

Design of Arithmetic Logic Circuit using ICs- Half Adder

Aim: To design, and verify a half adder used in the Arithmetic logic circuit, using ICs.

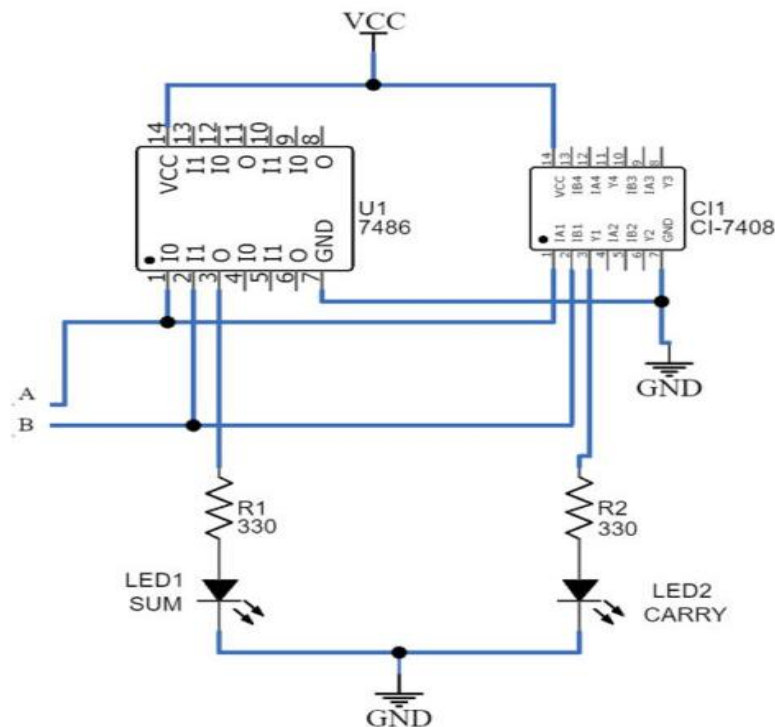
Apparatus required:

Item	Quantity	Specifications/ values
RPS	1	-----
Resistors	2	
XOR gate	1	7486
AND gate	1	7408
LED	2	-----

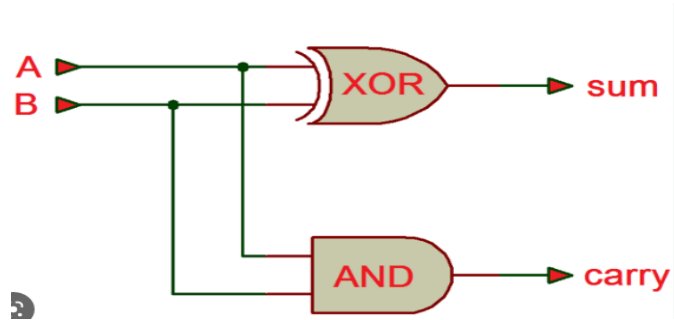
Theory: Adders form a core component of the Arithmetic Logic Unit (ALU) and play a major role in calculating memory addresses, table indices, etc. A half adder is the simplest digital adder. It is a combinational circuit that performs the addition of two binary digits. It takes in two input bits, A (addend) and B (augend), and produces two output bits, the sum, and the carry. The truth table for adding two binary digits A and B.

The half adder circuit is built using XOR gate IC 7486 and logic AND gate IC and both are two-input logic gate ICs. When the 5V VCC and ground is supplied to the logic gate IC and the binary inputs A and B are connected to the XOR logic gate and the logic AND gate IC, the output is obtained at the pin3 of both ICs. The output of the XOR gate is connected to the LED1 through a resistor R1 and the output of AND gate is connected to the LED2 through resistor R2. The LEDs are used to indicate the HIGH and LOW logic.

It takes two inputs **A** and **B** and gives two outputs **Sum** and **Carry**.



- Sum = $A \oplus B$
- Carry = $A.B$



Truth Table for Half Adder:

<i>A</i>	<i>B</i>	<i>SUM</i>	<i>CARRY</i>
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1