

Lab Performance (Lab 04)

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Course- CSE 231.L

Section- 04

Today's lab experiment name is BCD to Excess-3 Converter.

Today our Lab objective was –

- Learn various numerical representation systems.
- Design a complete minimal combinational logic system from specification to implementation.
- Minimize combinational logic circuits using Karnaugh maps.
- Implement circuits using minimal forms.

In this lab, we learned about BCD & Excess 3 Number system. Then we converted the BCD number system to excess 3 number system. From the truth table of the BCD number system, we found an excess 3 number system. Then used a k map to find the functions from the truth table.

Also, we learned about how to group k maps, don't care equations, etc. By using the Karnaugh maps.

To use the Karnaugh maps we had to make a group for 2^n . For 4 input it was $2^4=16$. So, we had to make 16 cells Karnaugh map then match them in groups. First, we looked for if there were any groups of 16, if not we search for 8 but we did not find for 8. We found 4 groups. Then we made some group and we found four equations, A, B, C, D.

Then we learned how to draw logicism functions from the equation. Also, we did k map for 16 tables. From number 9 we used the don't know operation as it is the hexadecimal number system.

Let's construct the table-

Decimal Digit	Binary Coded Decimal				Excess-3			
	W	X	Y	Z	A	B	C	D
0	0	0	0	0	0	0	1	1
1	0	0	0	1	0	1	0	0
2	0	0	1	0	0	1	0	1
3	0	0	1	1	0	1	1	0
4	0	1	0	0	0	1	1	1
5	0	1	0	1	1	0	0	0
6	0	1	1	0	1	0	0	1
7	0	1	1	1	1	0	1	0
8	1	0	0	0	1	0	1	1
9	1	0	0	1	1	1	0	0
10	1	0	1	0	X	X	X	X
11	1	0	1	1	X	X	X	X
12	1	1	0	0	X	X	X	X
13	1	1	0	1	X	X	X	X
14	1	1	1	0	X	X	X	X
15	1	1	1	1	X	X	X	X

K-Maps

	Y'Z'	Y'Z	YZ	YZ'
W'X'	0	0	0	0
W'X	0	1	1	1
WX	X	X	X	X
WX'	1	1	X	X

$$A=W+XZ+XY$$

	Y'Z'	Y'Z	YZ	YZ'
W'X'	0	1	1	1
W'X	1	0	0	0
WX	X	X	X	X
WX'	0	1	X	X

$$B=X'Z+X'Y+XY'Z'$$

	Y'Z'	Y'Z	YZ	YZ'
W'X'	1	0	1	0
W'X	1	0	1	0
WX	X	X	X	X
WX'	1	0	X	X

$$C=Y'Z'+YZ$$

	Y'Z'	Y'Z	YZ	YZ'
W'X'	1	0	0	1
W'X	1	0	0	1
WX	X	X	X	X
WX'	1	0	X	X

$$D=Y'Z'+YZ'$$

$$D=Z'(Y'+Y)$$

$$D=Z'$$

