LAB NO 6

Title : "Design and Implement BCD to Excess 3 using Logic Gates"

Objectives

The objective for designing and implementing a BCD to Excess-3 and Excess-3 to BCD converter using logic gates is to:

1. Gain a deeper understanding of digital logic and binary-coded decimal (BCD) representations.
2. Learn how to design and implement digital circuits that perform binary-coded decimal to Excess-3 and Excess-3 to BCD conversions.
3. Develop proficiency in using various logic gates (AND, OR, XOR, etc.) to construct complex digital circuits.
4. Explore practical applications of these converters in digital systems, such as in display and arithmetic units.
5. Enhance problem-solving skills and logical thinking in the context of digital design and circuitry.

Equipments

Logic gates (AND, OR, XOR, NOT, etc.)

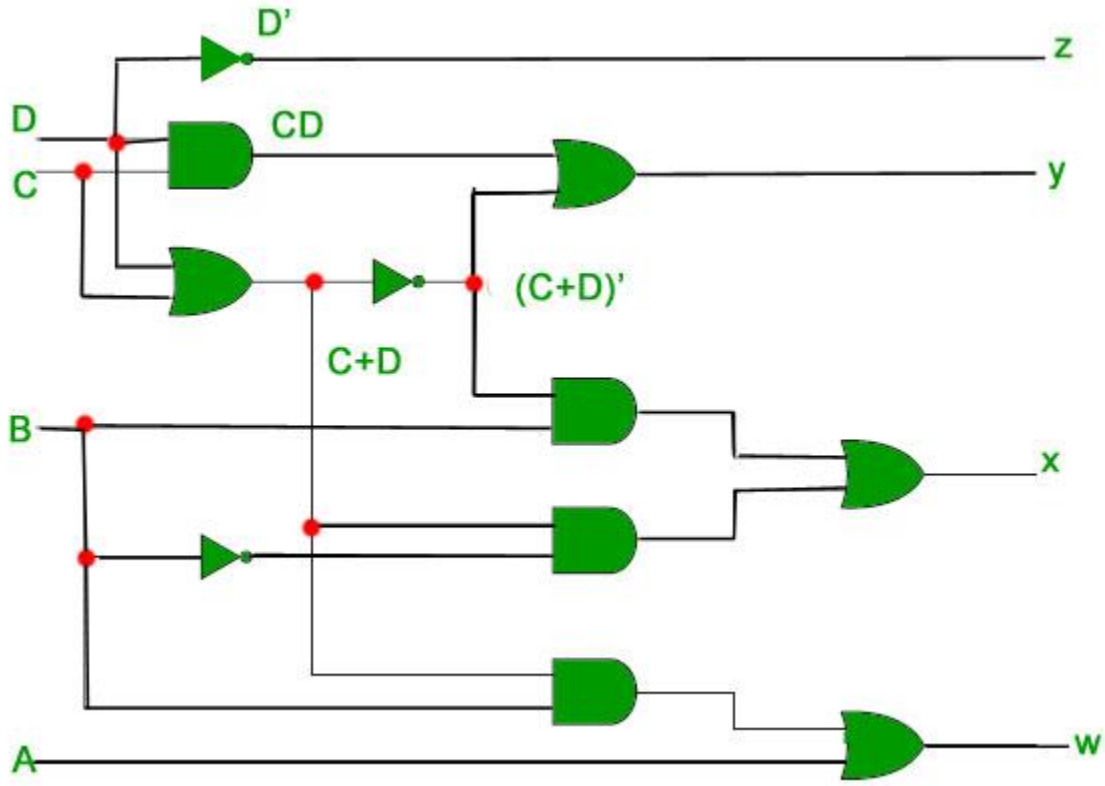
Breadboard or PCB (Printed Circuit Board)

Integrated Circuits (ICs) such as 74LS series or 74HC series.

Connecting wires and cables.

Power supply source (e.g., +5V DC power supply)

Logic Diagram



Truth table

Binary → **Excess 3**

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**

K-Map

For E0

	00	**01**	**11**	**10**
00	**1**			**1**
01	**1**			**1**
11	**x**	**x**	**x**	**x**
10	**x**		**x**	**x**

E0=B’

For E1

	00	**01**	**11**	**10**
00	**1**		**1**	
01	**1**		**1**	
11	**X**	**X**	**X**	**X**
10	**X**		**X**	**X**

E1=B1’B0’+B1B0

For E2

	00	01	11	10
00		1	1	1
01	1			
11	x	x	x	x
10		1	x	x

E2=B2B1B0+B2'B1'+B3'B2'B1

For E3

	00	01	11	10
00				
01		1	1	1
11	x	x	x	x
10	1	1	x	x

E3=B3B1'+B2B0+B2B1B0'

Conclusion

In conclusion, binary to excess-3 conversion is a straightforward process used to represent binary numbers in an excess-3 code, also known as XS-3 or Gray code. This conversion involves adding 3 (0011 in binary) to each digit of the binary number, essentially shifting it to a different number system. Excess-3 is particularly useful in error correction and digital systems, as it offers a one-bit change between consecutive numbers. This simple transformation facilitates error detection and correction, making it a valuable tool in various applications, including arithmetic logic units, digital communication, and coding schemes. By converting binary to excess-3, data integrity and reliability can be enhanced, and it plays a vital role in ensuring accurate information transmission in digital systems.