Practical 8

AIM: To implement Full Subtractor and Half Subtractor in Logisim Simulator

- **HALF SUBTRACTOR**

Inputs		Outputs	
A	B	Diff	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

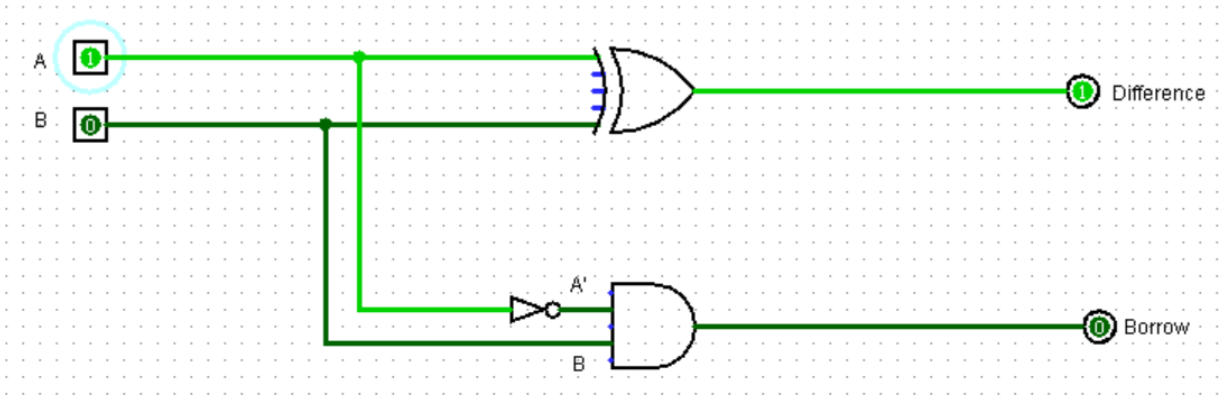
Diff = A'B + AB'

Diff = A $\oplus$ B

AND,

Borrow = A'B

Implementation:



- **FULL SUBTRACTOR**

Inputs			Outputs	
A	B	$Borrow_{in}$	Diff	Borrow
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

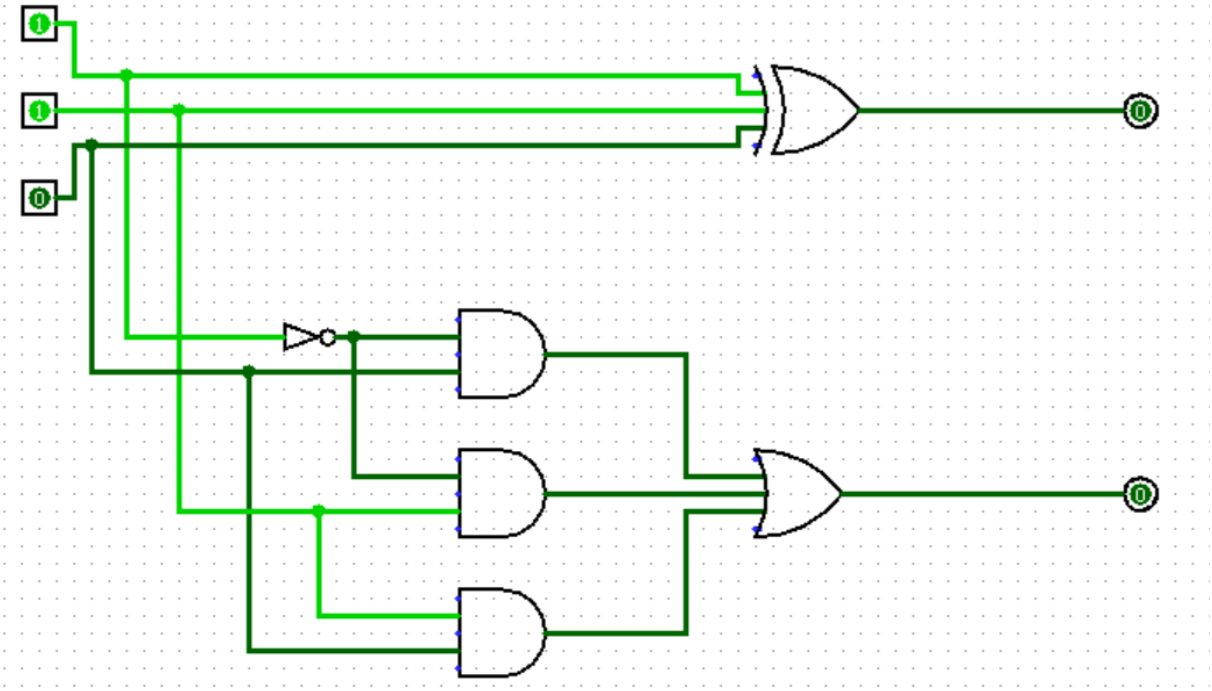
For Difference :

B Bin / A	00	01	11	10
0	0	1	3	2
1	4	5	7	6

For Borrow :

B Bin / A	00	01	11	10
0	0	1	3	2
1	4	5	7	6

Implementation:



Rubric wise marks obtained:

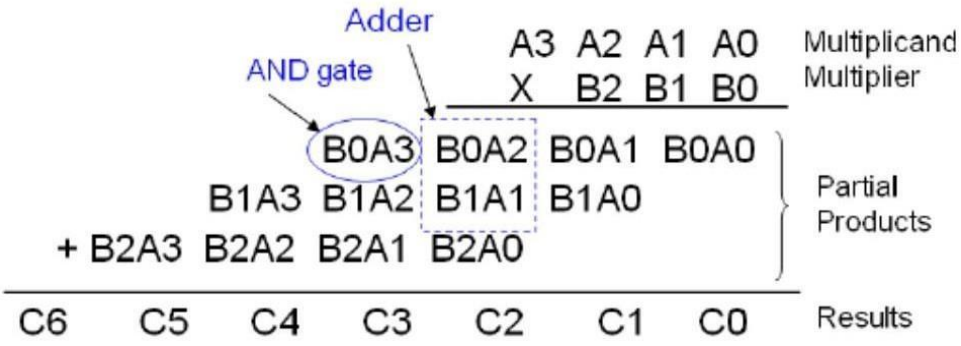
Rubrics	Regularity		Problem Understanding & Implementation of Solution in Simulator		Testing of the Solution		Documentation		Mock Viva Test		Total out of 10
	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

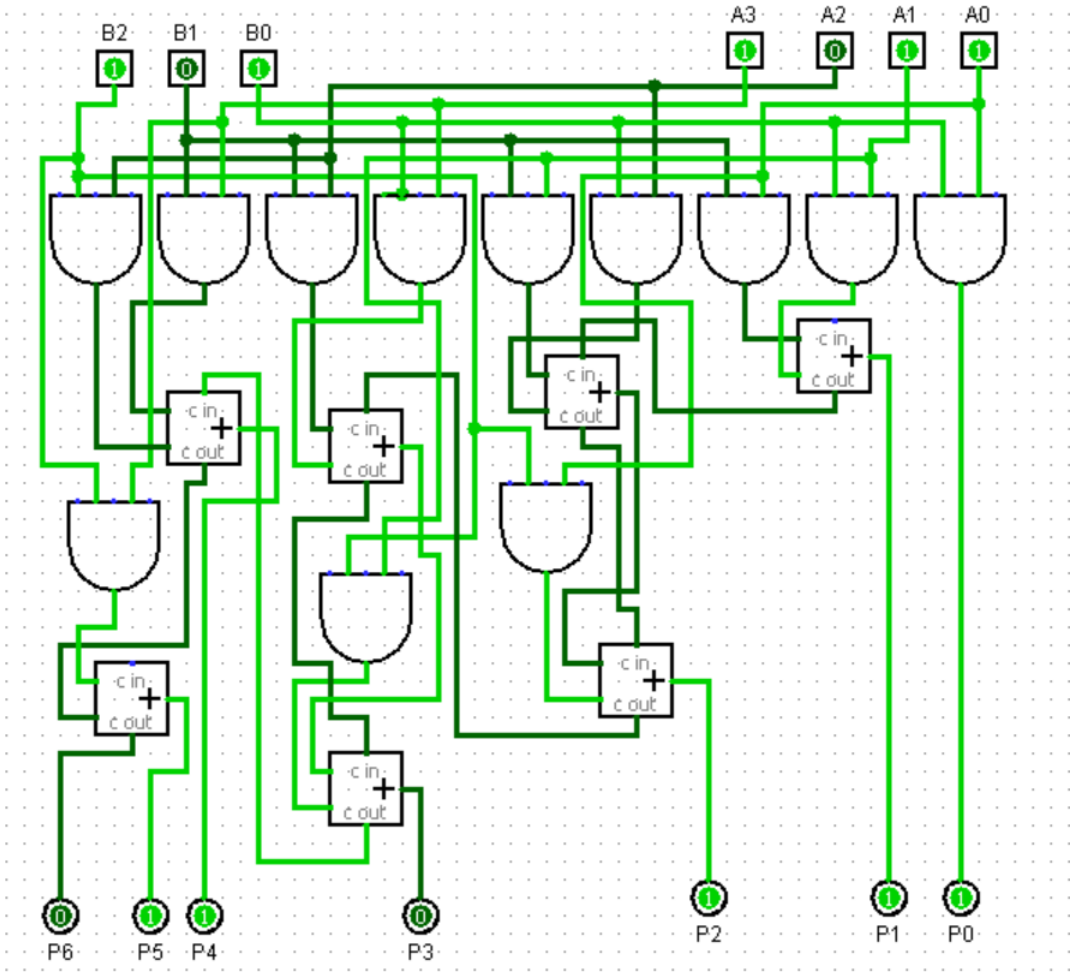
Practical 9

AIM: To implement four bit by three-bit binary multiplier

Theory:



Implementation:



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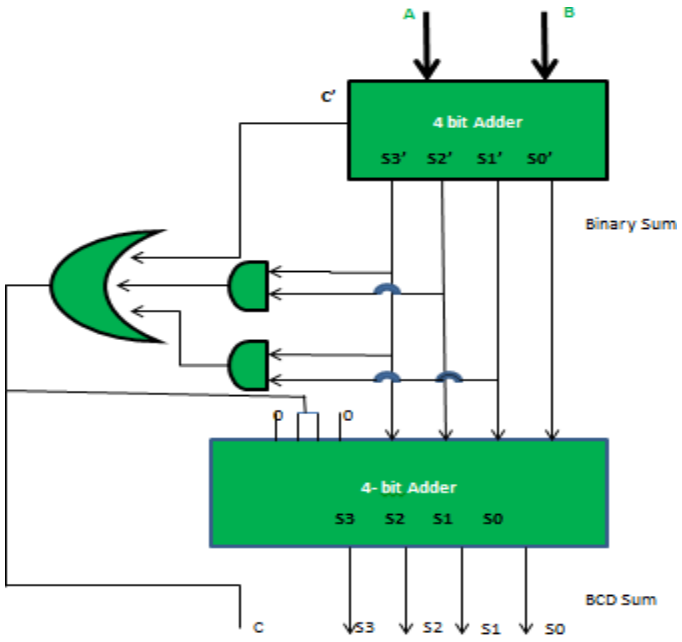
Faculty Signature

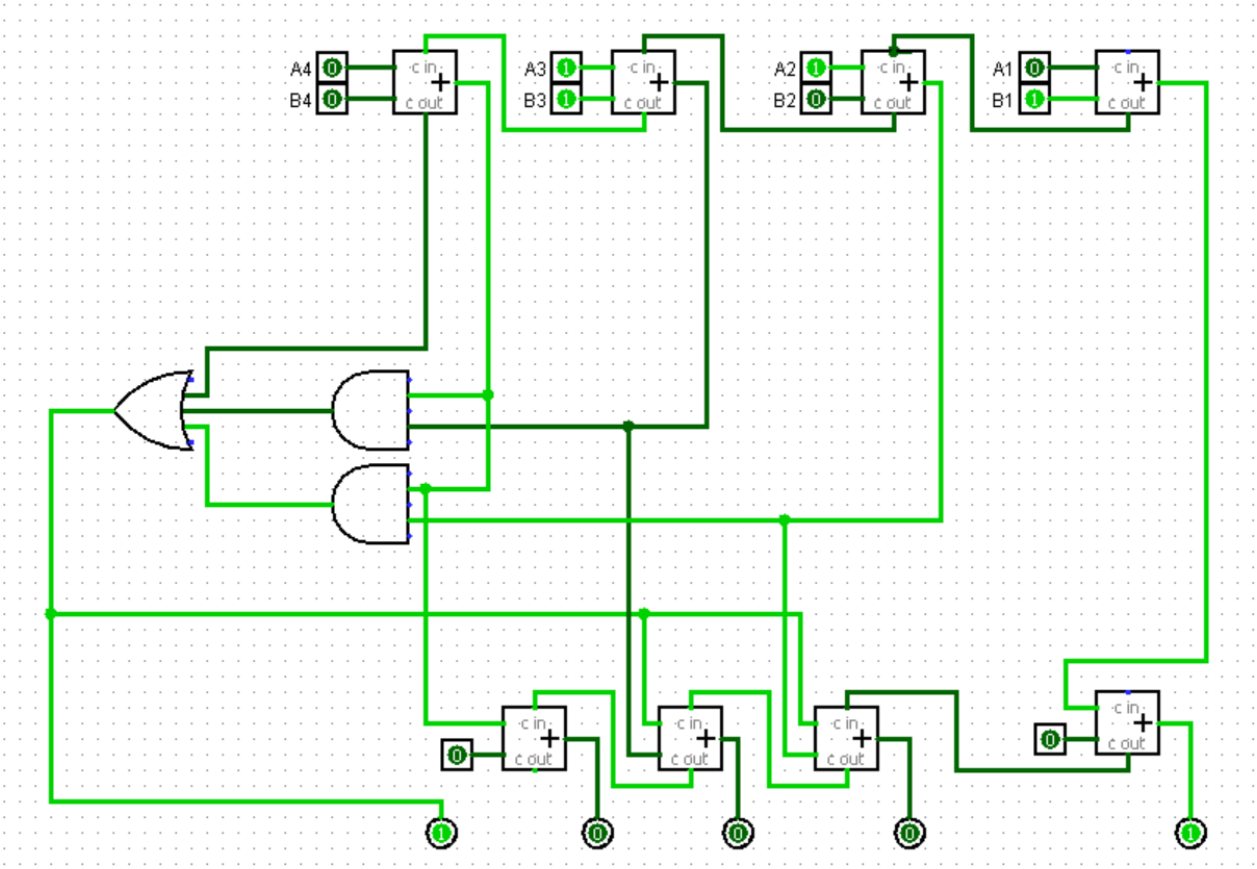
Practical 10

AIM: To implement BCD adder in Logisim simulator

Theory:



Implementation:



Rubric wise marks obtained:

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	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

Practical 11

AIM: To implement Magnitude Comparator in Logisim Simulator

Theory:

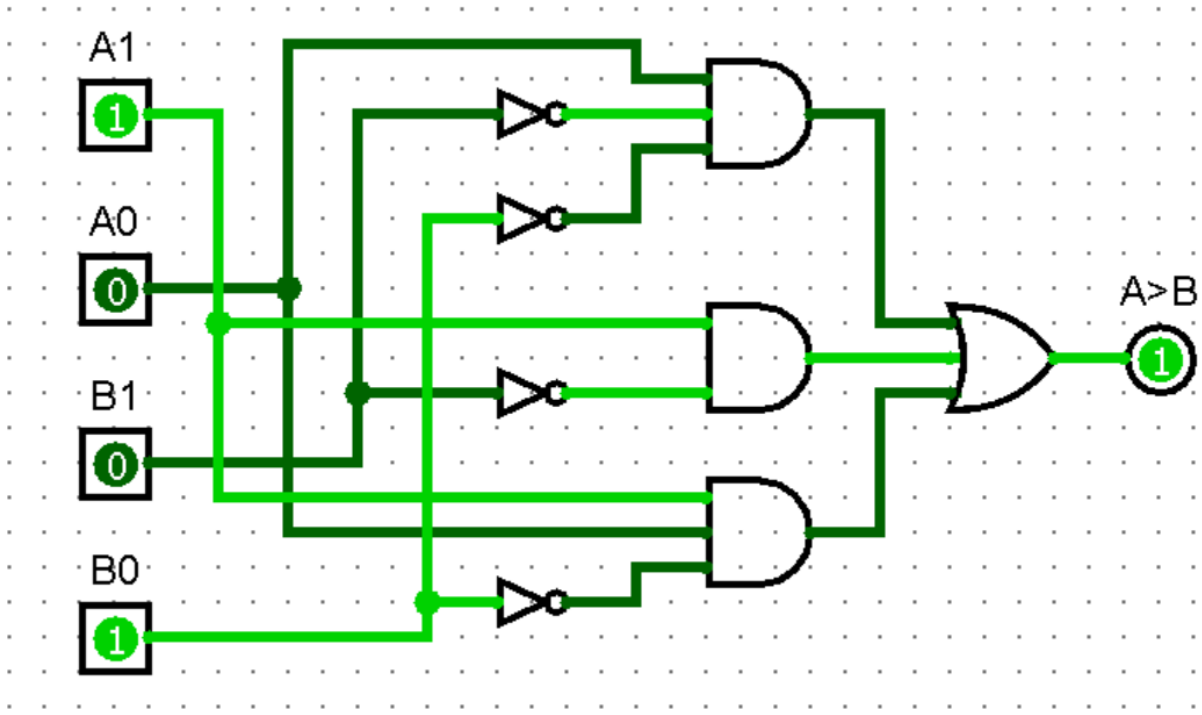
Inputs				Outputs		
A_1	A_0	B_1	B_0	A>B	A=B	A<B
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

FOR A>B :

A1A0 \ B1B0	00	01	11	10
00	**0**	**1**	**3**	**2**
01	**4**	**5**	**7**	**6**
11	**12**	**13**	**15**	**14**
10	**8**	**9**	**11**	**10**

$A > B = A_1' B_1' + A_0 B_1' B_0' + A_1 A_0 B_0'$

Implementation:



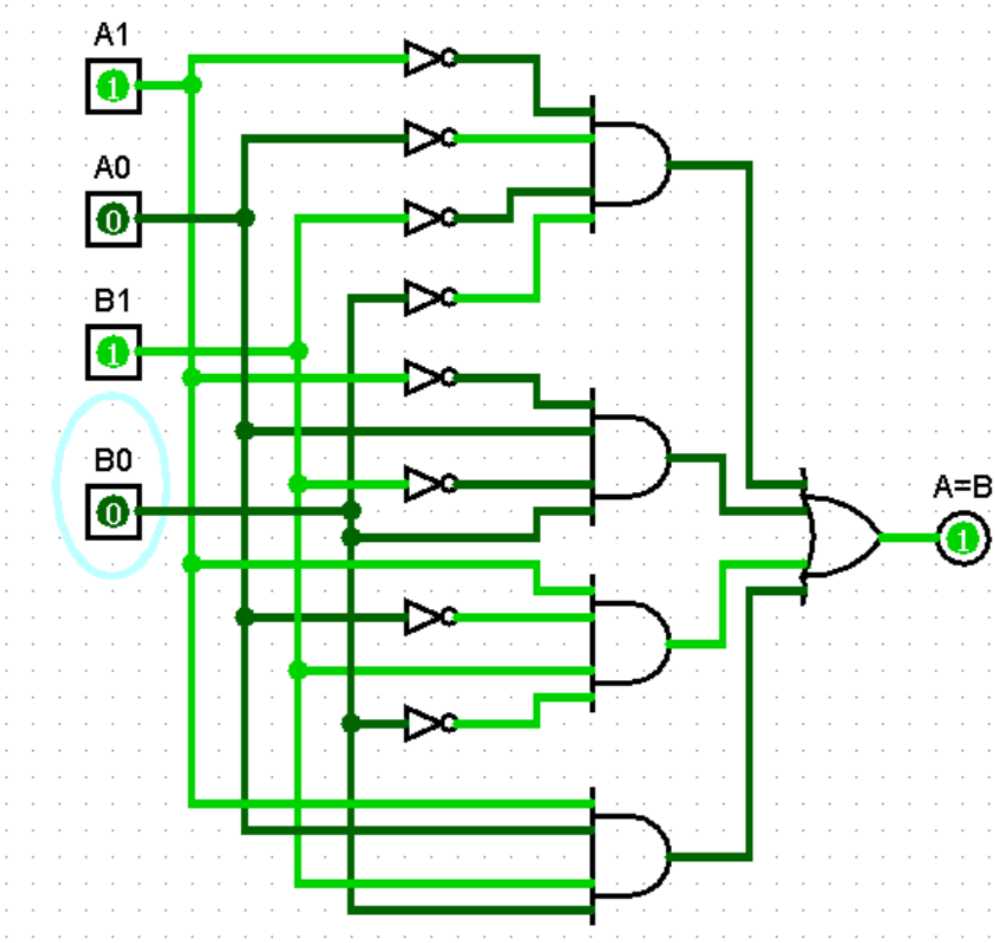
FOR A = B :

B1B0 / A1A0	00	01	11	10
00	**0**	**1**	**3**	**2**
01	**4**	**5**	**7**	**6**
11	**12**	**13**	**15**	**14**
10	**8**	**9**	**11**	**10**

$\{A = B\} = A_1' A_0' B_1' B_0' + A_1' A_0 B_1' B_0 + A_1 A_0' B_1 B_0'$

$+ A_1 A_0 B_1 B_0$

Implementation:

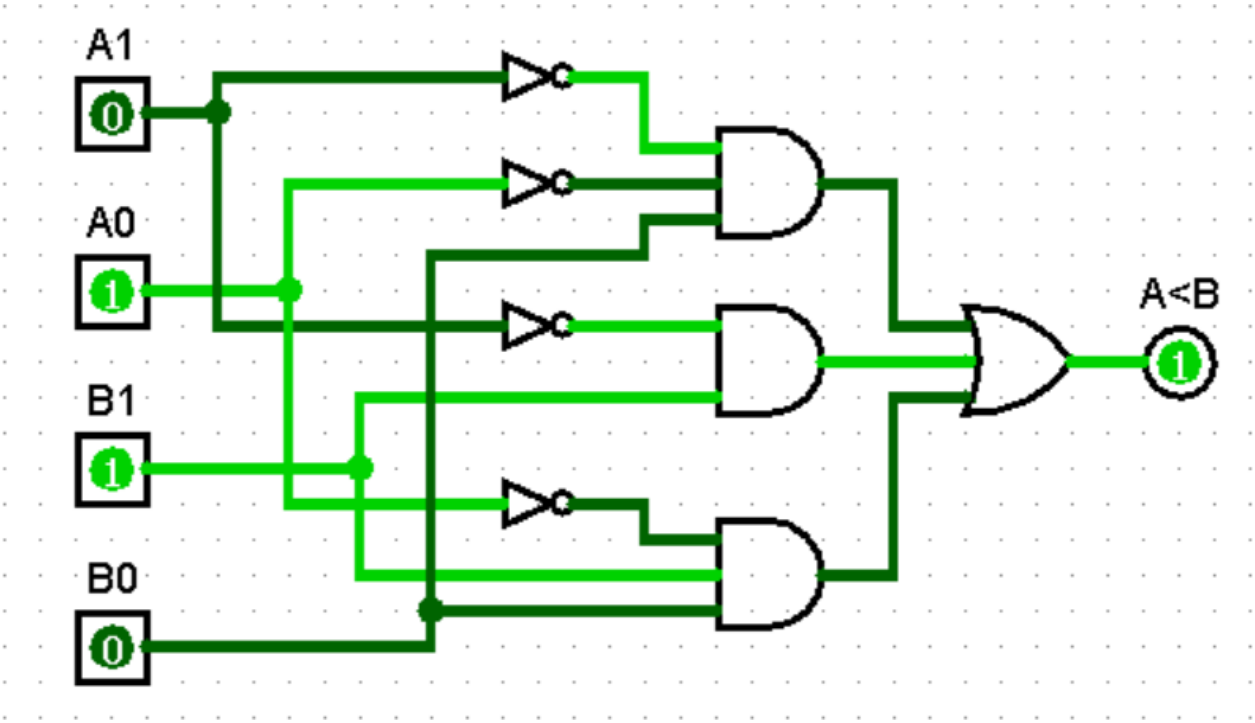


For A<B :

B1B0 / A1A0	00	01	11	10
00	**0**	**1**	**3**	**2**
01	**4**	**5**	**7**	**6**
11	**12**	**13**	**15**	**14**
10	**8**	**9**	**11**	**10**

{ A < B } = A_1' B_1 + A_1' A_0' B_0 + A_0' B_1 B_0

Implementation:



Rubric wise marks obtained:

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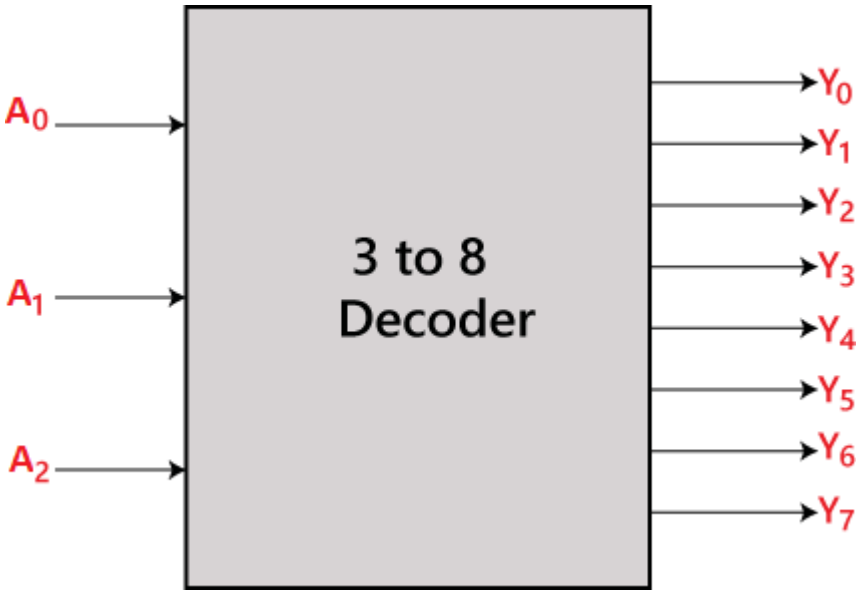
	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

Practical 12

AIM: To implement 3 X 8 decoder in Logisim Simulator

Theory:



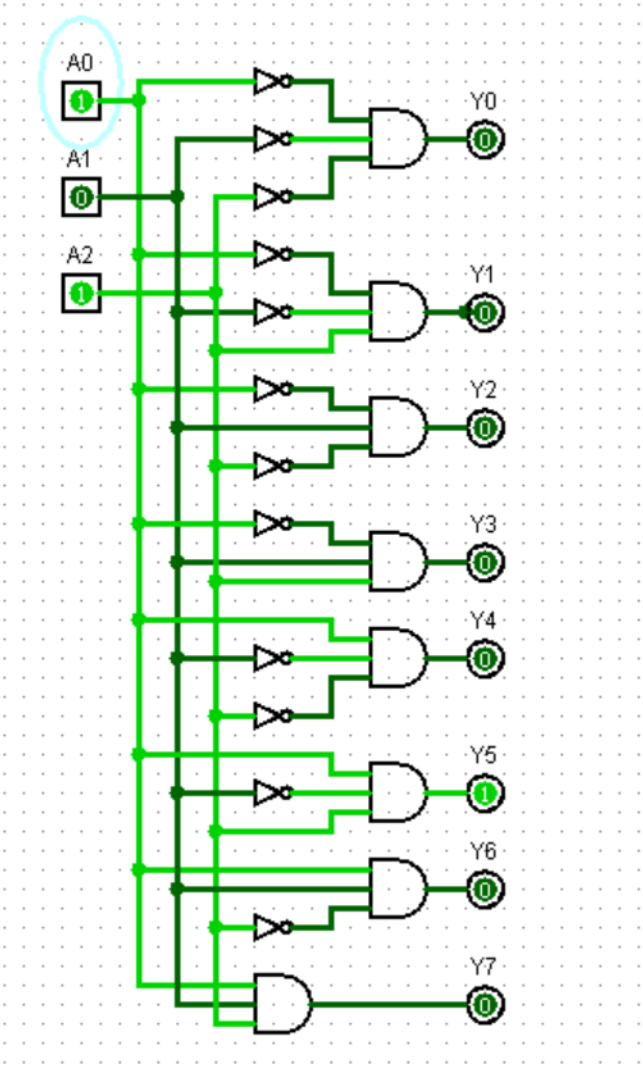
A0	A1	A2	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	0	0	0	1

$Y_0 = A_0' A_1' A_2'$ $Y_1 = A_0' A_1' A_2$ $Y_2 = A_0' A_1 A_2'$

$Y_3 = A_0' A_1 A_2$ $Y_4 = A_0 A_1' A_2'$ $Y_5 = A_0 A_1' A_2$

$Y_6 = A_0 A_1 A_2'$ $Y_7 = A_0 A_1 A_2$

Implementation:



Rubric wise marks obtained:

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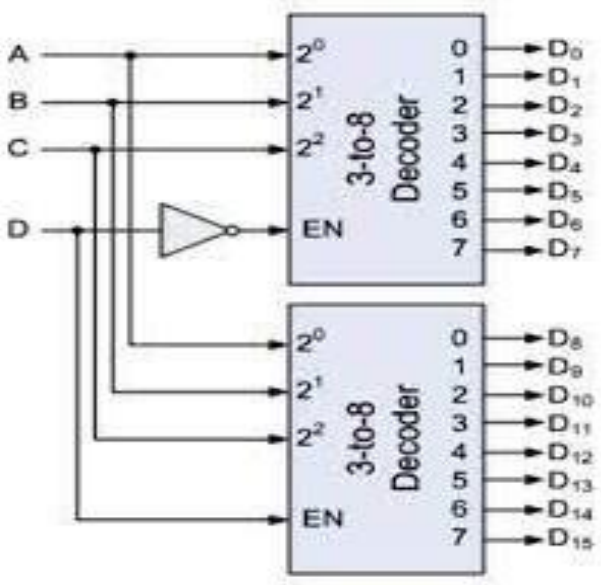
	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

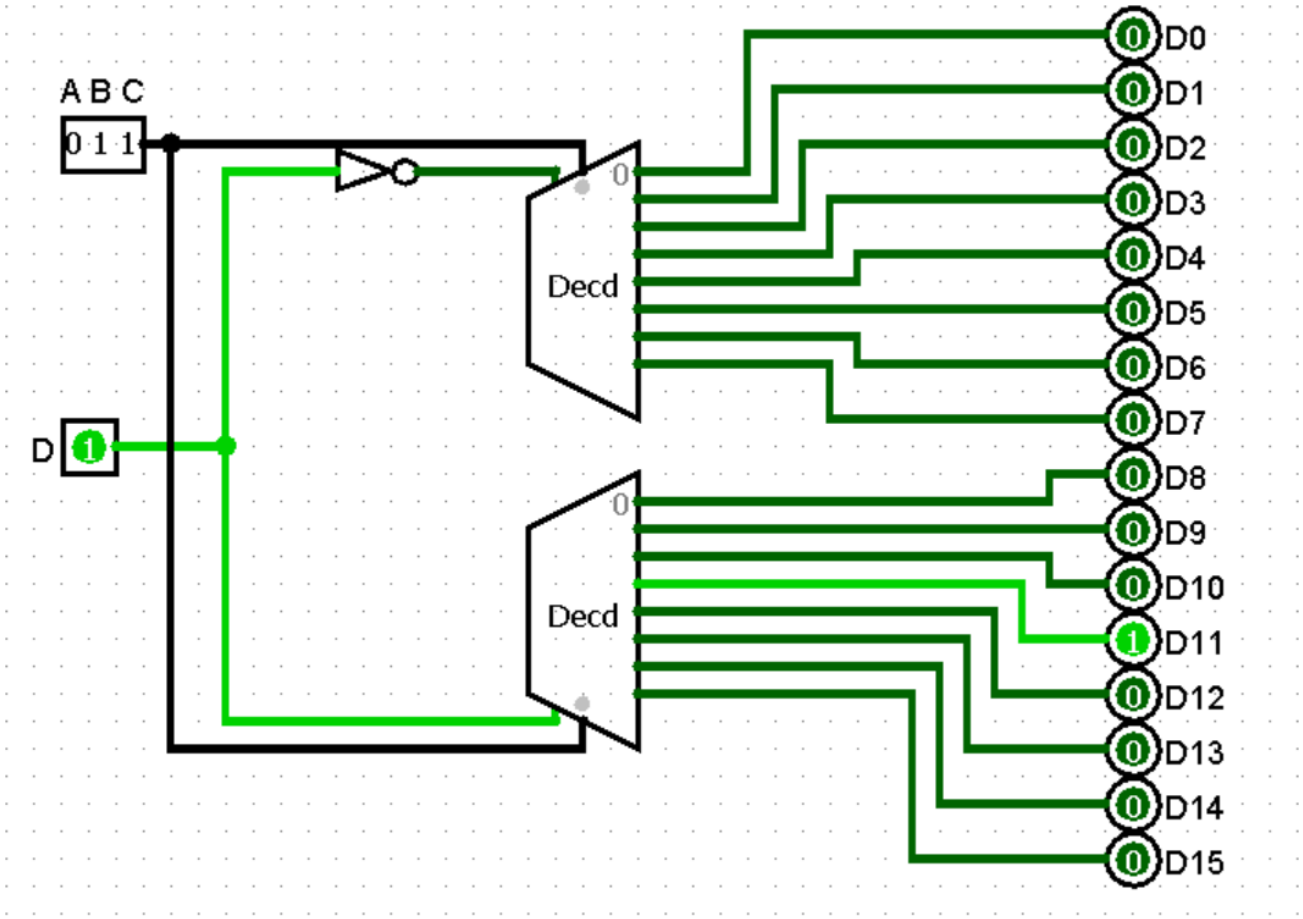
Practical 13

AIM: To implement 4 X 16 decoder with the help of 3 X 8 decoder

Theory:



Implementation:



Rubric wise marks obtained:

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	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

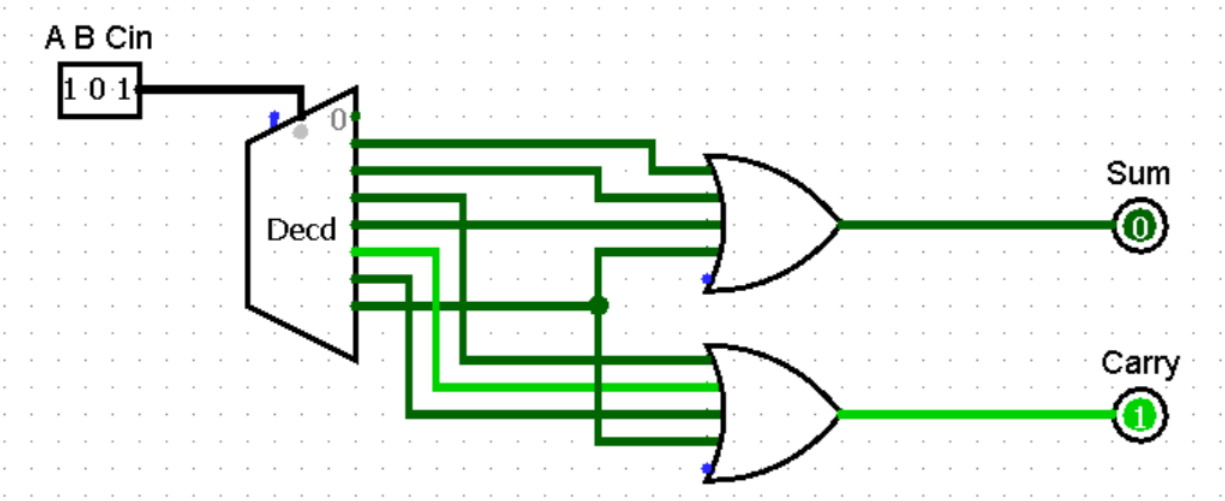
Practical 14

AIM: Draw Combinational circuit diagram for Full Adder and Full Subtractor using decoder

- FULL ADDER USING 3X8 DECODER

Inputs			Outputs	
A	B	C_{in}	Sum	Carry
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

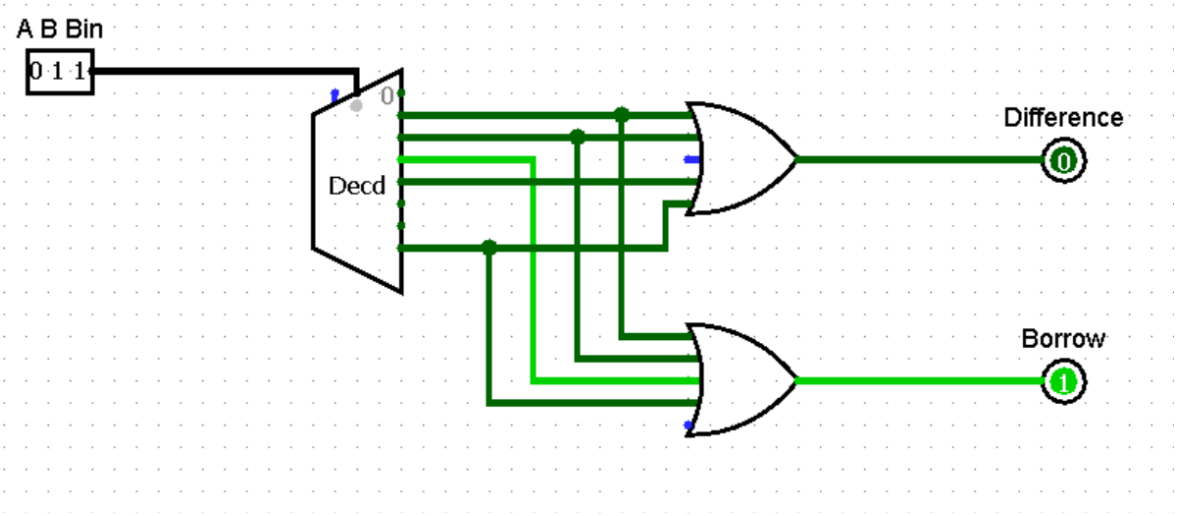
Implementation:



- FULL SUBTRACTOR USING 3X8 DECODER

Inputs			Outputs	
A	B	$Borrow_{in}$	Diff	Borrow
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Implementation



Rubric wise marks obtained:

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	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature

Practical 15

AIM: To implement 8 X 1 Multiplexer in Logisim Simulator

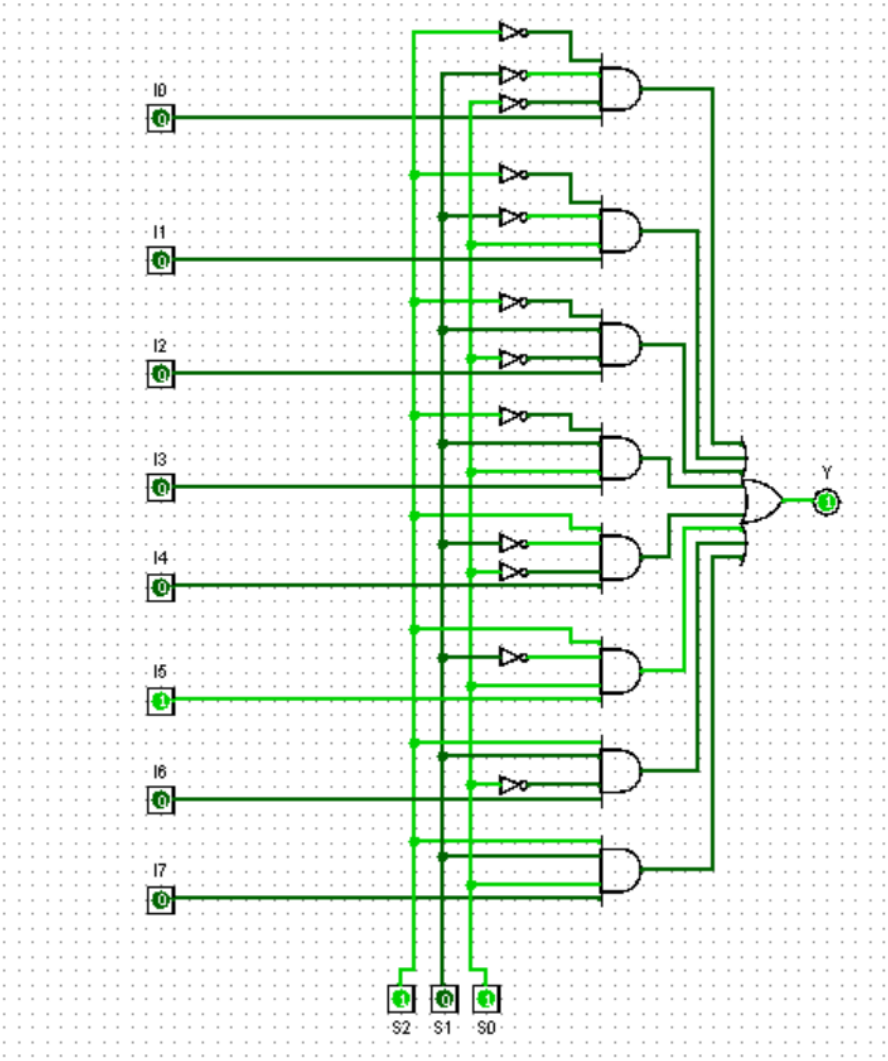
Theory:

INPUTS			Output
S_2	S_1	S_0	Y
0	0	0	A_0
0	0	1	A_1
0	1	0	A_2
0	1	1	A_3
1	0	0	A_4
1	0	1	A_5
1	1	0	A_6
1	1	1	A_7

$$Y = S_2' S_1' S_0' I_0 + S_2' S_1' S_0 I_1 + S_2' S_1 S_0' I_2 + S_2' S_1 S_0 I_3 +$$

$$S_2 S_1' S_0' I_4 + S_2 S_1' S_0 I_5 + S_2 S_1 S_0' I_6 + S_2 S_1 S_0 I_7$$

Implementation :



Rubric wise marks obtained:

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	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	Good (2)	Avg. (1)	

Faculty Signature