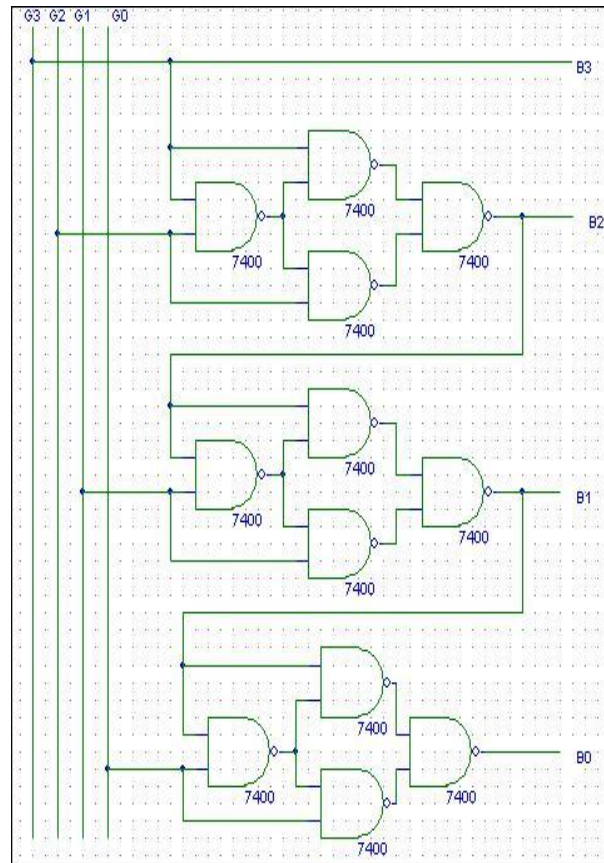
$$B0 = G3 \oplus G2 \oplus G1 \oplus G0$$

Gray				Binary			
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 CODE CONVERSION USING EX-OR GATES



REALIZATION USING NAND GATES:

**PROCEDURE:**

- 1 Check all the components for their working.
- 2 Insert the appropriate IC into the IC base.
- 3 Make connections as shown in the circuit diagram.
- 4 Verify the Truth Table and observe the outputs.