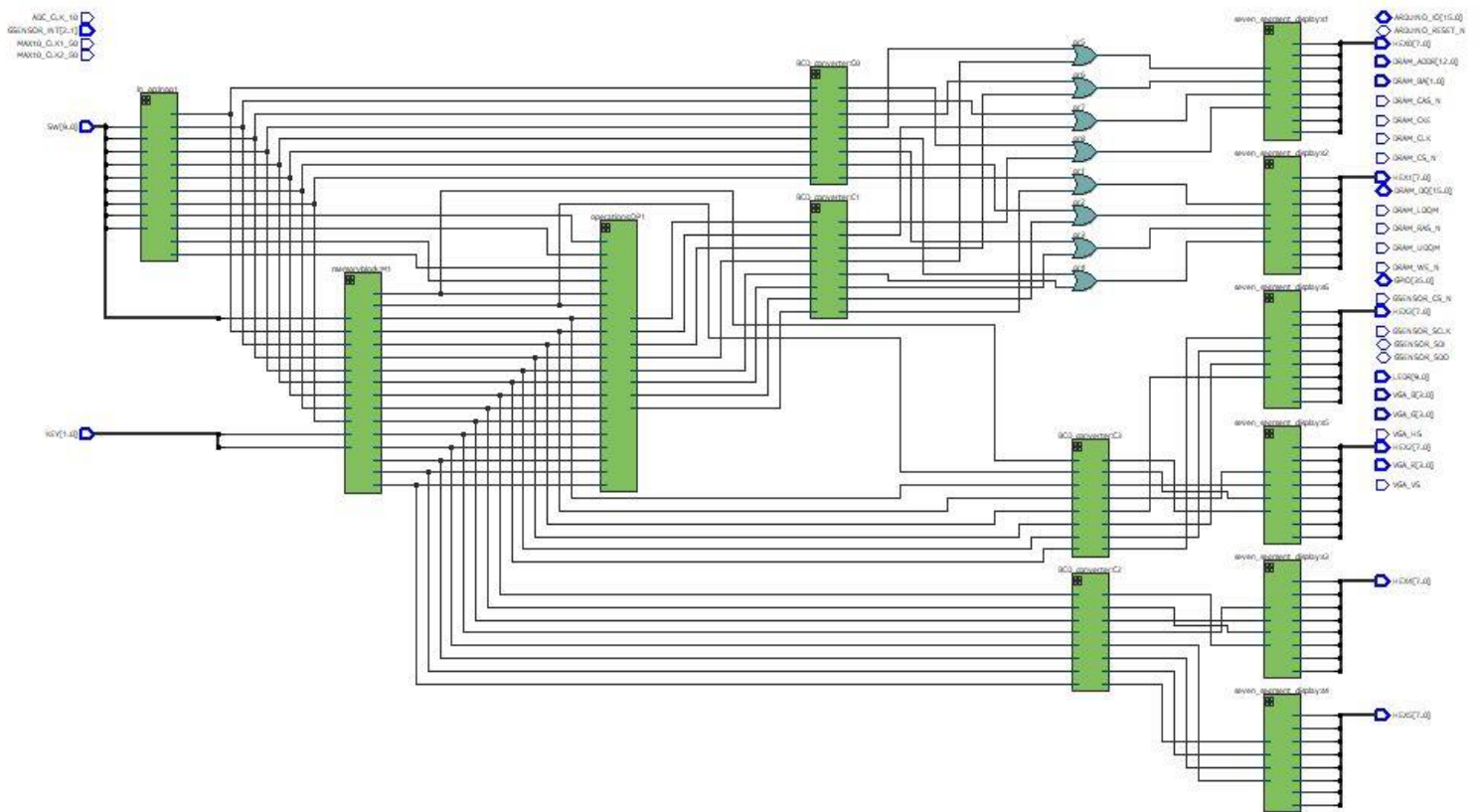# EC4010: DIGITAL DESIGN
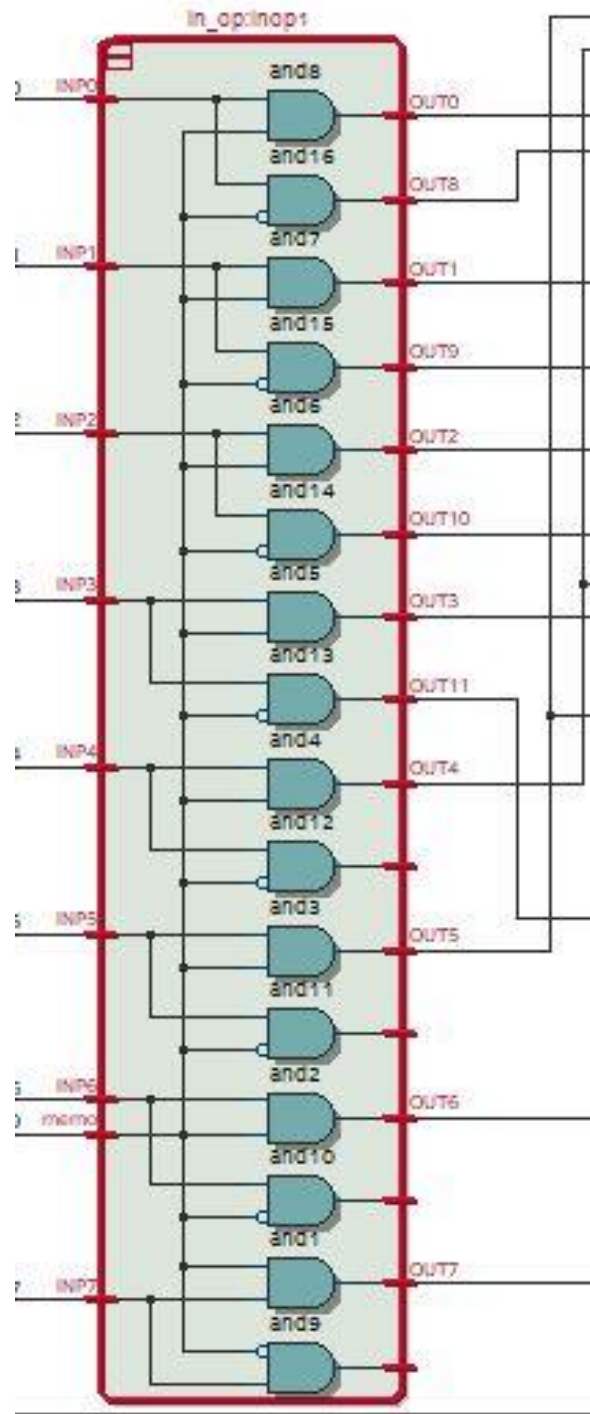
ASSIGNMENT 03

NAME: PERERRA G.A.N.C
PRIYABHASHANIE E.M
RATHNAYKA R.M.D.T

REG NUM: 2019/E/094
2019/E/099
2019/E/107

DATE: 30 JUNE 2022
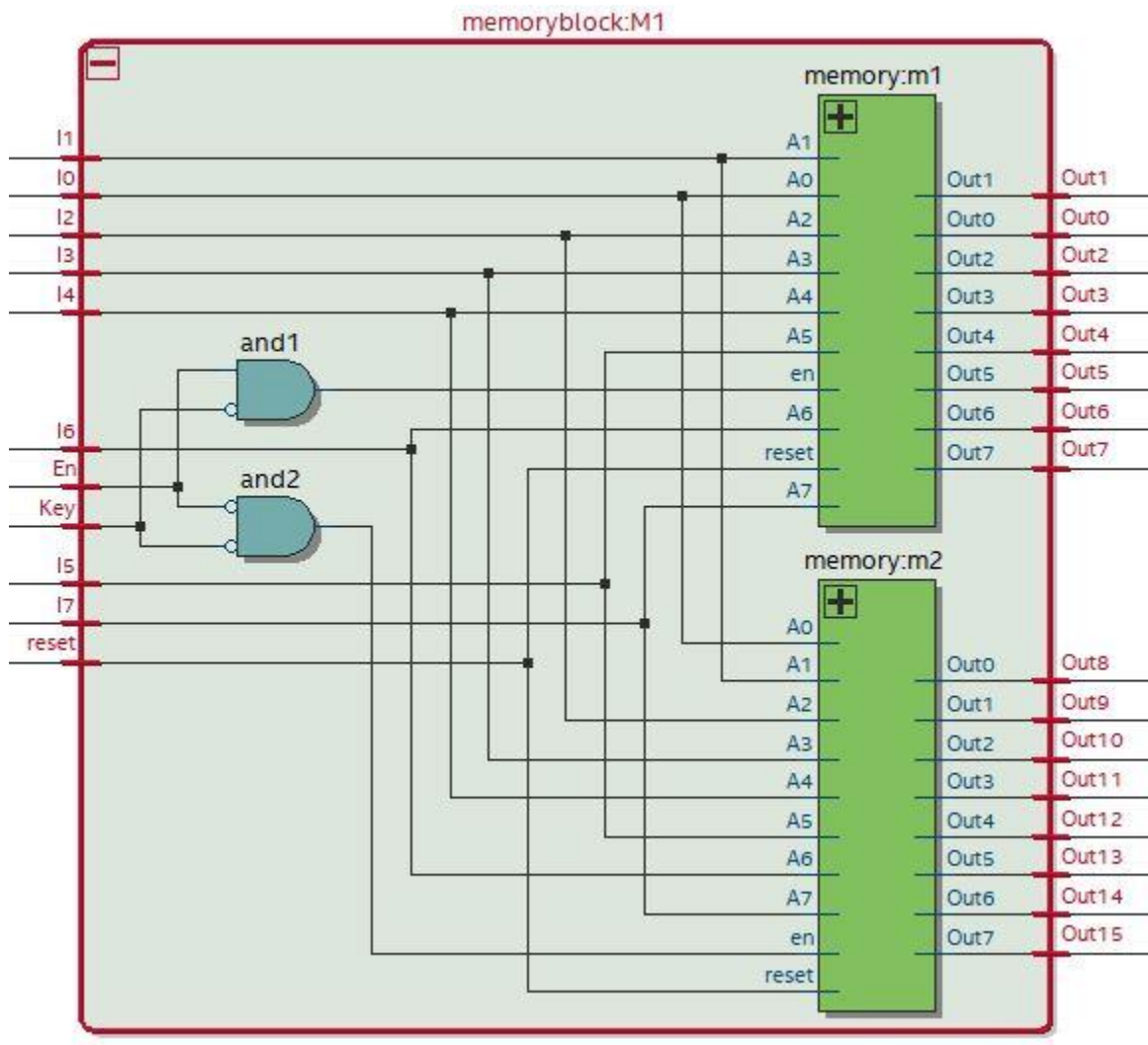
COMPLETE BLOCK DIAGRAM OF CALCULATOR

INPUT AND OPERATION SELECTION MODULE

MEMORY ELEMENT

MAIN MODULE

SUB MODULE

DLATCH

d_latch:D7

q$latch

d	DATAIN	
en	LATCH_ENABLE	OUT0	q
rstn	ACLR	
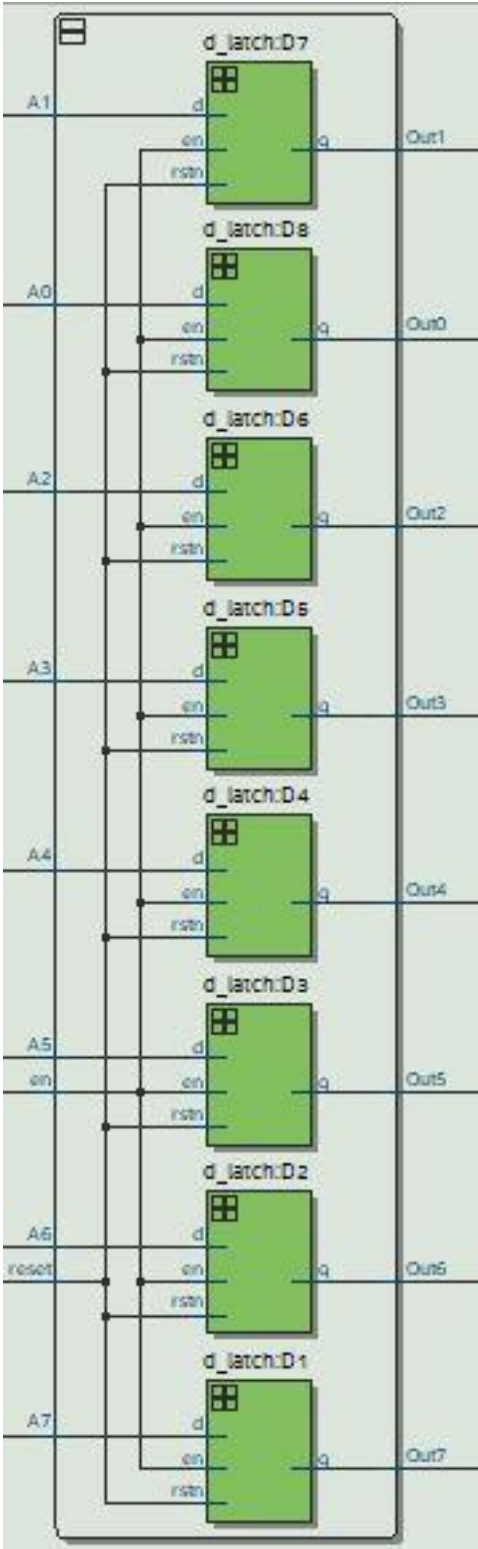
LATCH
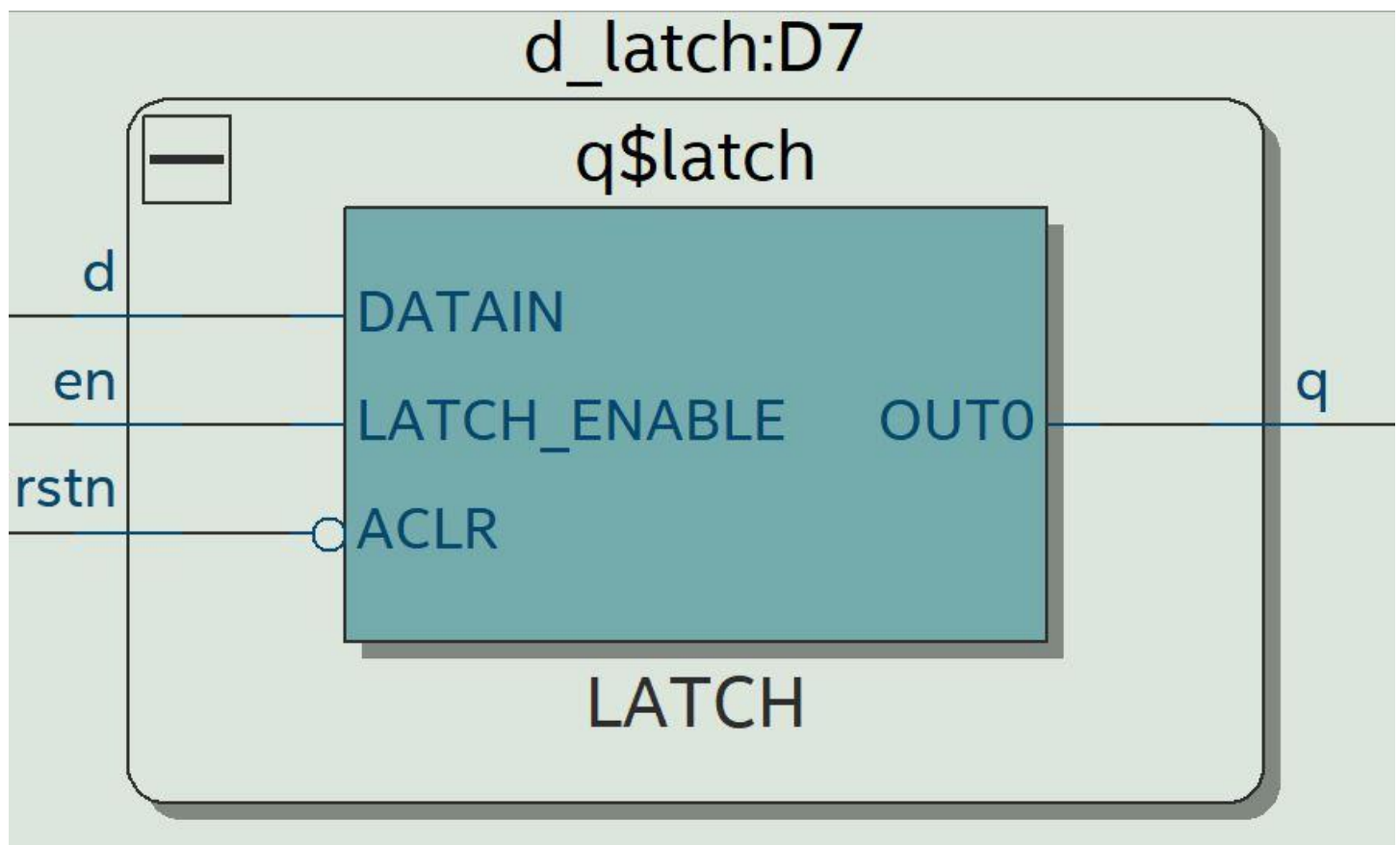
OPERATIONS MODULE

ADDER SUBTRACTOR MODULE

MAIN MODULE

SUB MODULE OF ADDER SUBTRACTOR

Adder_subtractor:AS1

ADDER:ADD6

A

xor1

B

Z

xor2

and1

and2

or1

s

c

MULTIPLICATION MODULE

MAIN MODULE

MAIN MODULE

DIVISION MODULE

MAIN MODULE
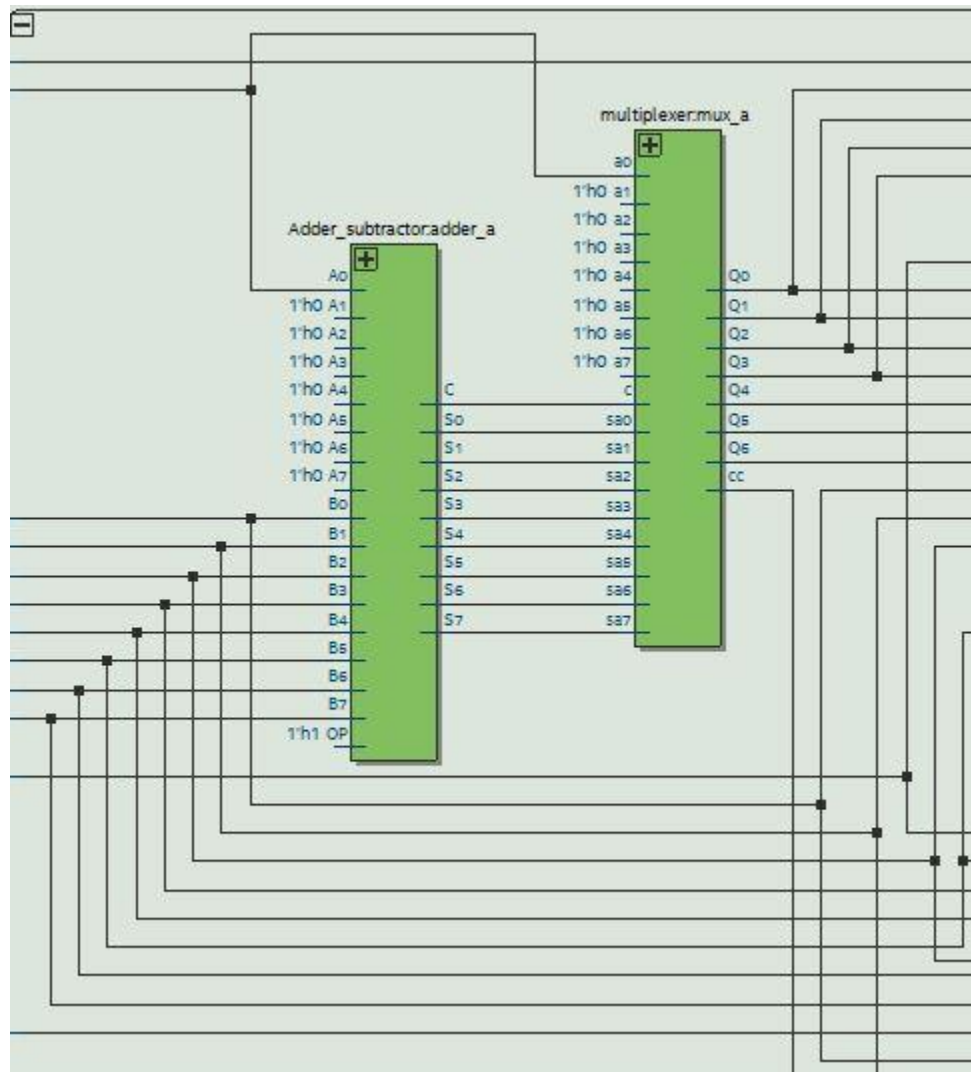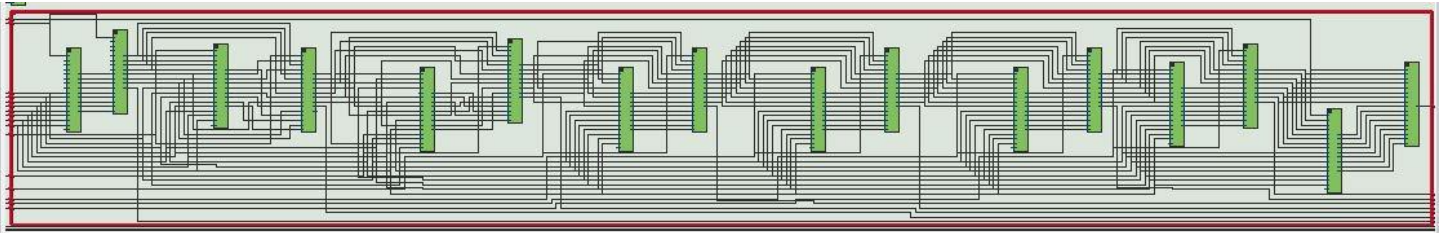
MULTIPLEXER
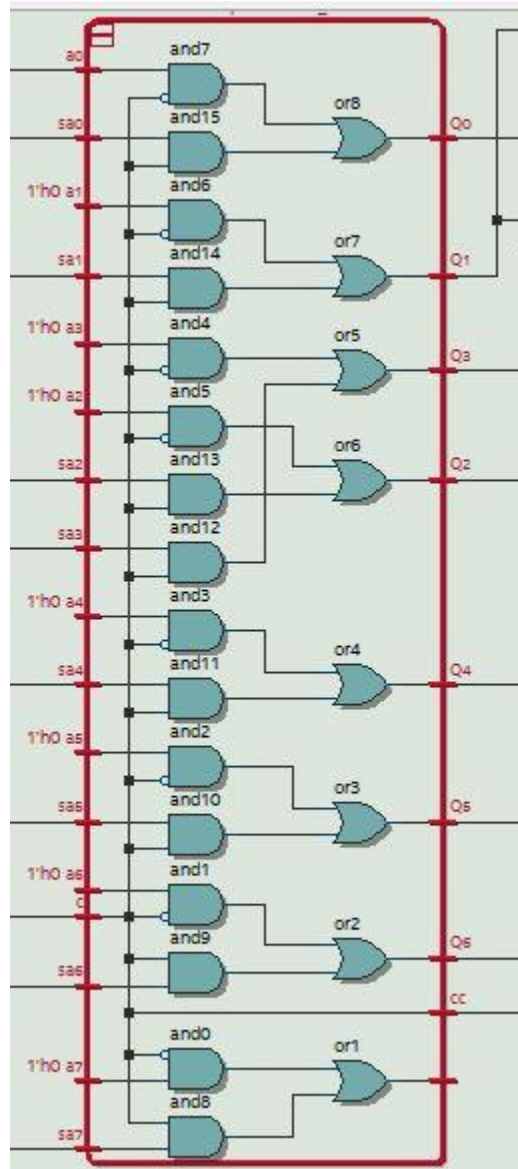
BCD CONVERTER MODULE
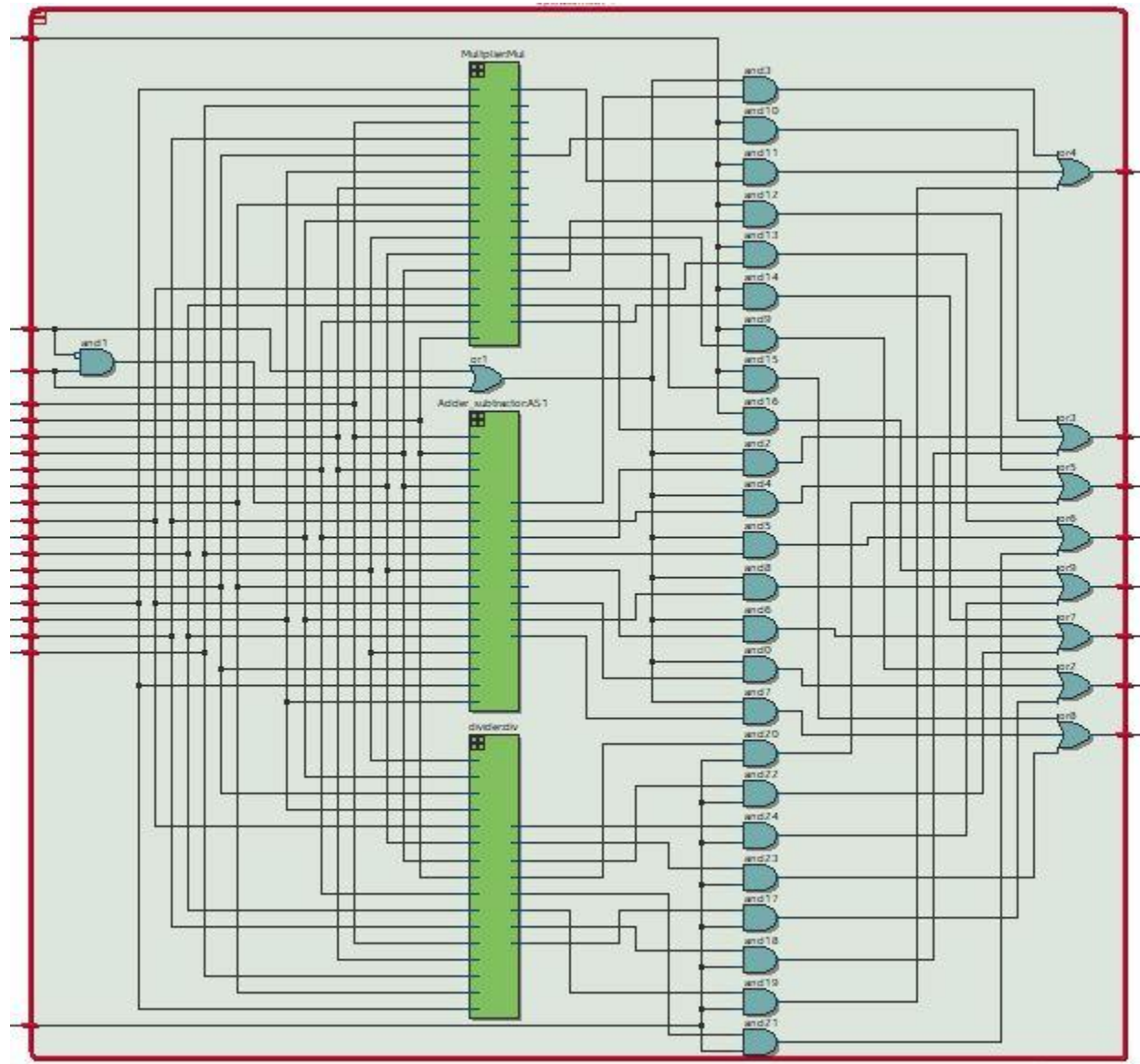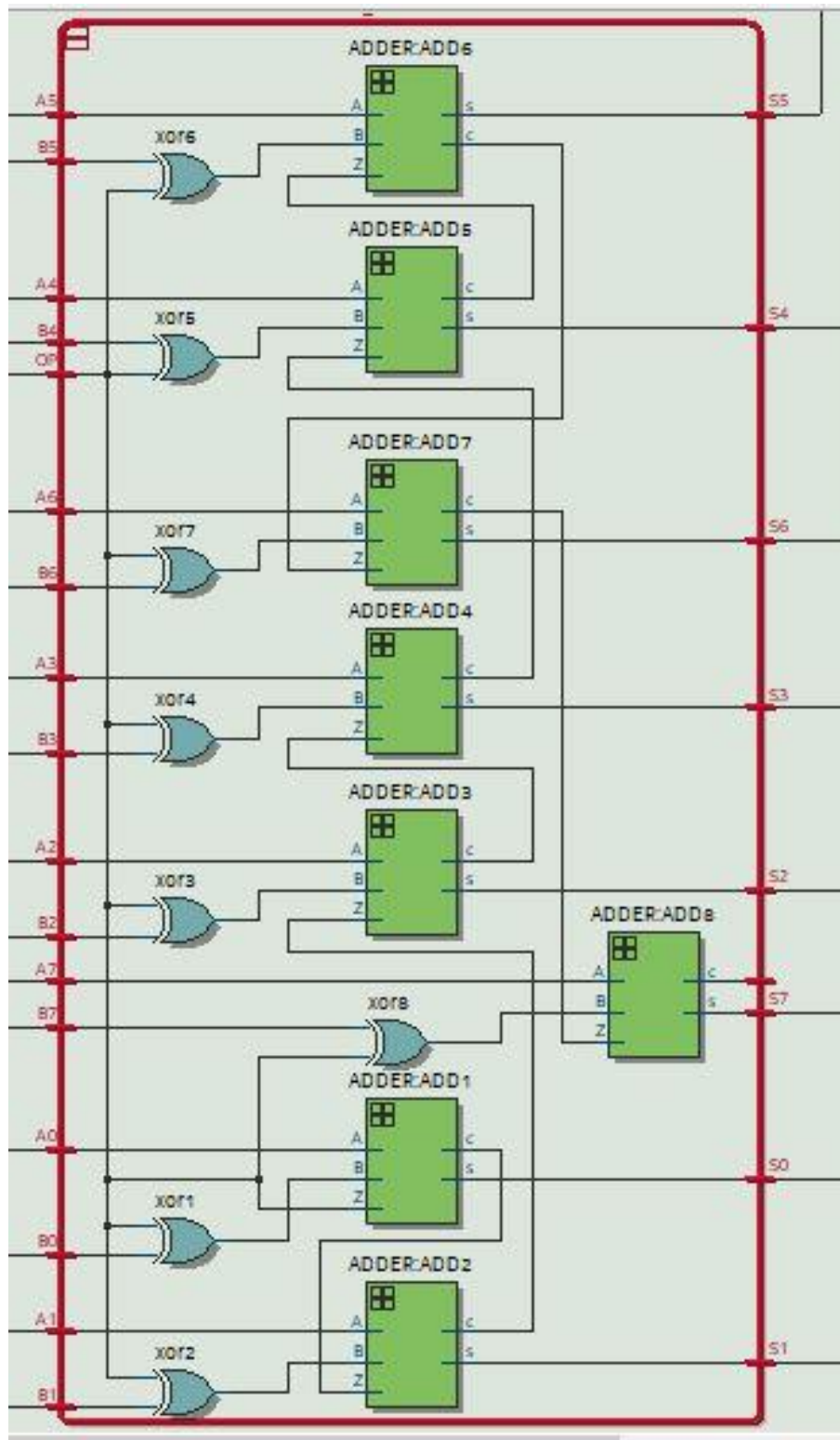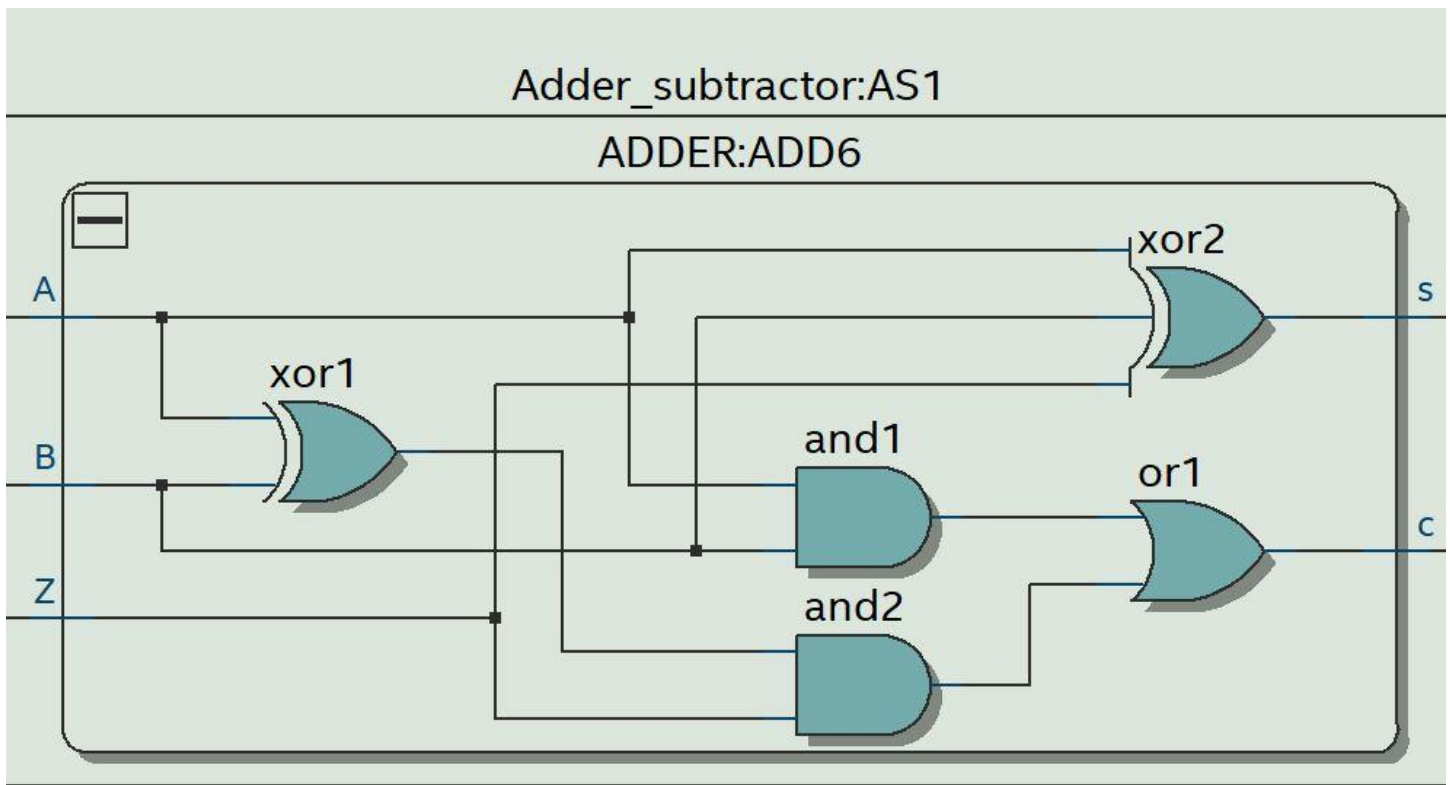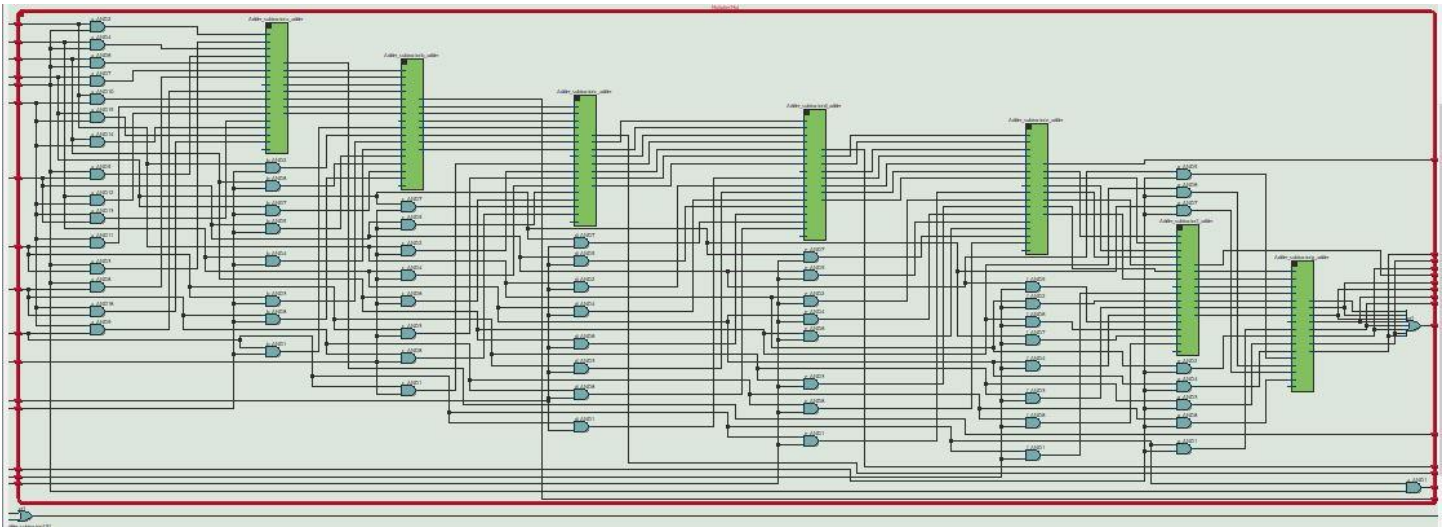
TRUTH TABELE FOR BCD CONVERTER

	A	B	C	D	a	b	c	d
0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1
2	0	0	1	0	0	0	1	0
3	0	0	1	1	0	0	1	1
4	0	1	0	0	0	1	0	0
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 FOR BCD CONVERTER

1.K'MAP FOR a:

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

F = A + BD + BC

2.K'MAP FOR b:

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

F = AD + BC'D'

3.K'MAP FOR c:

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

F = CD + AD' + B'C

4.K'MAP FOR d:

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

F = AD' + A'B'D + BCD'

MAIN MODULE
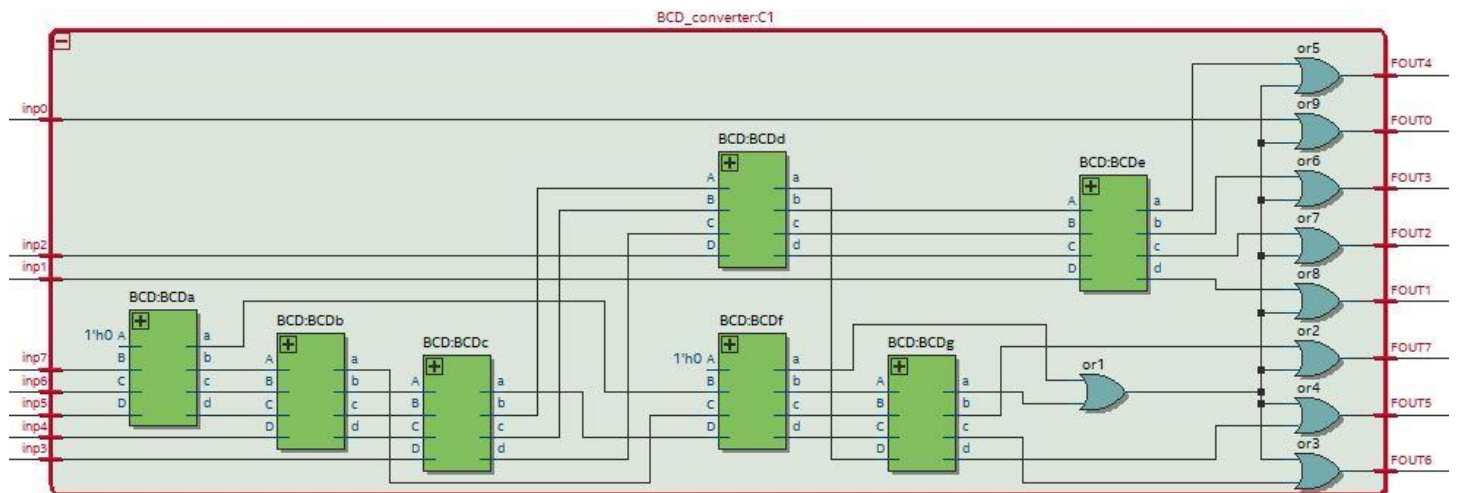
SEVEN SEGMENT DECORDER MODULE

TRUTH TABELE FOR SEVEN SEGMENT DECORDER

	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	1	1	0	0	1	1	1	1
2	0	0	1	0	0	0	1	0	0	1	0
3	0	0	1	1	0	0	0	0	1	1	0
4	0	1	0	0	1	0	0	1	1	0	0
5	0	1	0	1	0	1	0	0	1	0	0
6	0	1	1	0	0	1	0	0	0	0	0
7	0	1	1	1	0	0	0	1	1	1	1
8	1	0	0	0	0	0	0	0	0	0	0
9	1	0	0	1	0	0	0	0	1	0	0
10	1	0	1	0	0	1	1	0	0	0	0
11	1	0	1	1	0	1	1	0	0	0	0
12	1	1	0	0	0	1	1	0	0	0	0
13	1	1	0	1	0	1	1	0	0	0	0
14	1	1	1	0	0	1	1	0	0	0	0
15	1	1	1	1	0	1	1	0	0	0	0

K'MAPS FOR SEVEN SEGMENT DECORDER

1. K'MAP FOR SEGMENT a:

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

$$F = A'B'C'D + A'BC'D'$$

$$= A'C' (B'D + BD')$$

2.K'MAP FOR SEGMENT b:

CD

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

$$F = AB + AC + BC'D + BCD'$$

3.K'MAP FOR SEGMENT c:

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

$$F = AB + AC + B'CD'$$

4. K'MAP FOR SEGMENT d:

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

F = A'BC'D' + A'B'C'D + A'BCD

5. K'MAP FOR SEGMENT e:

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

F = AD' + A'BC' + B'C'D

6. K'MAP FOR SEGMENT f:

CD / AB	00	01	11	10
00	0	1	1	1
01	0	0	1	0
11	0	0	0	0
10	0	0	0	0

F = A'CD + A'B'D + A'B'C

7. K'MAP FOR SEGMENT G:

CD / AB	00	01	11	10
00	1	1	0	0
01	0	0	1	0
11	0	0	0	0
10	0	0	0	0

F = A'B'C' + A'BCD

MAIN MODULE
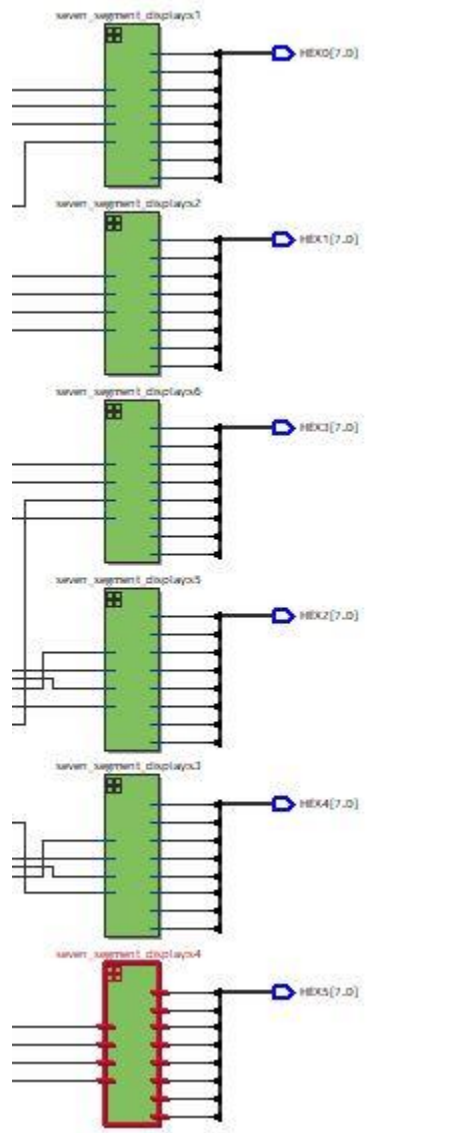
SUB MODULE
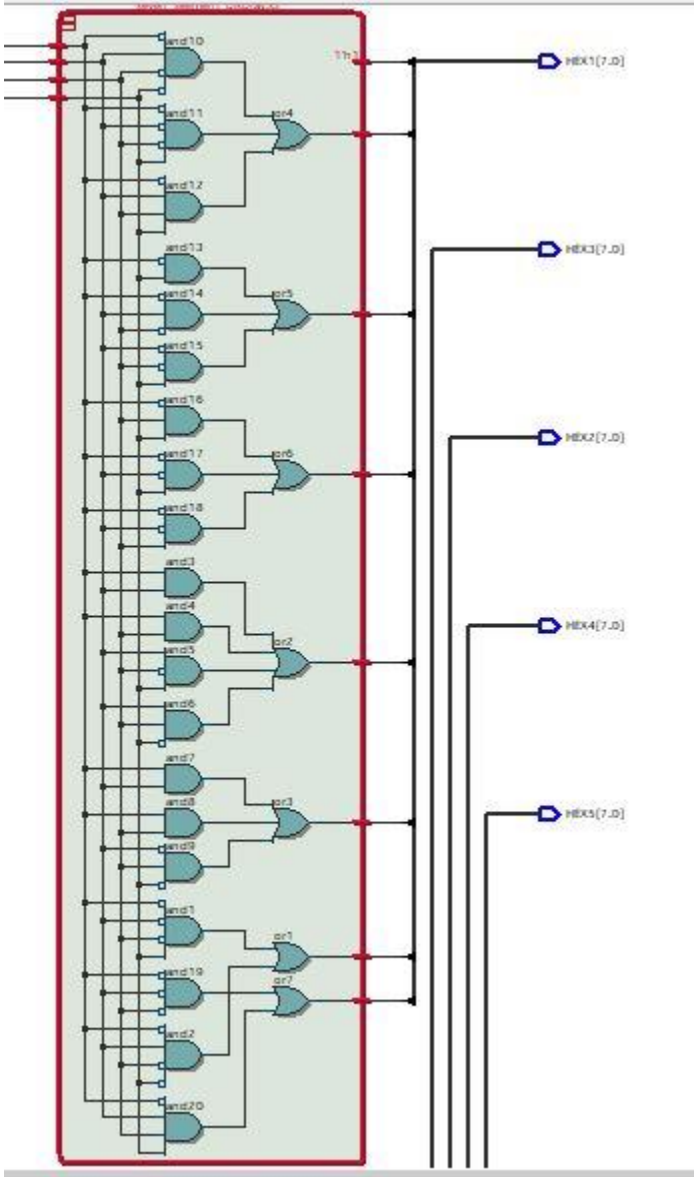
CONTRIBUTION

REGISTRATION NUMBER	NAME	CONTRIBUTION
2019/E/094	PERERRA G.A.N.C	**100%**
2019/E/099	PRIYABHASHANIE E.M	**100%**
2019/E/107	RATHNAYKA R.M.D. T	**100%**