Sr. No: 11

Name: Soham Desai

Date: 25/01/22

Experiment 3

Aim: Realize Half adder and Full adder

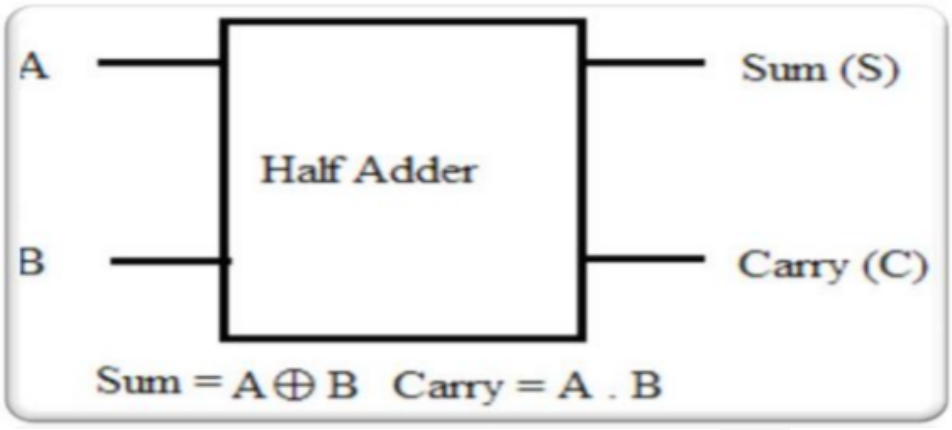
LO & Statement : LO: 2) Analyze and design combinational circuits

Software Requirements: Logisim software

Theory:

Half Adder

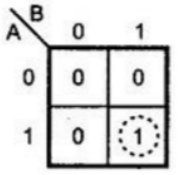
• The half adder is an example of a simple, functional digital circuit built from two logic gates.
• The half adder adds to one-bit binary numbers (A,B).
• The output is the sum of the two bits (S) and the carry



Half adder truth table

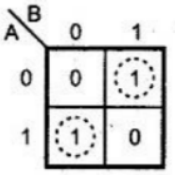
A	B	Sum	Carry-Out
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

For carry



Carry = AB

For Sum



$S = \bar{A}B + A\bar{B}$

S=A ⊕ B (Exclusive OR)

C=A.B (AND)

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Full Adder

• The full adder accepts two inputs bits and an input carry and generates a sum output and an output carry.
• The full-adder circuit adds three one-bit binary numbers (Cin, A ,B) and outputs two one-bit binary numbers, a sum (S) and a carry (Cout).
• The full-adder is usually a component in a cascade of adders, which add 8, 16, 32, etc. binary numbers.

HALF ADDER TRUTH TABLE

Inputs			Outputs	
A	B	C – IN	Sum	C – Out
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

For S:

$S = A \oplus B \oplus C_{in}$

For C_{out}:

$C_{out} = AB + BC_{in} + C_{in}A$

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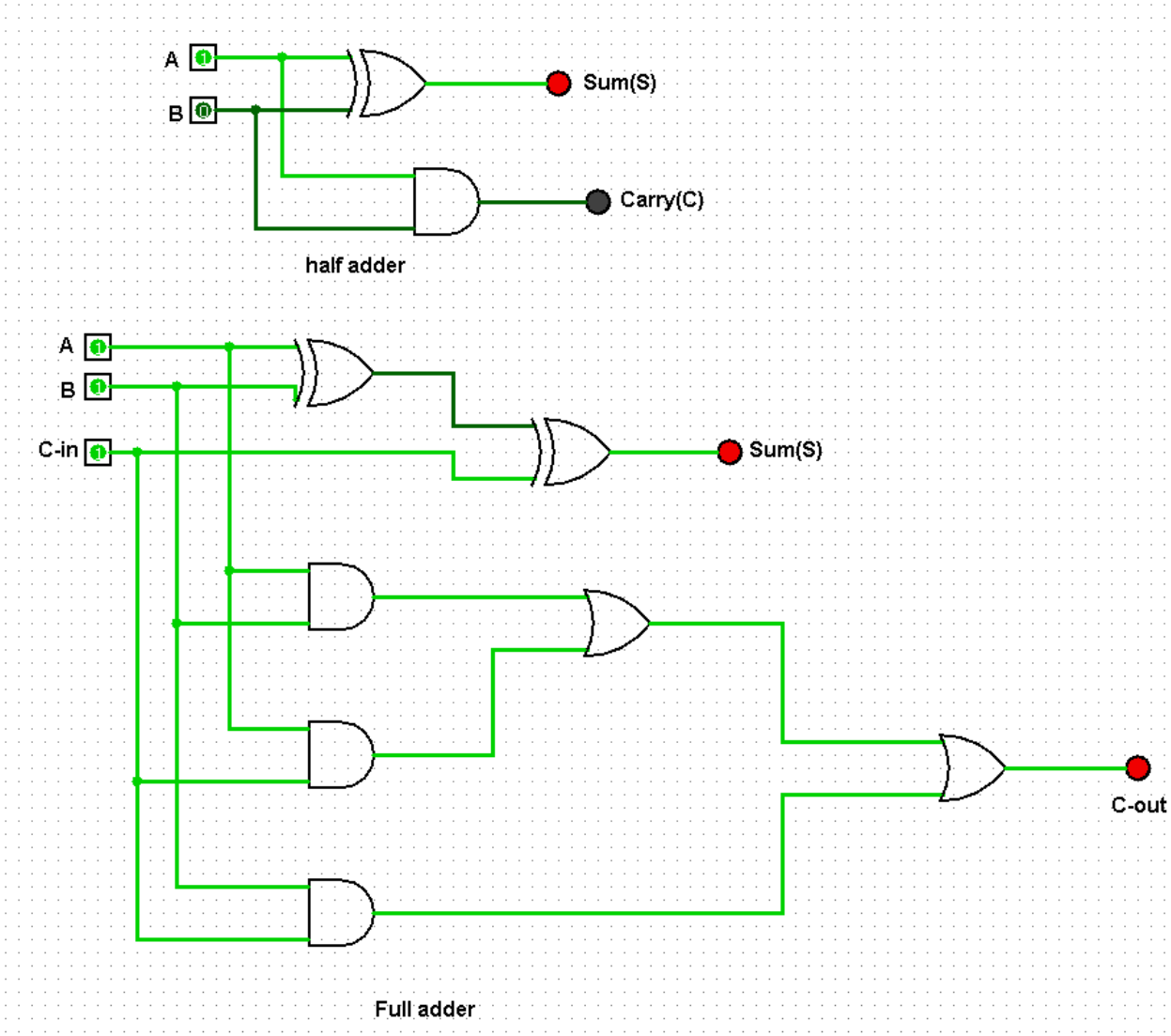
Output:



Conclusion:

The half adder and full adder is working as expected