

## 22. TWO BIT HALF SUBTRACTOR

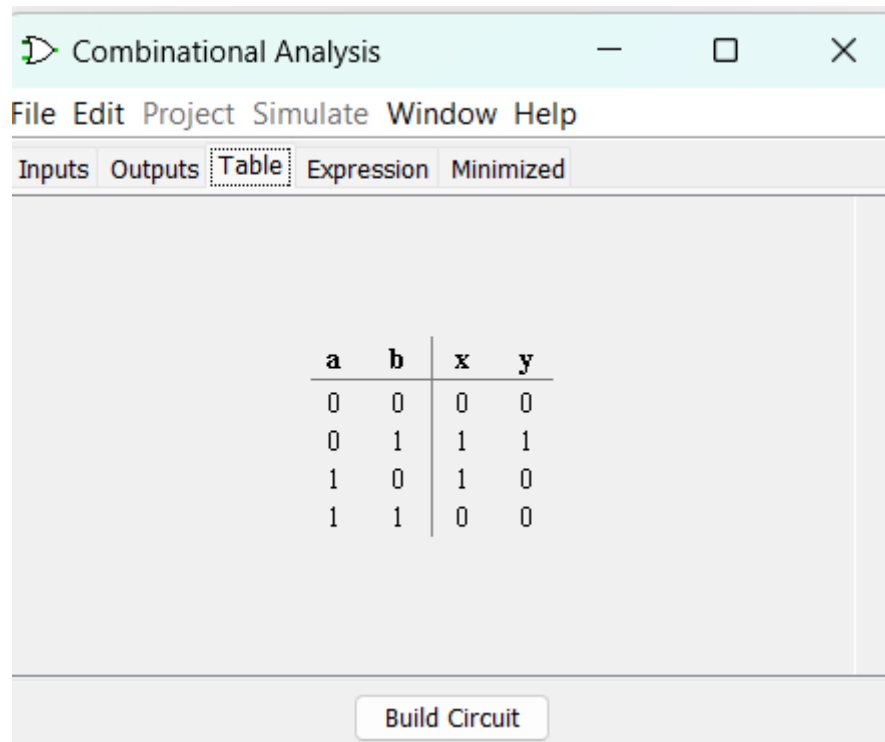
EXP.NO: 22

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:



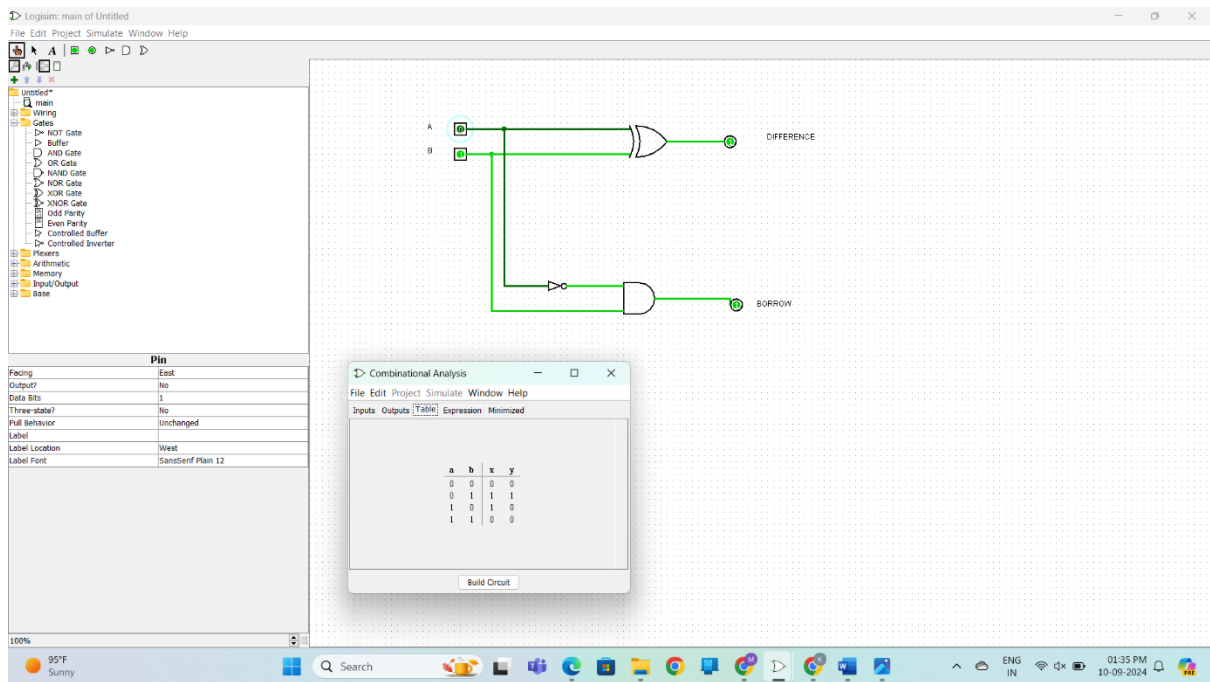
The screenshot shows the 'Combinational Analysis' window in Logisim. The window has a title bar with a play icon, the text 'Combinational Analysis', and standard window controls. Below the title bar is a menu bar with 'File', 'Edit', 'Project', 'Simulate', 'Window', and 'Help'. Under the menu bar is a tabbed interface with four tabs: 'Inputs', 'Outputs', 'Table', and 'Expression'. The 'Table' tab is selected and highlighted. The main area of the window displays a truth table with four columns: 'a', 'b', 'x', and 'y'. The table contains four rows of data. At the bottom of the window, there is a 'Build Circuit' button.

a	b	x	y
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

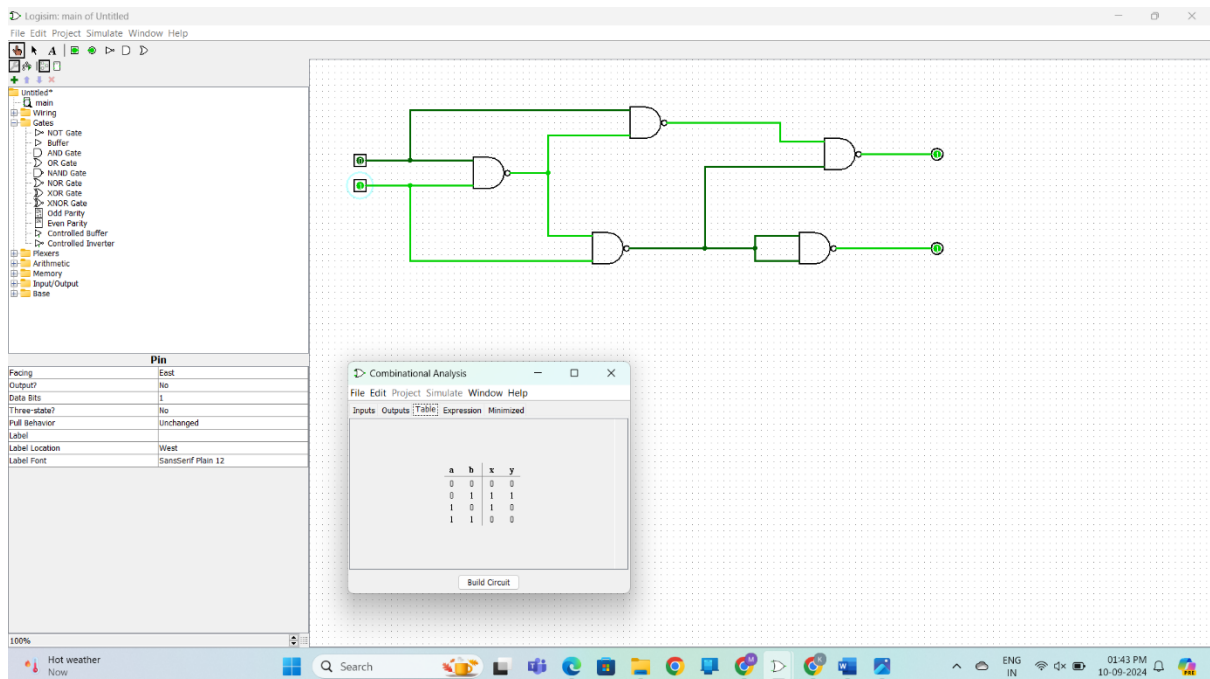
$\text{Diff} = A \oplus B + AB$

$\text{Borrow} = A \oplus B$

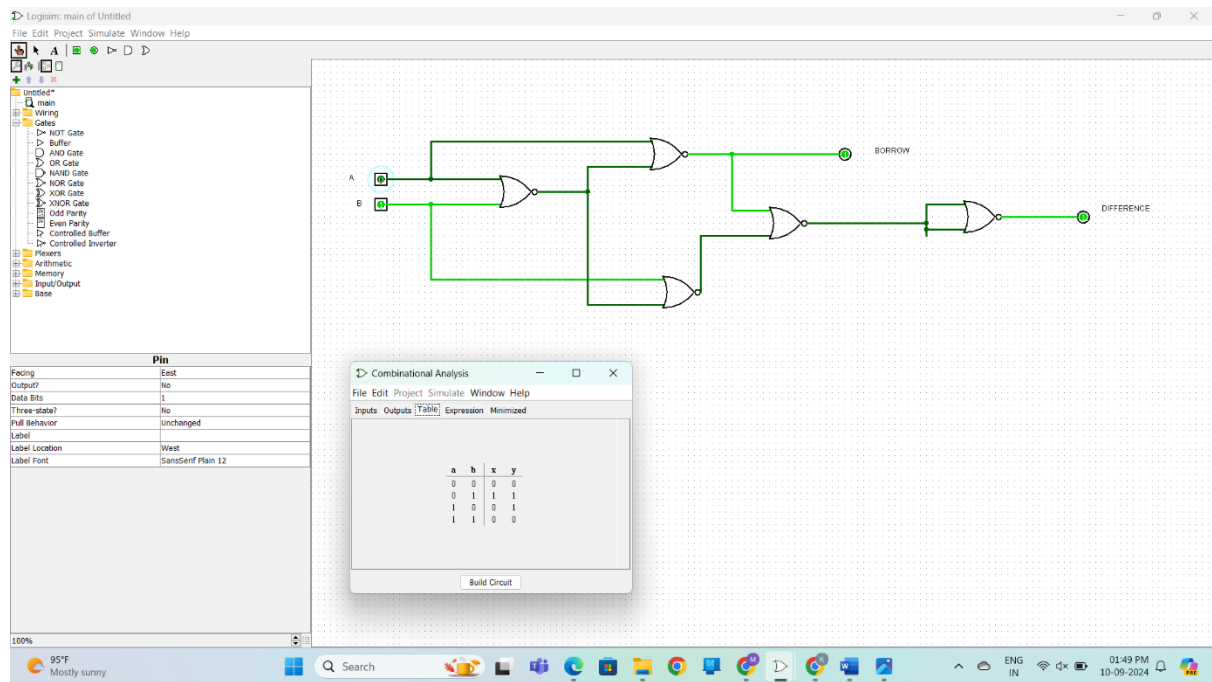
Logical Diagram:



Half Subtractor using NAND Gates OUTPUT:



Half Subtractor using NOR Gates OUTPUT:



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