DIGITAL ELECTRONICS LAB

EXPERIMENT – 2

PULKIT PANDEY

2K19/EP/076

AIM: To verify the truth table of half adder and full adder.

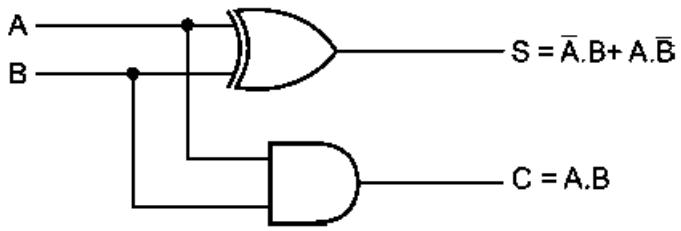
THEORY:

***HALF ADDER*:** A half adder is an MSI circuit that adds two binary digits, giving a SUM bit and a CARRY bit as in the logic truth table. If A and B are the two input bits then SUM is the XOR of A & B:

$$Sum = AB'+A'B$$

Similarly CARRY is the AND of A & B:

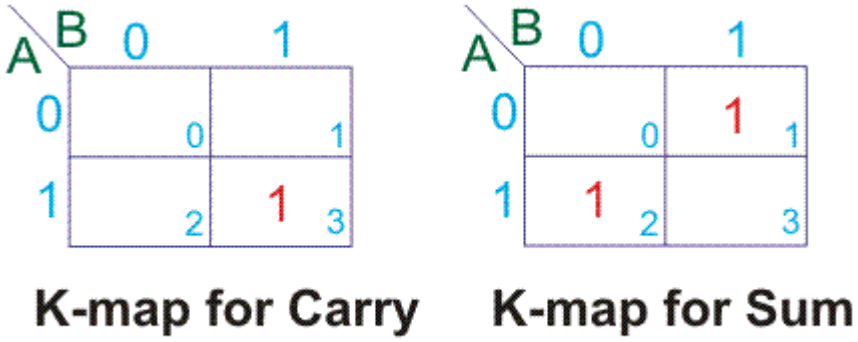
$$Carry=A.B$$



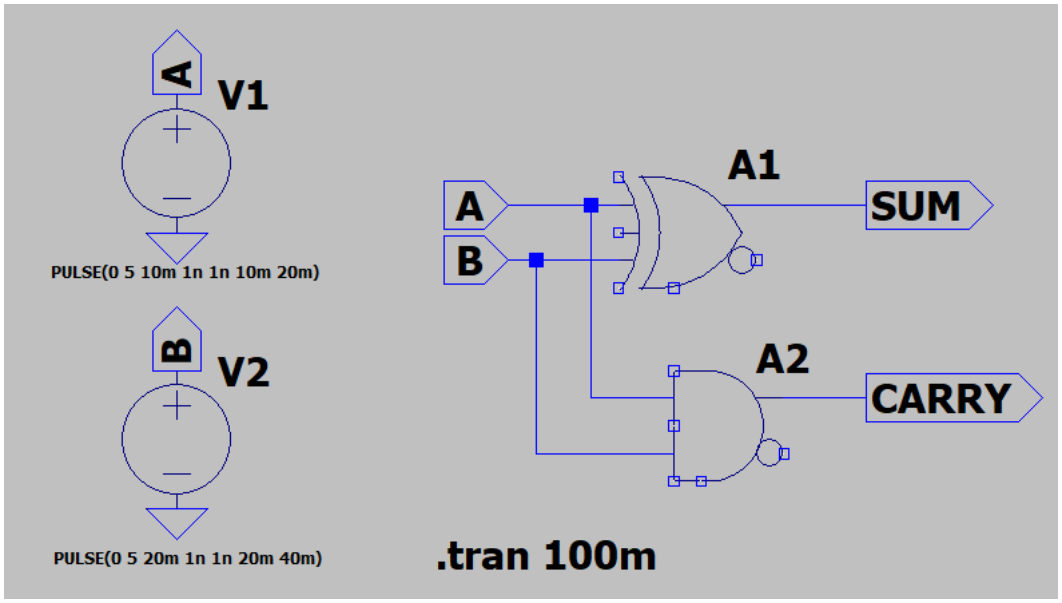
Circuit Diagram: Half Adder

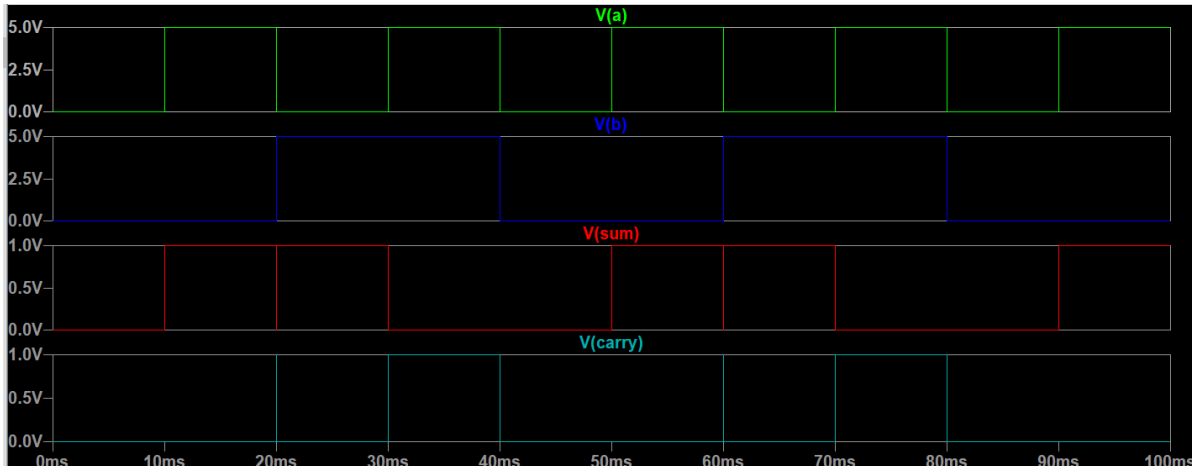
INPUTS		OUTPUTS	
A	**B**	**SUM**	**CARRY**
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Truth Table: Half Adder



K-MAPS for half adder.





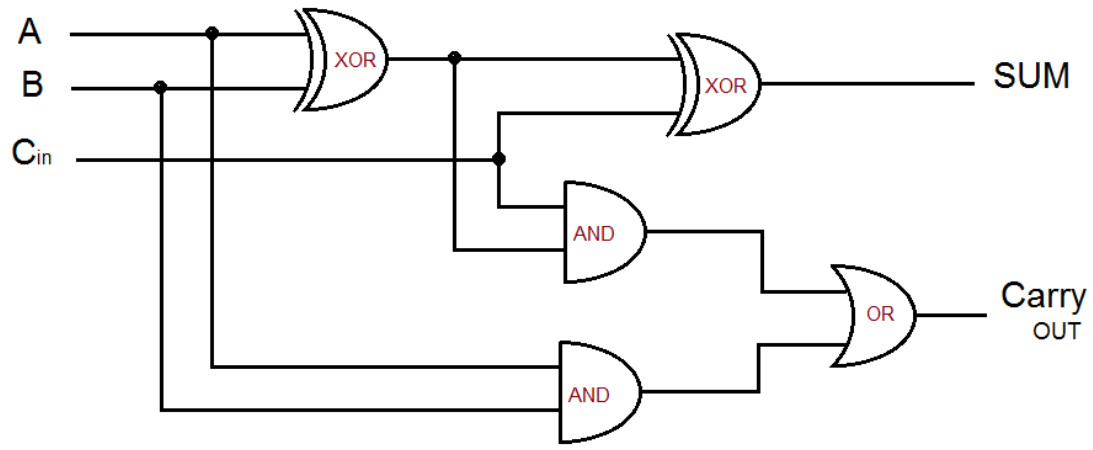
SIMULATION

***FULL ADDER*:** A full adder is an MSI circuit that adds two input bits and carry from the previous stage and outputs a SUM bit and a CARRY OUT bit. A and B are the main bits, C is the carry from the previous stage. Sum produced is:

$$Sum = A'B'C+A'BC'+AB'C'+ABC$$

CARRY is the output carry bit and is:

$$Carry = AB+BC+AC$$



Circuit Diagram: Full Adder

INPUTS			OUTPUTS	
A	**B**	**C**	**SUM**	**CARRY**
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

Truth Table: Full Adder

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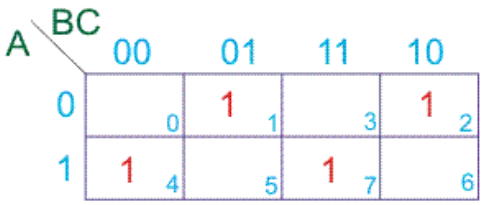
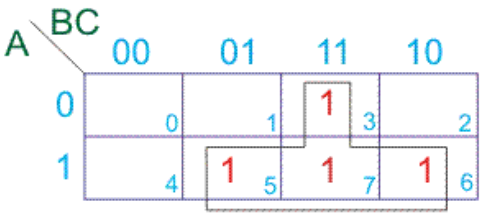


K-map for Sum (S)



K-map for Carry (C_{out})

K-MAPS for full adder.