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Submitted to :

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HALF SUBTRACTOR

AIM:

Design and verify the logic circuit of Half-subtractor using logic gate.

OBJECTIVES:

- To understand the principle of binary subtraction.
- To understand half-subtractor concept.
- Use truth table and Boolean Algebra theorems in simplifying a circuit design.
- To implement half-subtractor circuit using logic gates

PROCEDURE:

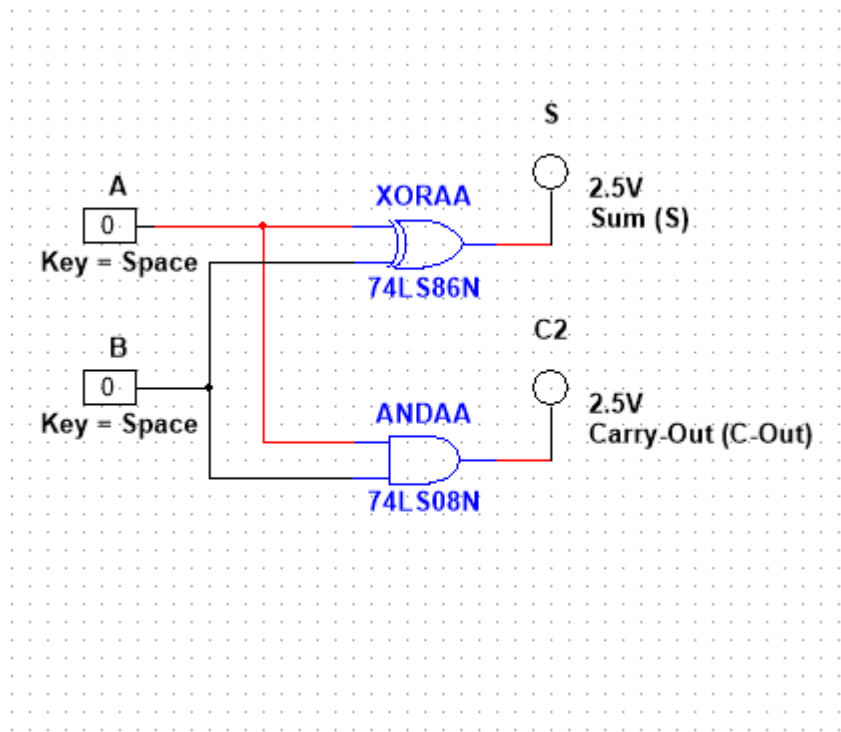
- Collect the components necessary to accomplish this experiment.
 - Plug the IC chip into the breadboard.
 - Connect the supply voltage and ground lines to the chips. PIN7 = Ground and PIN14 = +5V.
 - According to the pin diagram of each IC mentioned above, make the connections according to circuit diagram.
 - Connect the inputs of the gate to the input switches of the LED.
 - Connect the output of the gate to the output LEDs.
 - Once all connections have been done, turn on the power switch of the bread-board
 - Operate the switches and fill in the truth table (Write "1" if LED is ON and "0" if LED is OFF)
- Apply the various combination of inputs according to the truth table and observe the condition of Output LEDs.

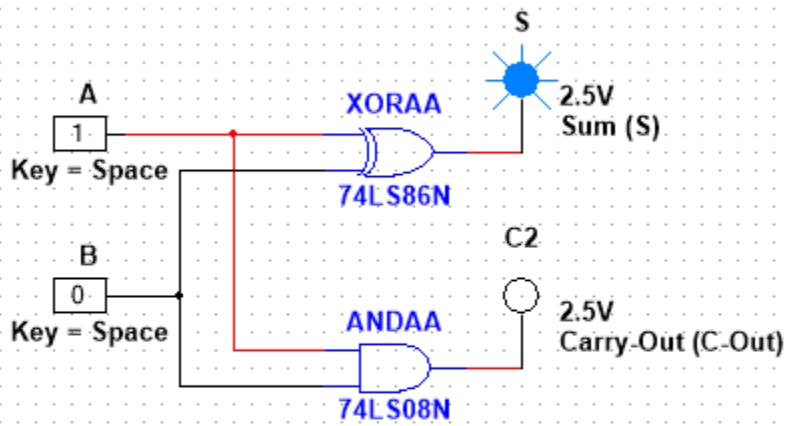
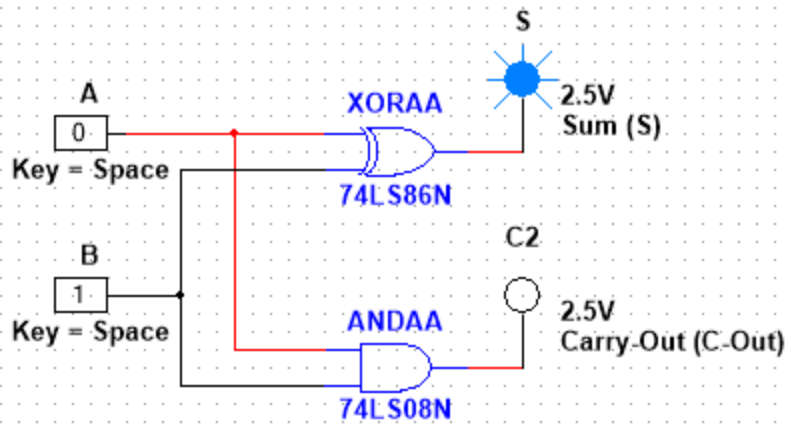
HALF SUBTRACTOR:

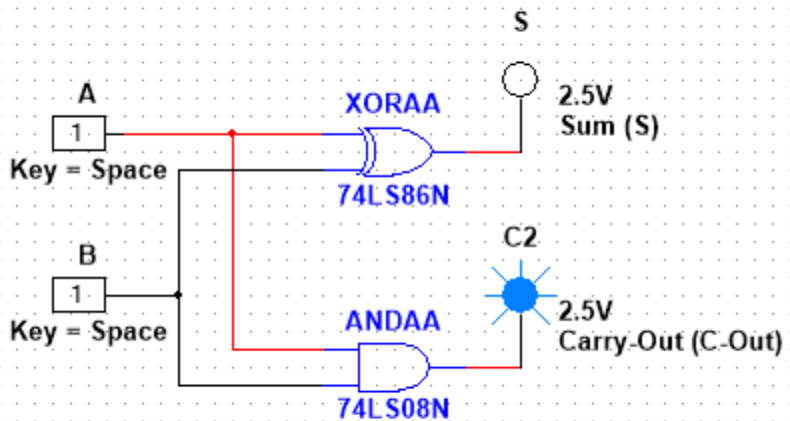
The half-subtractor is a combinational circuit which is used to perform subtraction of two bits. It has two inputs, X (minuend) and Y (subtrahend) and two outputs D (difference) and B (borrow).

Observation Table:

A	B	D	BO
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0







RESULTS AND ANALYSIS:

Verified the truth table as follows.

Verified the truth table of Full Subtractor as $D = 1$ i.e. LED which is connected to D terminal glows when inputs are, Y, BIN Verified the truth table of Full Subtractor as $BOUT = 1$ i.e. LED which is connected to BOUT terminal glows when inputs are X, Y, BIN

CONCLUSION:

- To add two bits, we require one XOR gate (IC 7486) to generate Difference and one AND (IC 7408) and NOT Gate (IC 7432) to generate Borrow.
- To add three bits, we require two half subtractor.