AIM: To perform binary to gray and gray to binary conversion.

RESOURCE REQUIRED: Digital Lab Kit, ICs, IC-7486 (EX-OR) breadboards, Connecting Wires.

THEORY:

a. BINARY TO GRAY CONVERSION

B_1B_0 \ B_3B_2	00	01	11	10
00	0	0	1	1
01	0	0	1	1
11	0	0	1	1
10	0	0	1	1

$G3 = B3$

B_1B_0 \ B_3B_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

$G2 = \bar{B}_3 B_2 + B_3 \bar{B}_2$

$G2 = B3 \oplus B2$

B_1B_0 \ B_3B_2	00	01	11	10
00	0	1	1	0
01	0	1	1	0
11	1	0	0	1
10	1	0	0	1

$G1 = \bar{B}_1 B_2 + B_1 \bar{B}_2$

$G1 = B1 \oplus B2$

B_1B_0 \ B_3B_2	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	0	0
10	1	1	1	1

$G0 = \bar{B}_1 B_0 + B_1 \bar{B}_0$

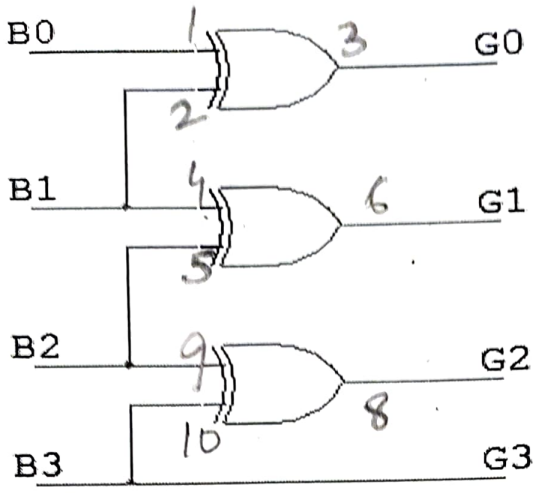
$G0 = B1 \oplus B0$

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:

$G3 = B3$, $G2 = B3 \oplus B2$,
$G1 = B1 \oplus B2$; $G0 = B1 \oplus B0$

BINARY TO GRAY CODE CONVERSION USING EX-OR GATE

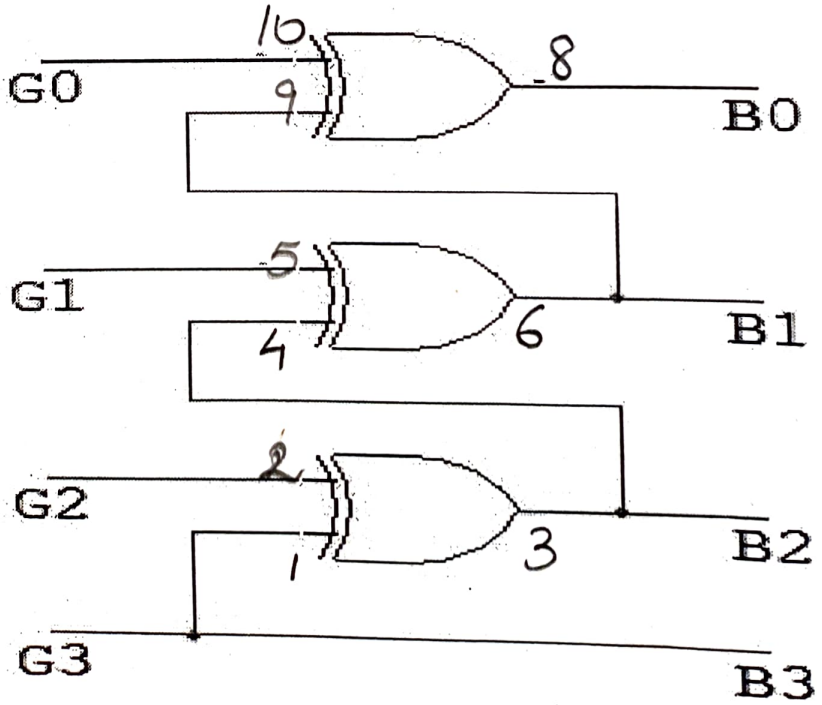


b. GRAY TO BINARY CONVERSION

BOOLEAN EXPRESSIONS:

B3=G3
B2=G3 ⊕ G2
B1=G3 ⊕ G2 ⊕ G1
B0=G3 ⊕ G2 ⊕ G1 ⊕ G0

GRAY TO BINARY CODE CONVERSION USING EX-OR GATE



PROCEDURE:

a. The circuit connections are made as shown in fig.
b. Pin (14) is connected to +Vcc and Pin (7) to ground.
c. In the case of binary to gray conversion, the inputs B0, B1, B2 and B3 are given at respective pins and outputs G0, G1, G2, G3 are taken for all the 16 combinations of the input.
d. In the case of gray to binary conversion, the inputs G0, G1, G2 and G3 are given at respective pins and outputs B0, B1, B2, and B3 are taken for all the 16 combinations of inputs.
e. The values of the outputs are tabulated.

RESULT: Binary to gray code conversion and vice versa is realized using EX-OR gates

CONCLUSION: Thus, we have studied and implemented the binary to gray and gray to binary code converter.