Bahria University,

Karachi Campus

LAB EXPERIMENT NO.

11

LIST OF TASKS

TASK NO	OBJECTIVE
01	Design and implement the circuits for a half adder, full adder, half subtractor, and full subtractor in Multisim using basic gates, along with their truth tables and corresponding sum, difference, and carry/borrow equations.
02	Design and implement a 2-bit adder & subtractor circuit in Multisim using basic gates.
03	Design and implement a 4-bit adder & subtractor circuit in Multisim using Full Adder ICs.
04	Design and implement a 4-bit multiplier circuit in Multisim using Adder's ICs.

Submitted On:

Date: 5/12/2025

Task No. 01:

"Design and implement the circuits for a half adder, full adder, half subtractor, and full subtractor in Multisim using basic gates, along with their truth tables and corresponding sum, difference, and carry/borrow equations."

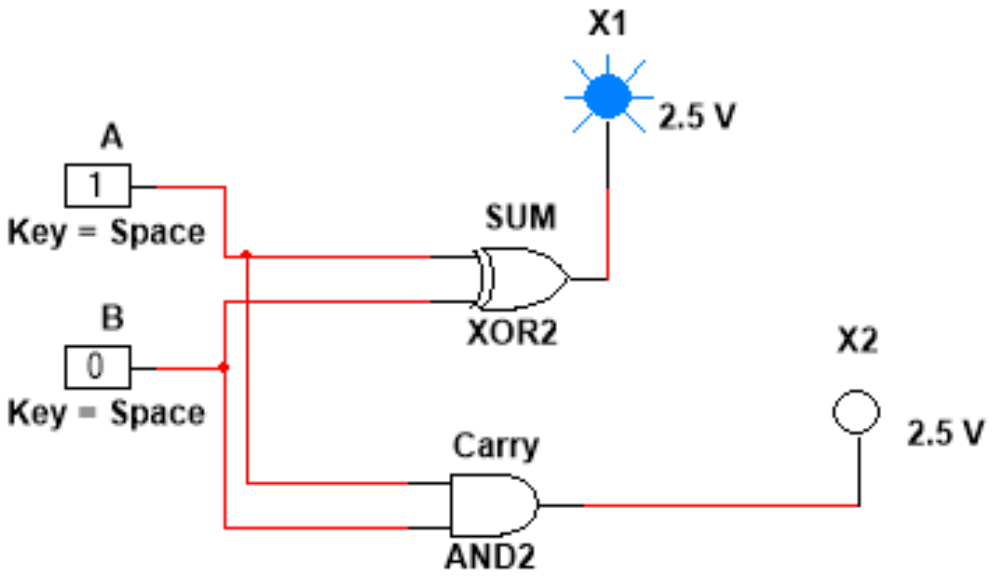
Solution:

Half Adder:

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Sum=A'B+AB' =A⊕B

Carry=A.B

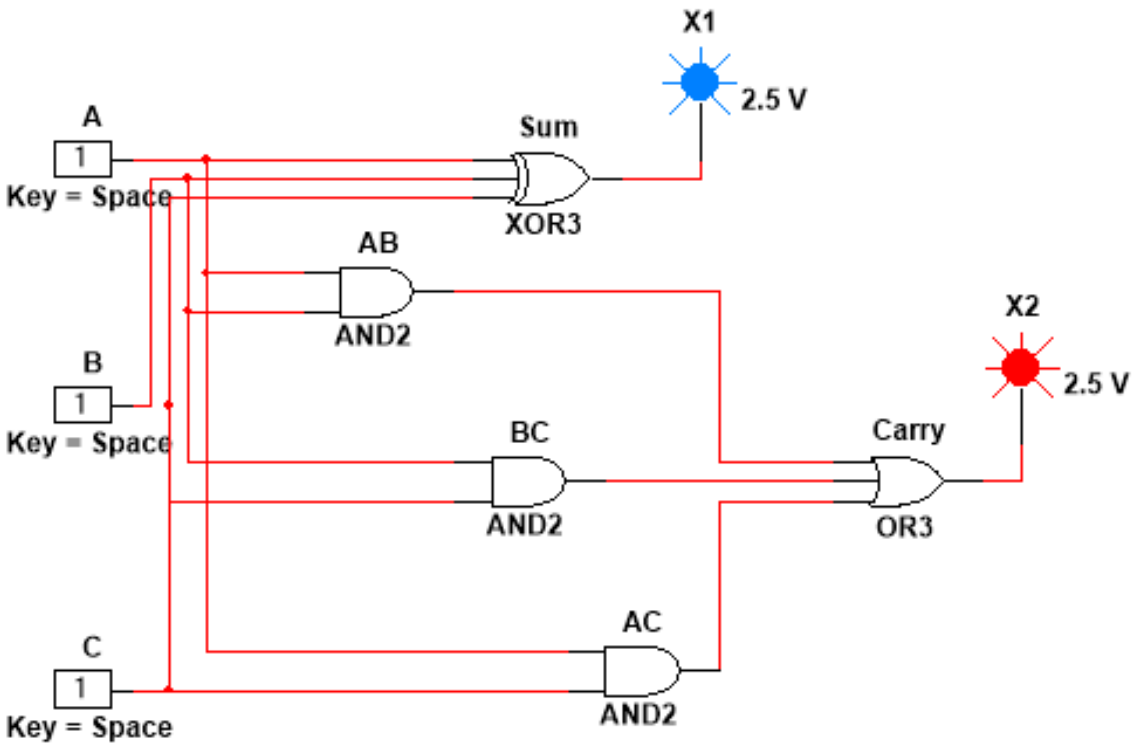


Full Adder:

A	B	Cin	Sum	Cout
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

Sum=A'B'C+A'BC'+AB'C'+ABC= A ⊕ B ⊕ C

Carry=A'BC+AB'C+ABC'+ABC= AB+AC+BC

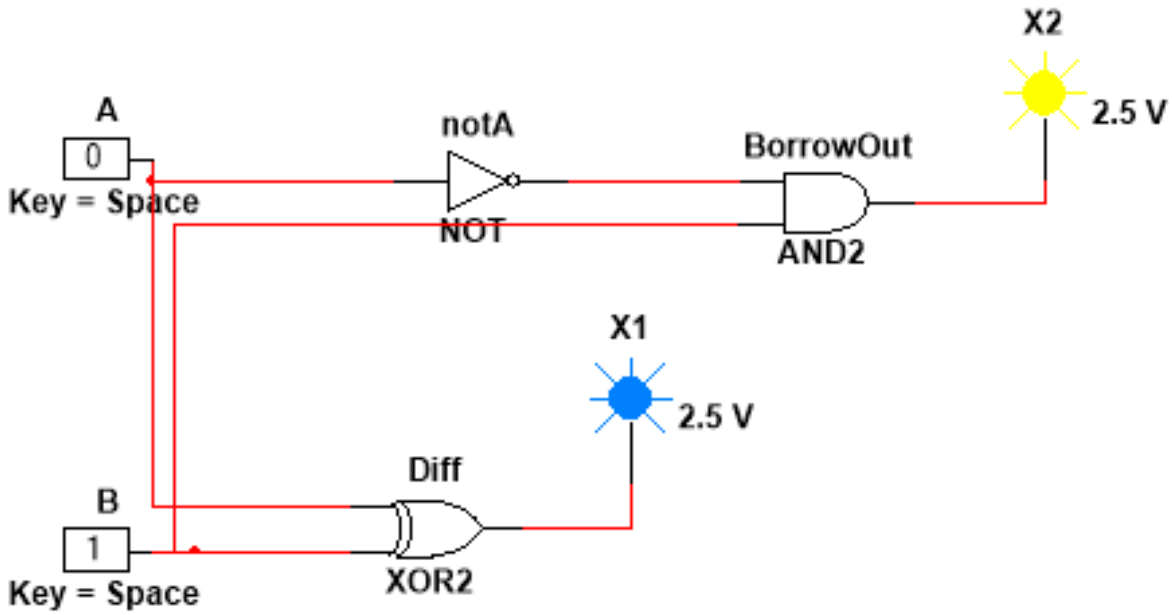


Half Subtractor:

A	B	Difference	BorrowOut
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

Difference = A'B+AB' = A ⊕ B

Borrow = A'.B

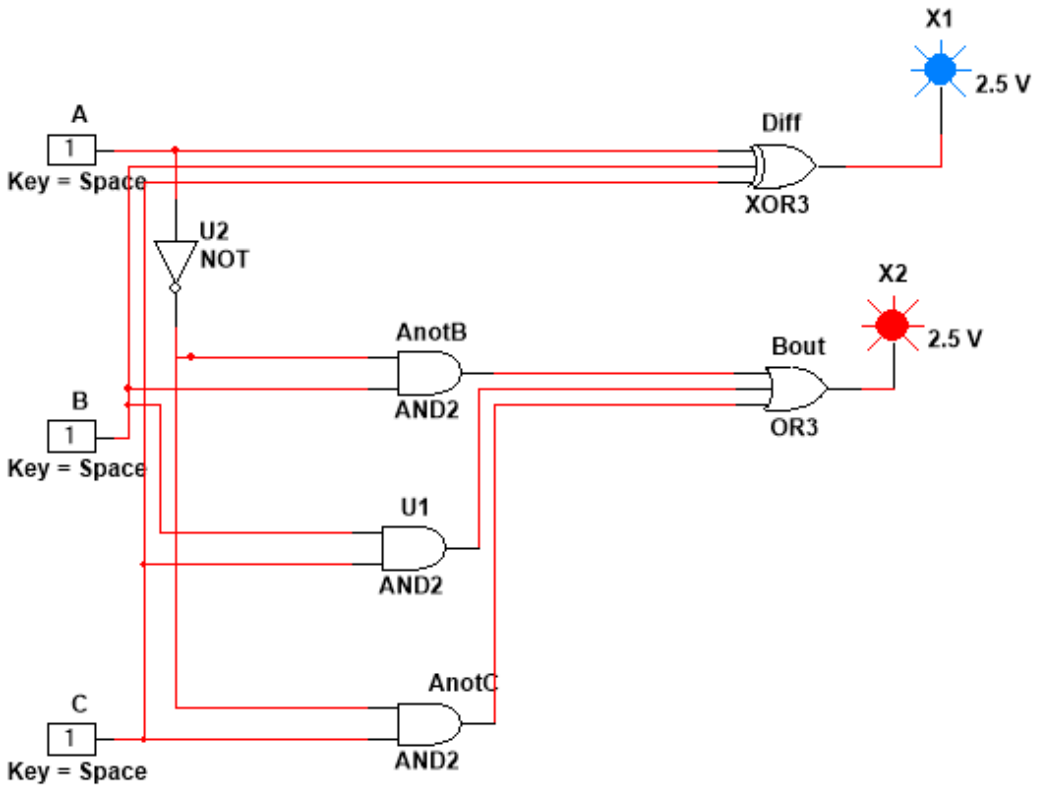


Full Subtractor:

A	B	Bin	Difference	Bout
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Difference = A'B'C+A'BC'+AB'C'+ABC= A ⊕ B ⊕ C

Bout = A'B'C+A'BC'+A'BC+ABC = A'B+A'C+BC

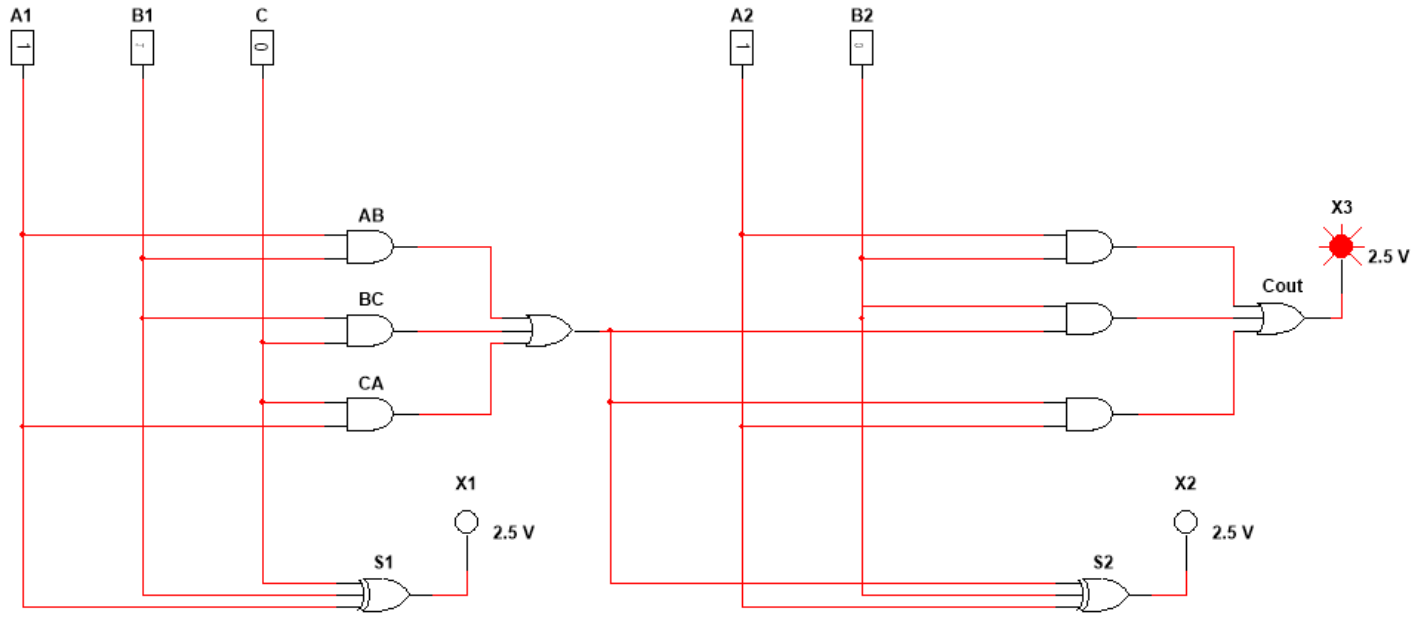


Task No. 02:

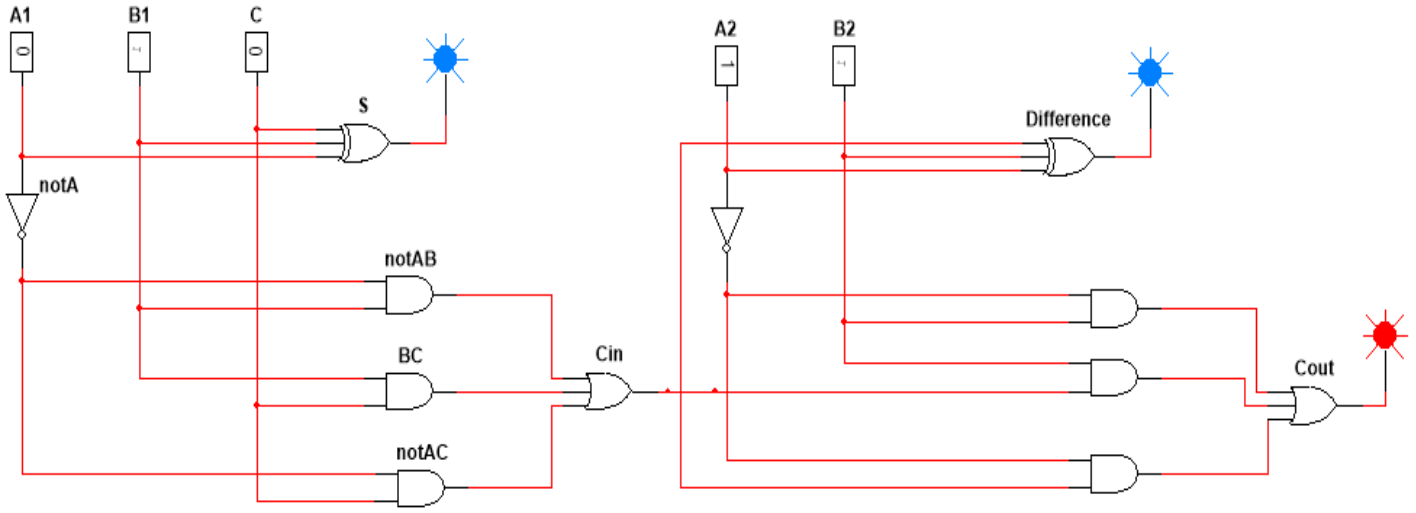
"Design and implement a 2-bit adder & subtractor circuit in Multisim using basic gates."

Solution:

2 BIT ADDER:



2 BIT SUBTRACTOR:

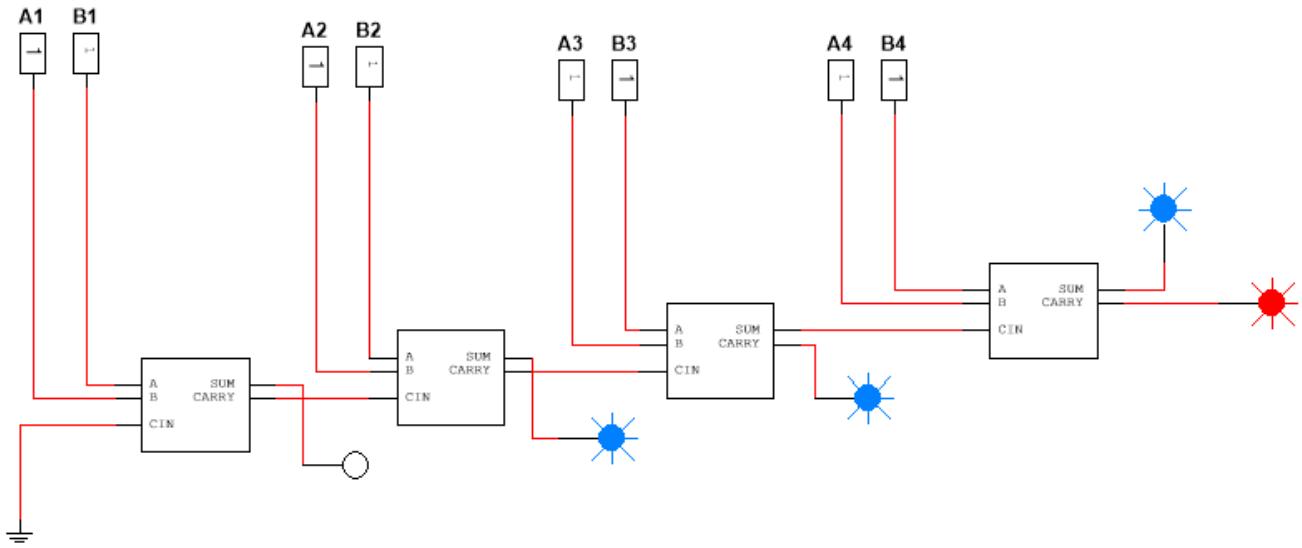


Task No. 03:

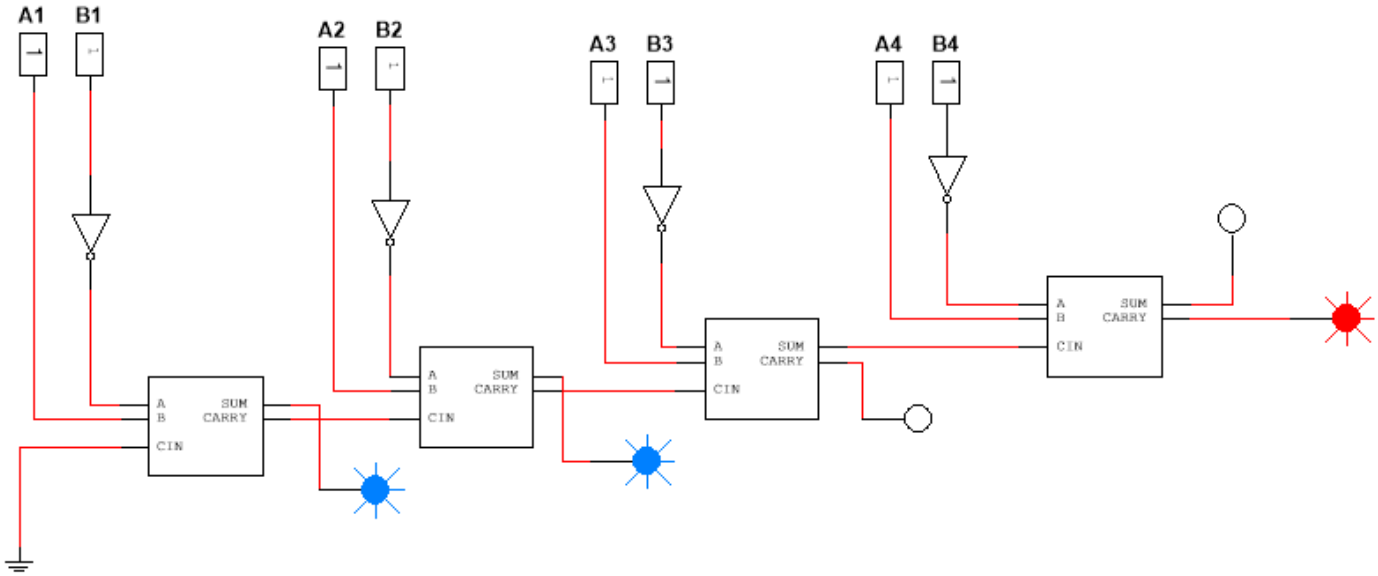
"Design and implement a 4-bit adder & subtractor circuit in Multisim using Full Adder ICs."

Solution:

4 BIT ADDER:



4 BIT SUBTRACTOR:



Task No. 04:

"Design and implement a 4-bit multiplier circuit in Multisim using Adder's ICs."

Solution: