LOGIC SIMALTOR

21. HALF ADDER

EXP.NO: 21

AIM: To design and implement the two bit half adder using Logisim simulator.

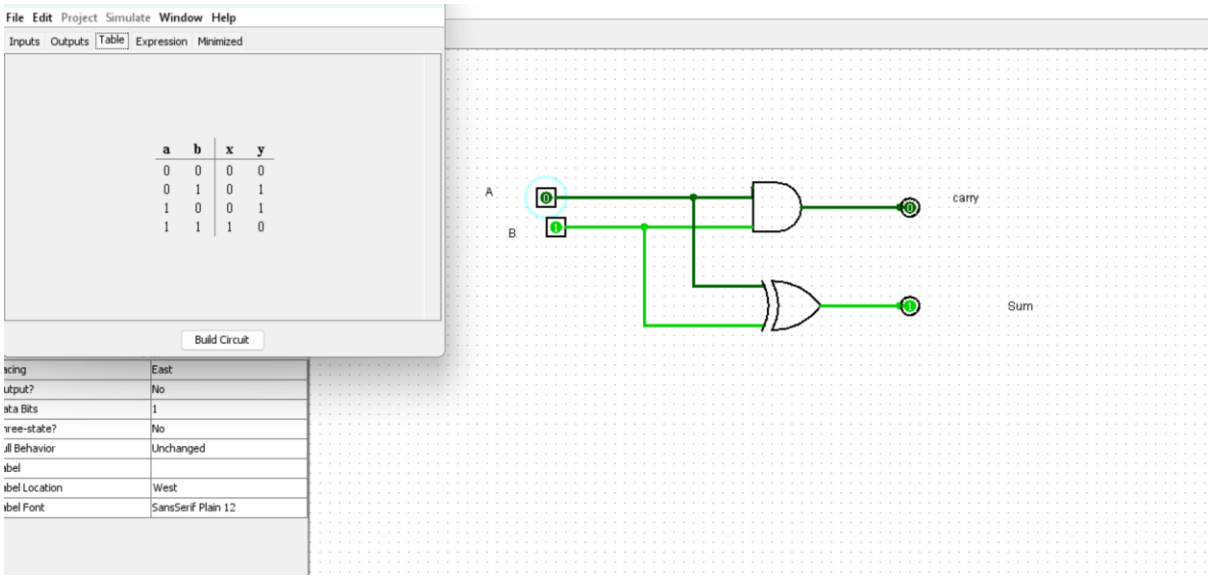
PROCEDURE:

1) Pick and place the necessary gates
2) Insert 2 inputs into the canvas.
3) Connect the inputs to the XOR gate and AND gate.
4) Insert 2 outputs into the canvas.
5) Make the connections using the connecting wires.
6) Verify the truth table.

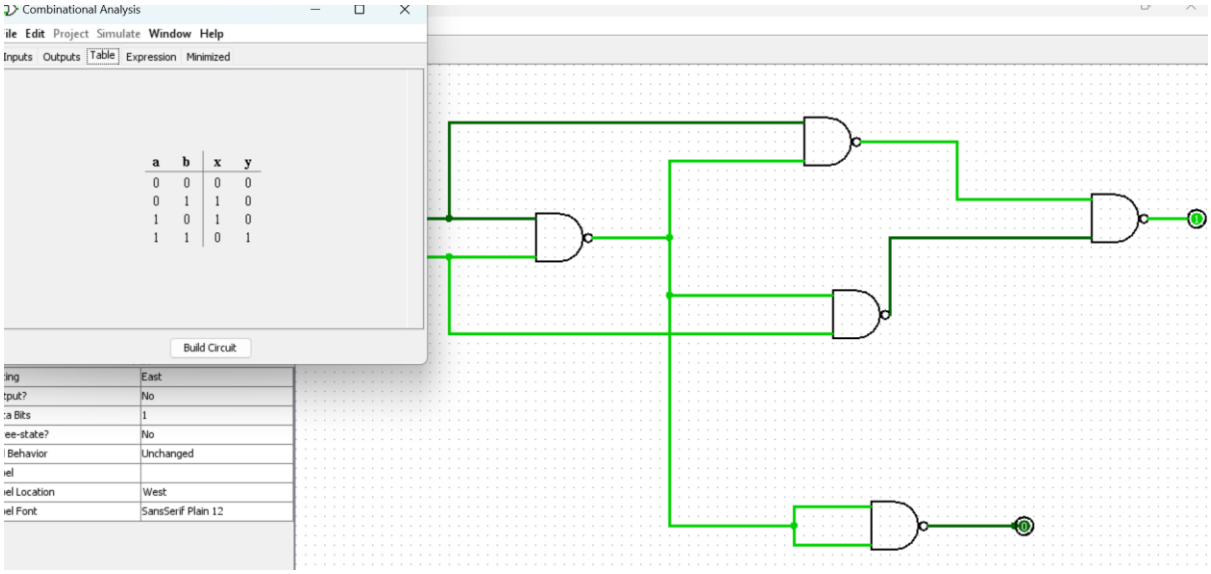
TRUTH TABLE

Truth Table			
Input		Output	
A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

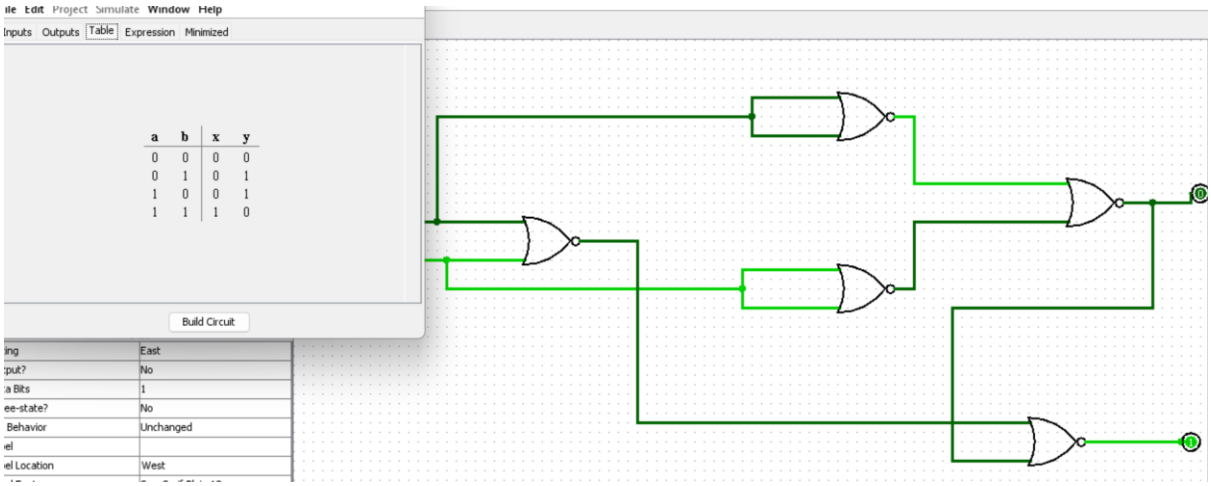
Logical Diagram:



Half Adder using NAND Gates:



Half Adder using NOR Gates:



RESULT: Thus 2-bit half adder has been designed and implemented successfully using logisim simulator.

22. TWO BIT HALF SUBTRACTOR

EXP.NO: 22

AIM: To design and implement the two bit half subtractor using Logisim simulator.
PROCEDURE:

1) Pick and place the necessary gates.

2) Insert 2 inputs into the canvas.

3) Connect the inputs to the OR gate, AND gate and NOT gate.

4) Insert 2 outputs into the canvas.

5) Make the connections using the connecting wires.

6) Verify the truth table.

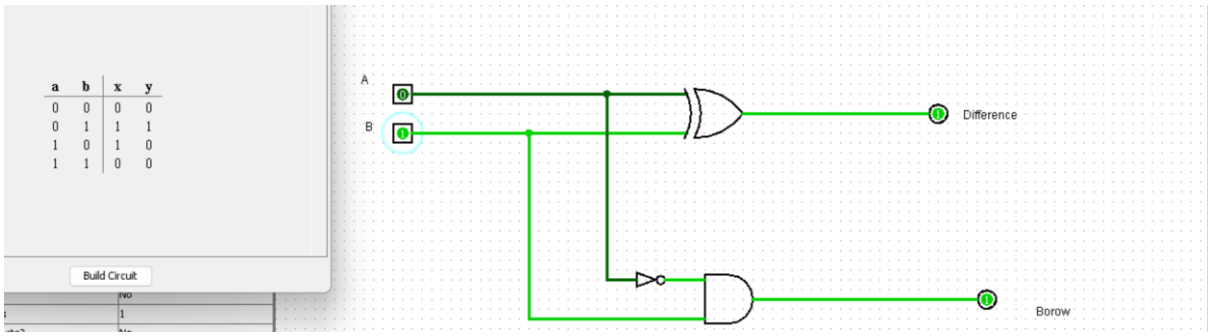
TRUTH TABLE

A	B	Diff	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

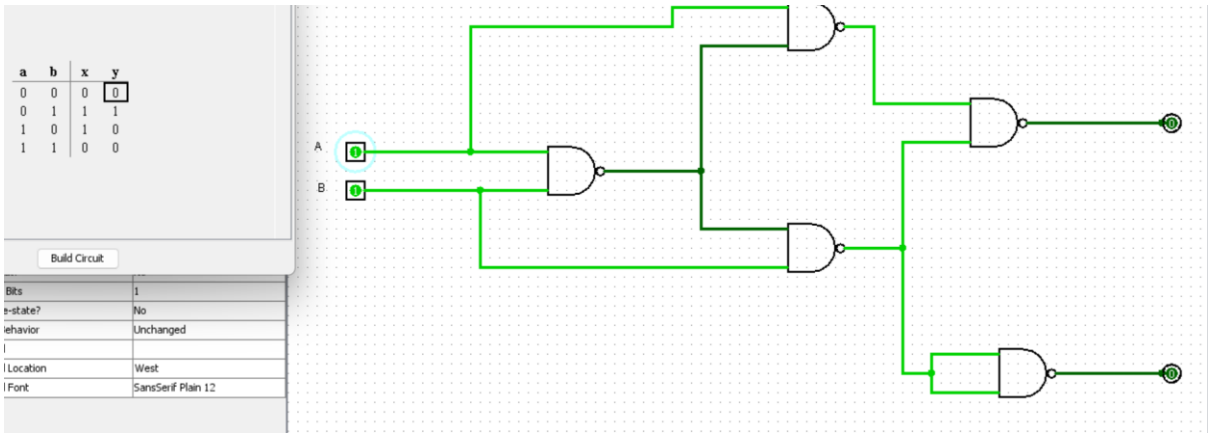
Diff=A'B+AB'

Borrow = A'B

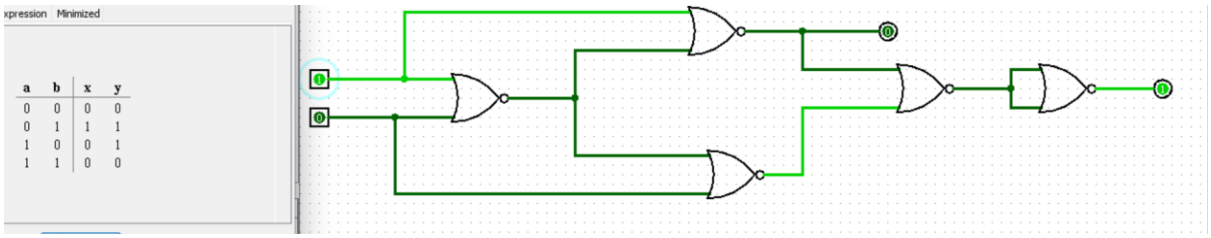
Logical Diagram



Half Subtractor using NAND Gates:



Half Subtractor using NOR Gates:



RESULT: Thus 2-bit half subtractor has been designed and implemented successfully using logisim simulator

23. FULL ADDER

EXP.NO: 23

AIM: To design and implement the full adder using Logisim simulator. PROCEDURE:

1) Pick and place the necessary gates.

2) Insert 3 inputs into the canvas.

3) Connect the inputs to the XOR gate, AND gate and OR gate.

4) Insert 2 outputs into the canvas.

5) Make the connections using the connecting wires.

6) Verify the truth table.

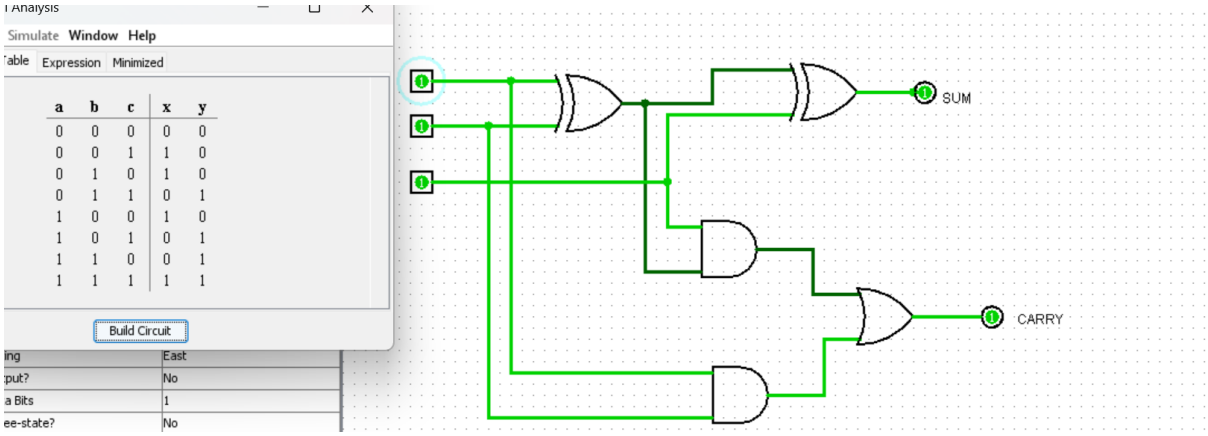
TRUTH TABLE

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

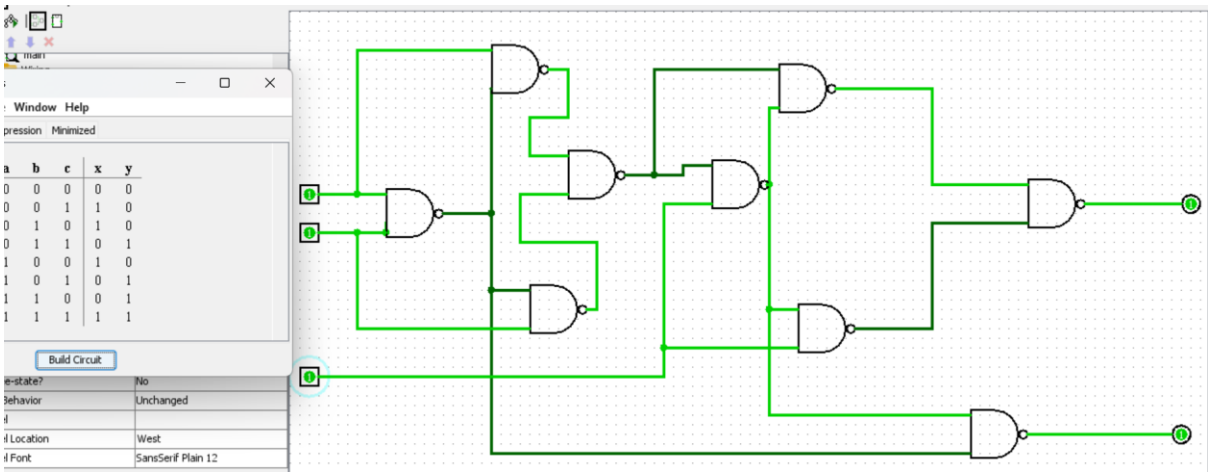
Sum=(A⊕B)

⊕Cin Carry=A.B+ (A ⊕B)

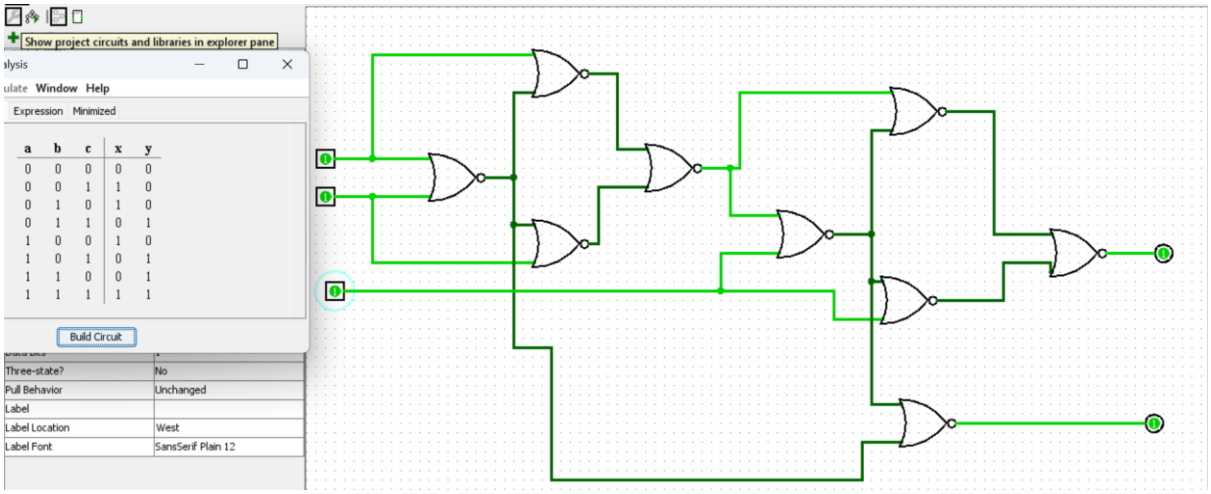
Logical Diagram:



Full adder using NAND Gates:



Full adder using NOR Gates:



RESULT: Thus full adder has been designed and implemented successfully using logisim simulator**. 24. FULL SUBTRACTOR**

EXP.NO: 24

AIM: To design and implement the full subtractor using Logisim simulator.
PROCEDURE:

1) Pick and place the necessary gates.

2) Insert 3 inputs into the canvas.

3) Connect the inputs to the XOR gate, AND gate and OR gate.

4) Insert 2 outputs into the canvas.

5) Make the connections using the connecting wires.

6) Verify the truth table**.**

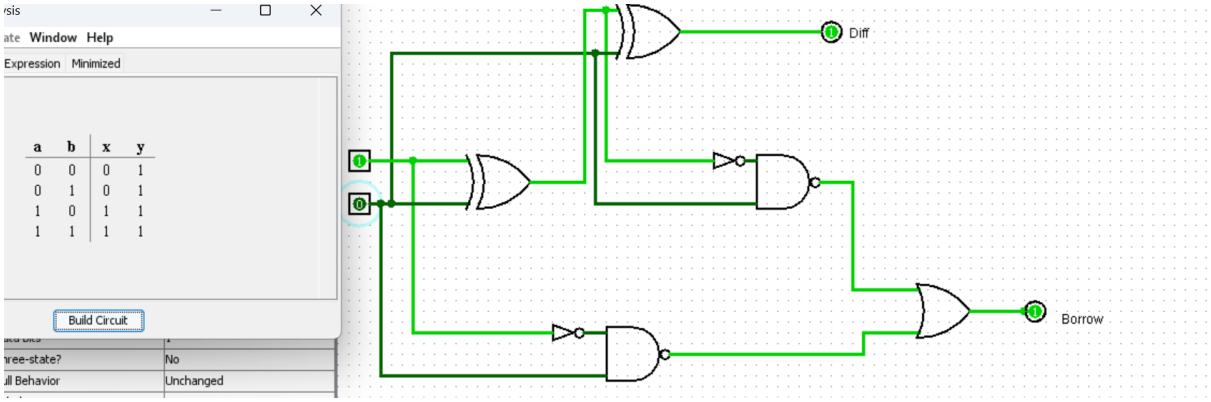
TRUTH TABLE:

INPUT			OUTPUT	
A	B	Bin	D	Bout
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

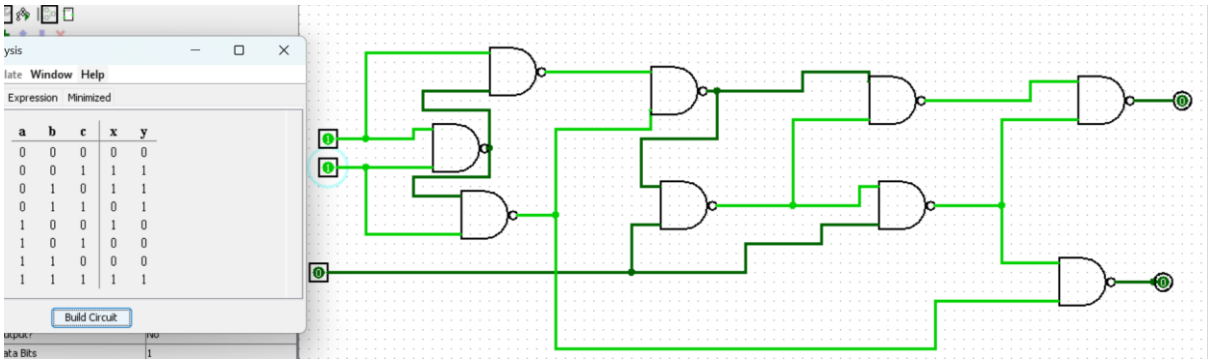
Diff=(A ⊕ B) ⊕

'Borrowin' Borrow=A'.B + (A ⊕ B)'

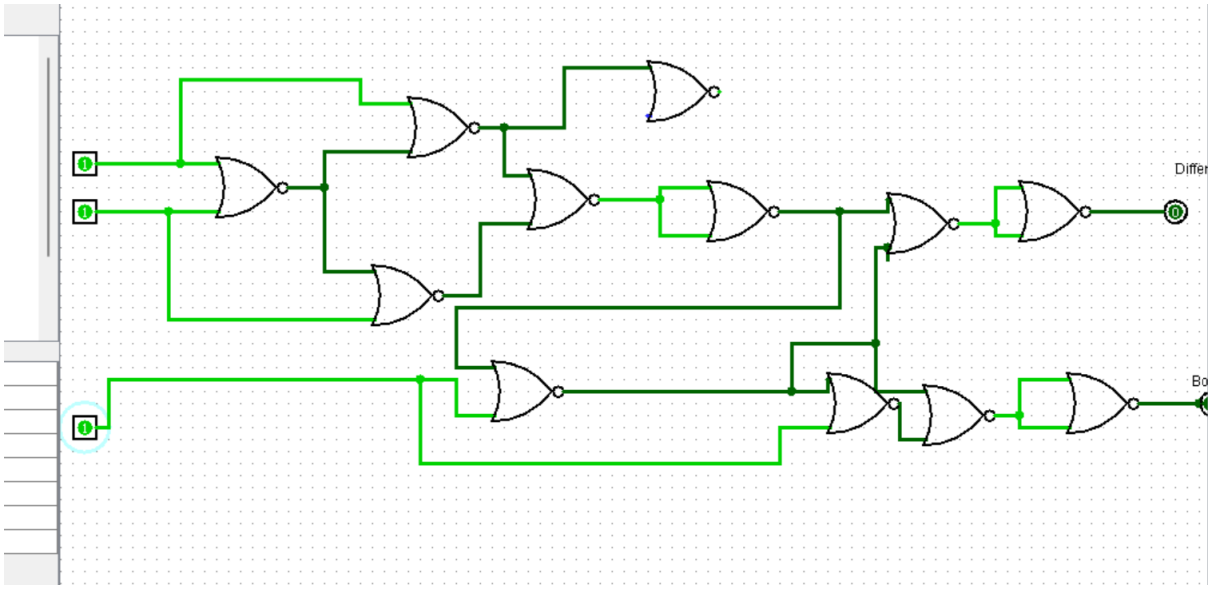
Logic Diagram:



Full Subtractor using NAND Gates:



Full Subtractor using NOR Gates:



RESULT: Thus full subtractor has been designed and implemented successfully using logisim simulator