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 2n. For 4 input it was 24 =16So, we had to mad 16 cells Karnaugh map the 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 found 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’ |  |  |  | Y’Z’ | Y’Z | YZ | YZ’ |
| W’X’ | 0 | 0 | 0 | 0 |  |  | W’X’ | 0 | 1 | 1 | 1 |
| W’X | 0 | 1 | 1 | 1 |  |  | W’X | 1 | 0 | 0 | 0 |
| WX | X | X | X | X |  |  | WX | X | X | X | X |
| WX’ | 1 | 1 | X | X |  |  | WX’ | 0 | 1 | X | X |

A=W+XZ+XY B=X’Z+X’Y+XY’Z’

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Y’Z’ | Y’Z | YZ | YZ’ |  |  |  | Y’Z’ | Y’Z | YZ | YZ’ |
| W’X’ | 1 | 0 | 1 | 0 |  |  | W’X’ | 1 | 0 | 0 | 1 |
| W’X | 1 | 0 | 1 | 0 |  |  | W’X | 1 | 0 | 0 | 1 |
| WX | X | X | X | X |  |  | WX | X | X | X | X |
| WX’ | 1 | 0 | X | X |  |  | WX’ | 1 | 0 | X | X |

C=Y’Z’+YZ D=Y’Z’+YZ’

D=Z’(Y’+Y)

D = Z’