BCD to XS-3

B_3	B_2	B_1	B_0	E_3	E_2	E_1	E_0
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

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

$E_0 = B_0'$

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

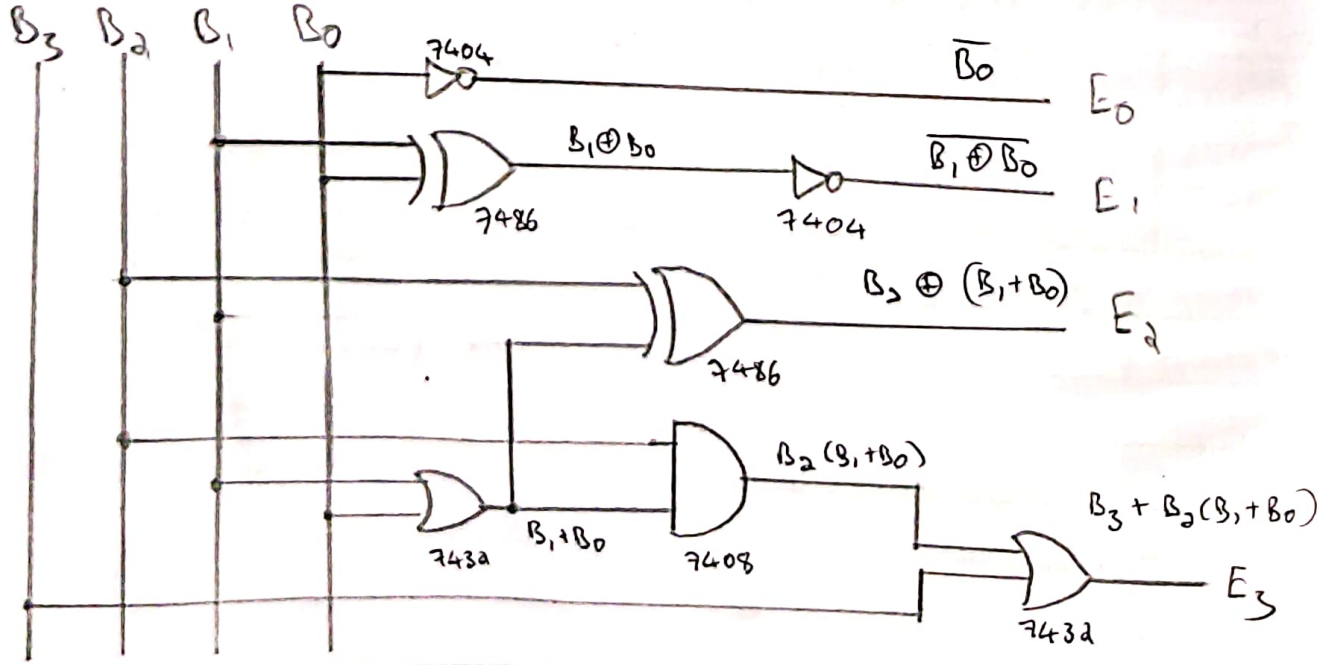
$E_1 = \overline{B_1 \oplus B_0}$

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

$E_2 = B_2 \oplus (B_1 +$

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

$E_3 = B_3 + B_2(B_1 + B_0)$



3. Code converters

AIM:

To design and implement :

(i) BCD to excess -3

(ii) Binary to Gray code converters

COMPONENTS REQUIRED:

IC Trainer Kit, IC 7486, IC 7408, IC 7404, IC 7432

THEORY:

To convert BCD to XS-3 code, a binary three (0011) is added to corresponding BCD and thus obtained. BCD is only valid upto binary 9. after which the states are invalid

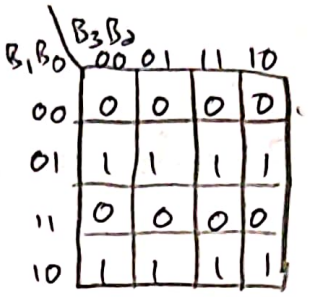
To convert a binary number to corresponding gray code the following rules are applied :

-> The MSB in gray code is same as corresponding digit in binary code. while going from left to right. each adjacent pair of binary digit is added to get the next gray code digit.

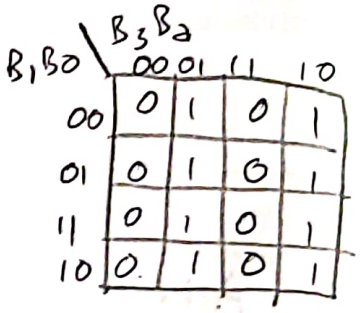
-> To design a binary to gray code converters

Binary to Gray code

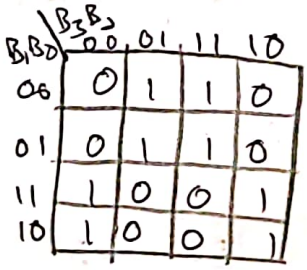
B_3	B_2	B_1	B_0	G_3	G_2	G_1	G_0
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	1
0	1	1	1	0	1	0	0
1	0	0	0	1	1	0	0
1	0	0	1	1	1	0	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	0
1	1	0	0	1	0	1	0
1	1	0	1	1	0	1	1
1	1	1	0	1	0	0	1
1	1	1	1	1	0	0	0



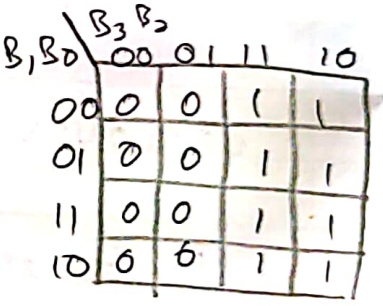
$G_0 = B_1 \oplus B_0$



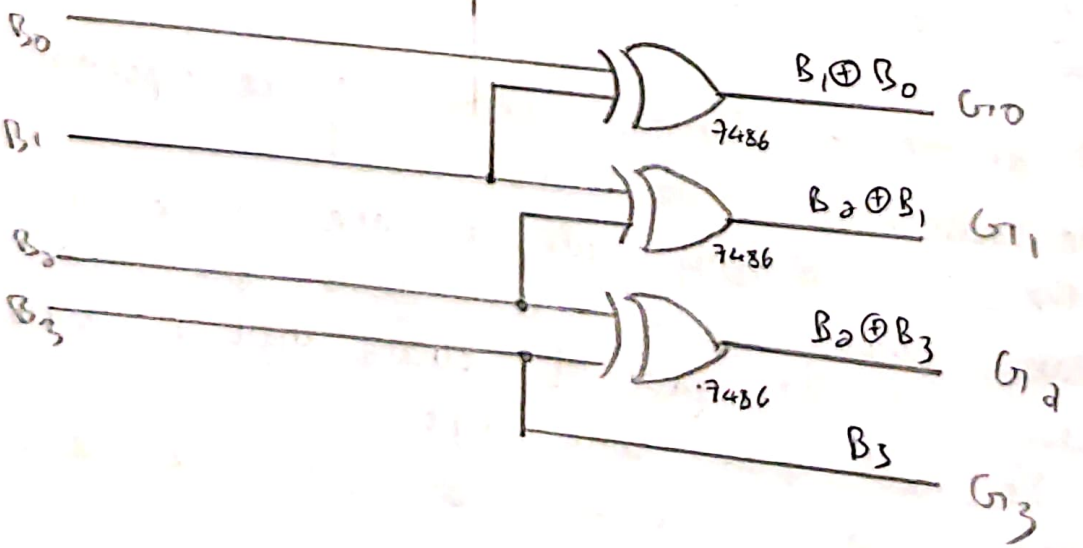
$G_2 = B_2 \oplus B_3$



$G_1 = B_1 \oplus B_2$



$G_3 = B_3$



Setup a truth table with binary number $B_3 B_2 B_1 B_0$ and corresponding gray code number $G_3 G_2 G_1 G_0$. Setup a circuit realizing the simplified logic expressions obtained using K-map for G's as function of B's.

PROCEDURE

1. Test all components and IC packages using multimeter digital IC tester.
2. Place ICs on kit and make sure that the VCC and GND are properly done.
3. Set up the circuit and feed input combinations
4. observe output for given input code.
5. Verify truth table for all cases

RESULT

Designed and setup following code converters circuits:

i) BCD to XS-3

ii) 4 bit binary to gray code

24/4/23