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SUBJECT: DIGITAL LOGIC DESIGN

SEMESTER: 3RD

PROGRAMME: BS (SOFTWARE ENGINEERING)

# FULL ADDER

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

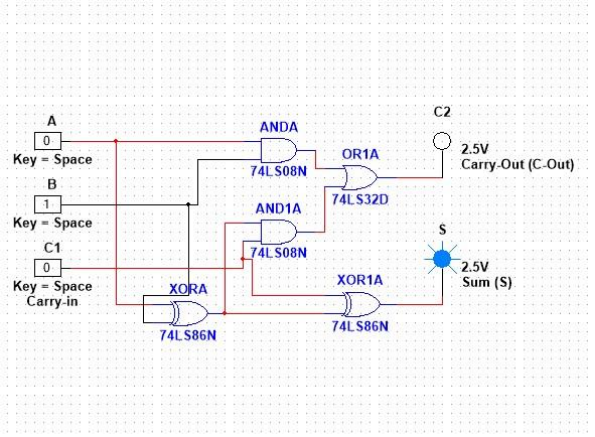
OBJECTIVES: • To understand the principle of binary addition. • To understand full adder concept. • Use truth table and Boolean Algebra theorems in simplifying a circuit design. • To implement full adder circuit using logic gates.

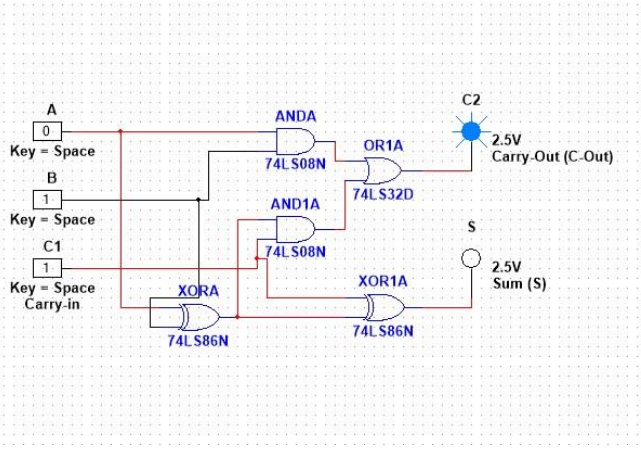
PROCEDURE: • Collect the components necessary to accomplish this experiment. • Plug the IC chip into the breadboard • Connect the supply voltage and ground lines to the chips. PIN7 = Ground and PIN14 = +5V. • According to the pin diagram of each IC mentioned above, make the connections according to circuit 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 breadboard • 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.

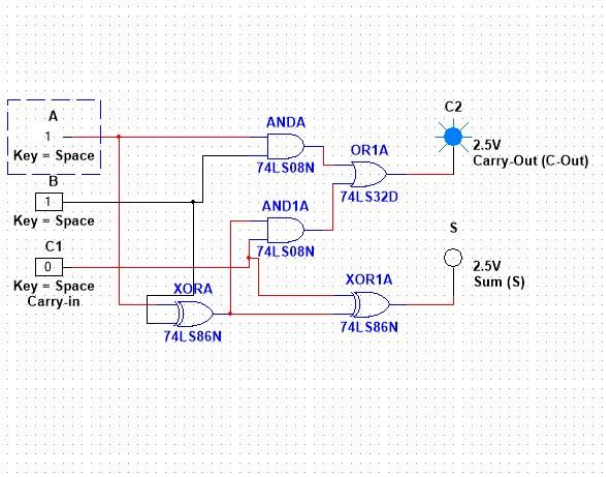
FULL ADDER: Full adder is a logical circuit that performs an addition operation on three binary digits. The full adder produces a sum and carry value, which are both binary digits. It can be combined with other full adders or work on its own.

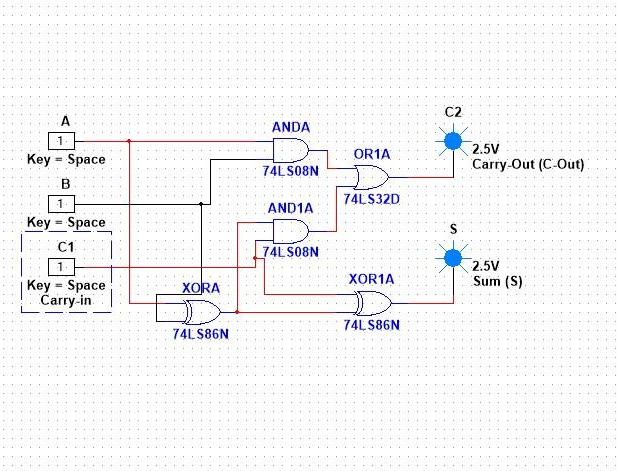
## OBSERVATION TABLE:

| A | B | Carry-in | Sum (S) | Carry-Out | A |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 |






RESULTS AND ANALYSIS: Verified the truth table as follows. Full Adder: Verified the truth table of Full Adder as S = 1 i.e. LED which is connected to S terminal glows when inputs are A, B, Ci Verified the truth table of Full Adder as Co = 1 i.e. LED which is connected to Co terminal glows when inputs are A, B, Co.

CONCLUSION: • To add two bits, we require one XOR gate (IC 7486) to generate Sum and one AND (IC 7408) to generate carry. • To add three bits, we require two half adders.