North South University

Department of Electrical & Computer Engineering

LAB REPORT

Course Code : EEE211

Course Title: Digital Electronics

Section: 01

Experiment Number: 04

Experiment Name: Combinational Logic

Experiment Date: 30.11.2020

Date of Submission: 07.12.2020

Course Instructor: Fahimul Haque

Submitted To: Fatema Zahra

Name of Experiment:

Combinational Logic Design.

Objectives:

→ Design a complete minimal combinational logic system from specification to implementation.

→ Minimize combinational logic circuits using K-maps.

→ Learn various numerical representation systems.

→ Implements circuits using 1st & 2nd canonical minimal forms.

Apparatus:

→ Trainer Board.

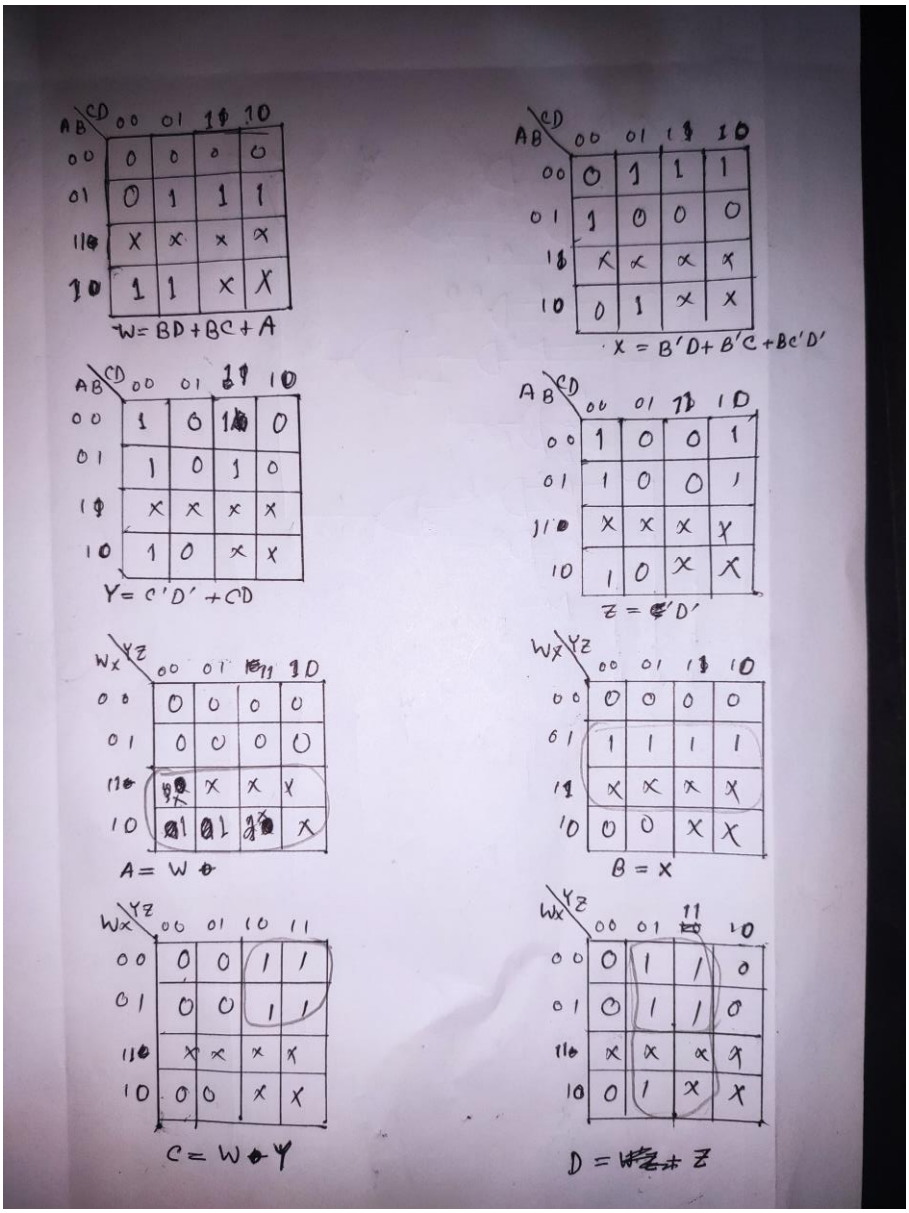
→ Logic gates ICs: 2 & 3 input - AND, OR, NOR, NAND.

Theory:

In this lab, we have learned number conversion.

Binary Coded Decimal (BCD)				Excess-3			
A	B	C	D	W	X	Y	Z
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
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x

Excess-3				Binary Coded Decimal (BCD)			
W	X	Y	Z	A	B	C	D
0	0	1	1	0	0	0	0
0	1	0	0	0	0	0	1
0	1	0	1	0	0	1	0
0	1	1	0	0	0	1	1
0	1	1	1	0	1	0	0
1	0	0	0	0	1	0	1
1	0	0	1	0	1	1	0
1	0	1	0	0	1	1	1
1	0	1	1	1	0	0	0
1	1	0	0	1	0	0	1
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x



AB \ CD	00	01	11	10
00	0	0	0	0
01	0	1	1	1
11	X	X	X	X
10	1	1	X	X

W = BD + BC + A

AB \ CD	00	01	11	10
00	0	1	1	1
01	1	0	0	0
11	X	X	X	X
10	0	1	X	X

X = B'D + B'C + BC'D'

AB \ CD	00	01	11	10
00	1	0	1	0
01	1	0	1	0
11	X	X	X	X
10	1	0	X	X

Y = C'D' + CD

AB \ CD	00	01	11	10
00	1	0	0	1
01	1	0	0	1
11	X	X	X	X
10	1	0	X	X

Z = C'D'

Wx \ YZ	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	X	X	X	X
10	1	1	X	X

A = W

Wx \ YZ	00	01	11	10
00	0	1	1	0
01	1	1	1	1
11	X	X	X	X
10	0	0	X	X

B = X

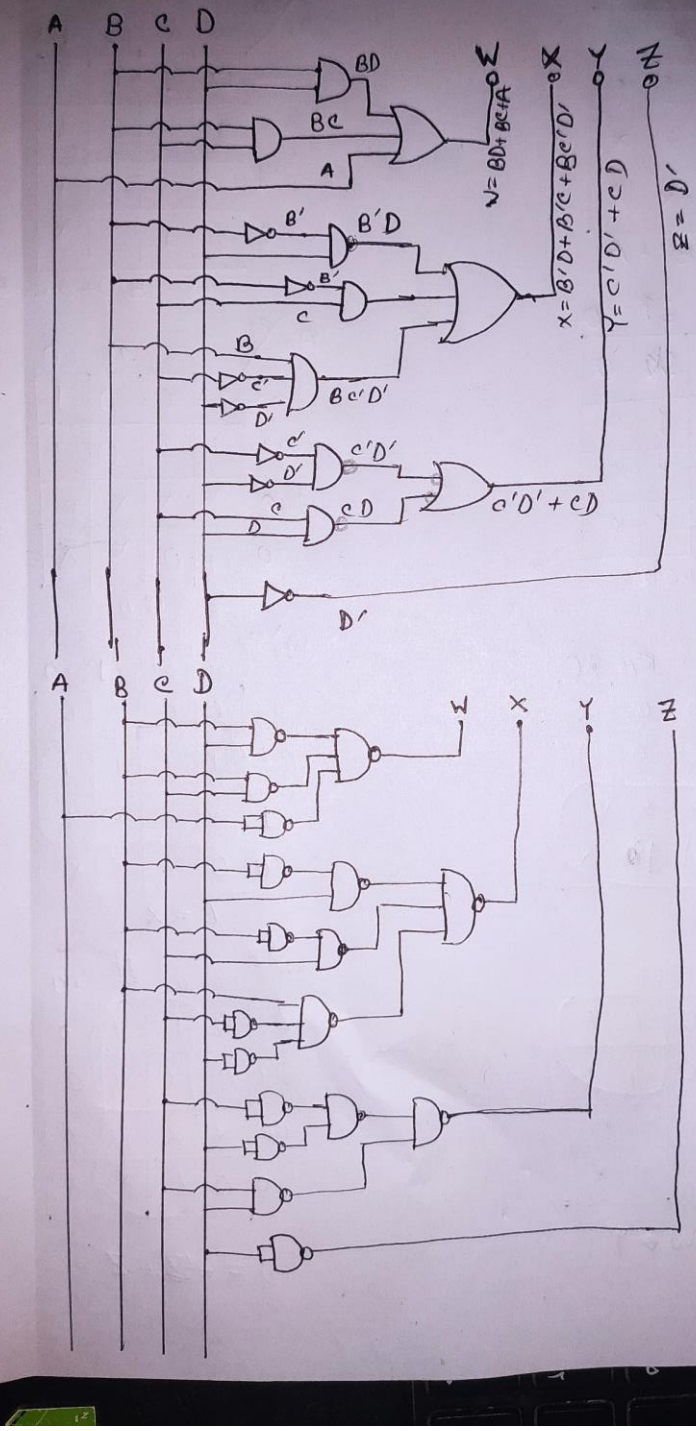
Wx \ YZ	00	01	10	11
00	0	0	1	1
01	0	0	1	1
11	X	X	X	X
10	0	0	X	X

C = W + Y

Wx \ YZ	00	01	11	10
00	0	1	1	0
01	0	1	1	0
11	X	X	X	X
10	0	1	X	X

D = Z + Z

Circuit Diagram:



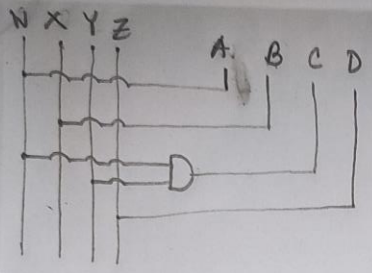


Fig: Excess-3 to BCD Circuit diagram

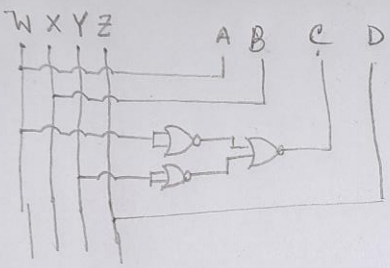


Fig: Excess-3 to BCD Circuit Diagram using NOR gates.

Discussion:

Due to pandemic we are attending the lab online & using software simulation we are completing the ~~expe~~ experiment. Through this experiment we learned the conversion procedure of number. We also learned to use K-map for output as well; whether we used K-map for input only previously. This lab helped us to relate our theoretical idea with the practical one's.