

# Logic Design I – Laboratory 04

## Adders

#	Student ID	Student Name	Grade (10)	Instructor signature
1				
2				
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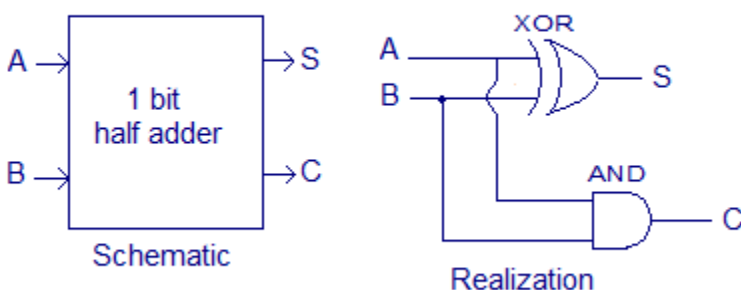
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## Objective

Is to design and build single stage half adder and full adder. Then design 2 digits adder each consists of 4 bits.

## Theory Overview

Half adder is a combinational arithmetic circuit that adds two numbers and produces a sum bit (S) and carry bit (C) as the output. If A and B are the input bits, then sum bit (S) is the X-OR of A and B and the carry bit (C) will be the AND of A and B. From this it is clear that a half adder circuit can be easily constructed using one X-OR gate and one AND gate. Half adder is the simplest of all adder circuit,



inputs		outputs	
A	B	Carry	Sum
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

The main difference between a half-adder and a full-adder is that the full-adder has three inputs and two outputs. The first two inputs are A and B and the third input is an input carry designated as CIN. When adding the next digit a carry from the previous stage must be taken into consideration. The full adder combines two half adders

inputs			Outputs	
A	B	Cin	carry	Out
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

## Procedure

- Insert a Quad 2-input AND gate 7408 and a Quad 2-input Exclusive OR gate 7486, into the logic lab breadboard.
- Construct the circuit as shown in Fig

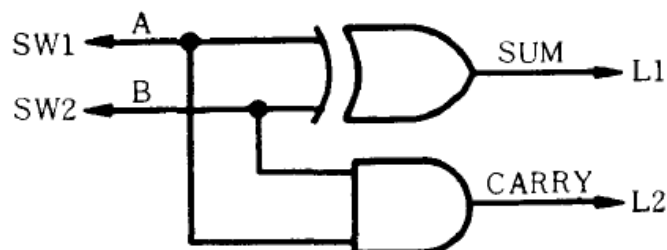
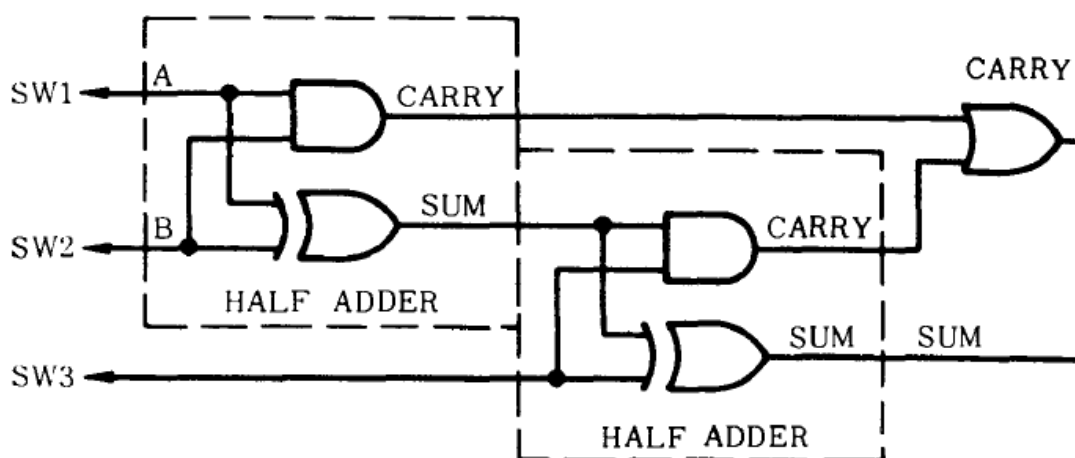


Fig.

- Complete the truth table.
- In addition install a Quad 2-input OR gate 7432 in the logic lab breadboard.
- Wire the circuit as shown



- Complete the truth table.



## Results and data analysis

Half adder

inputs		outputs	
A	B	Carry	Sum

Full adder

inputs			Outputs	
A	B	Cin	carry	Out





