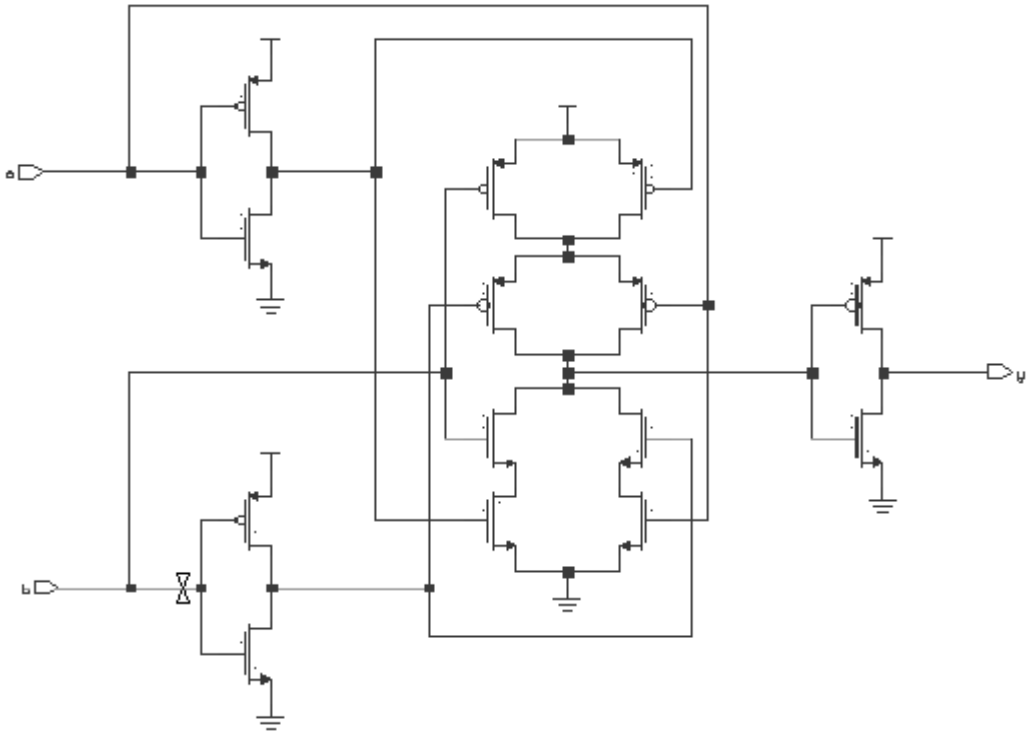
Experiment No: 04

Problem Statement: Simulate Schematic of CMOS two input XOR gate and do ERC and transient analysis.

Circuit Diagram:



Logic Diagram of CMOS XOR Gate

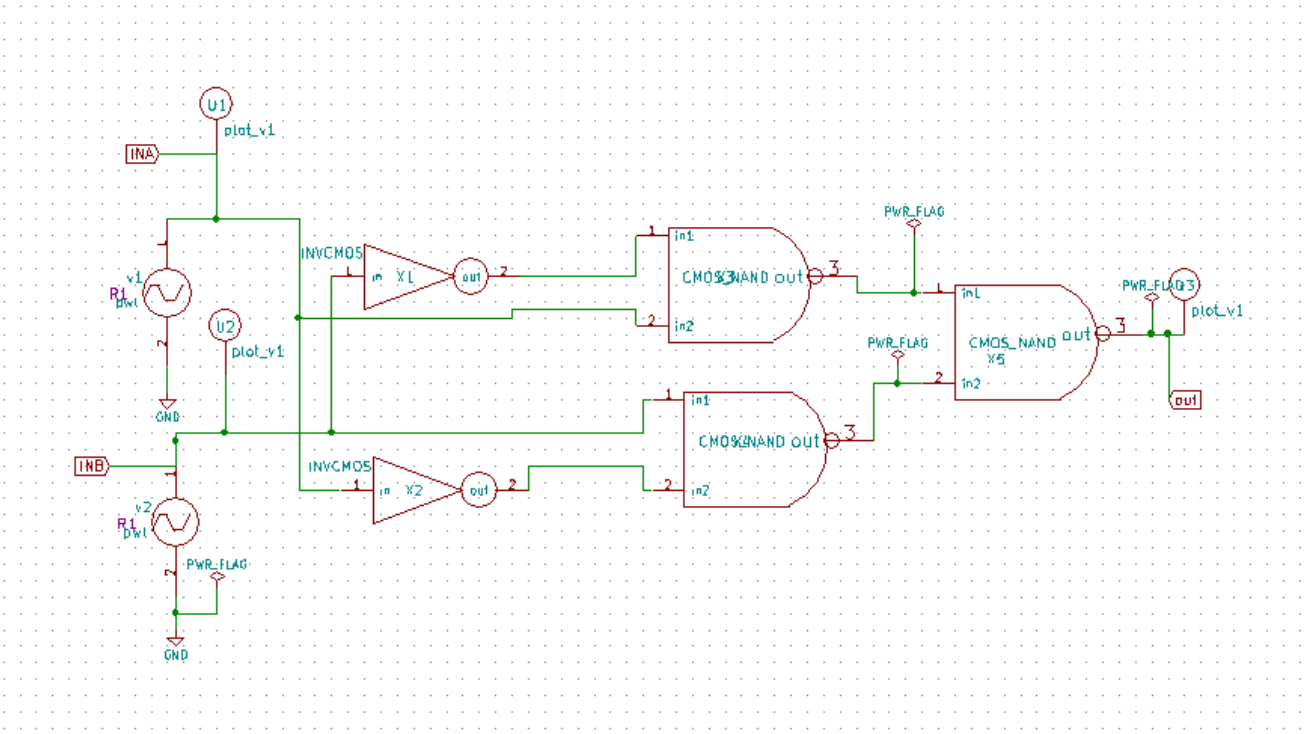
Theory:

XOR gate (sometimes EOR, or EXOR and pronounced as Exclusive OR) is a digital logic gate that gives a true (1 or HIGH) output when the number of true inputs is odd. An XOR gate implements an exclusive or; that is, a true output results if one, and only one, of the inputs to the gate is true.

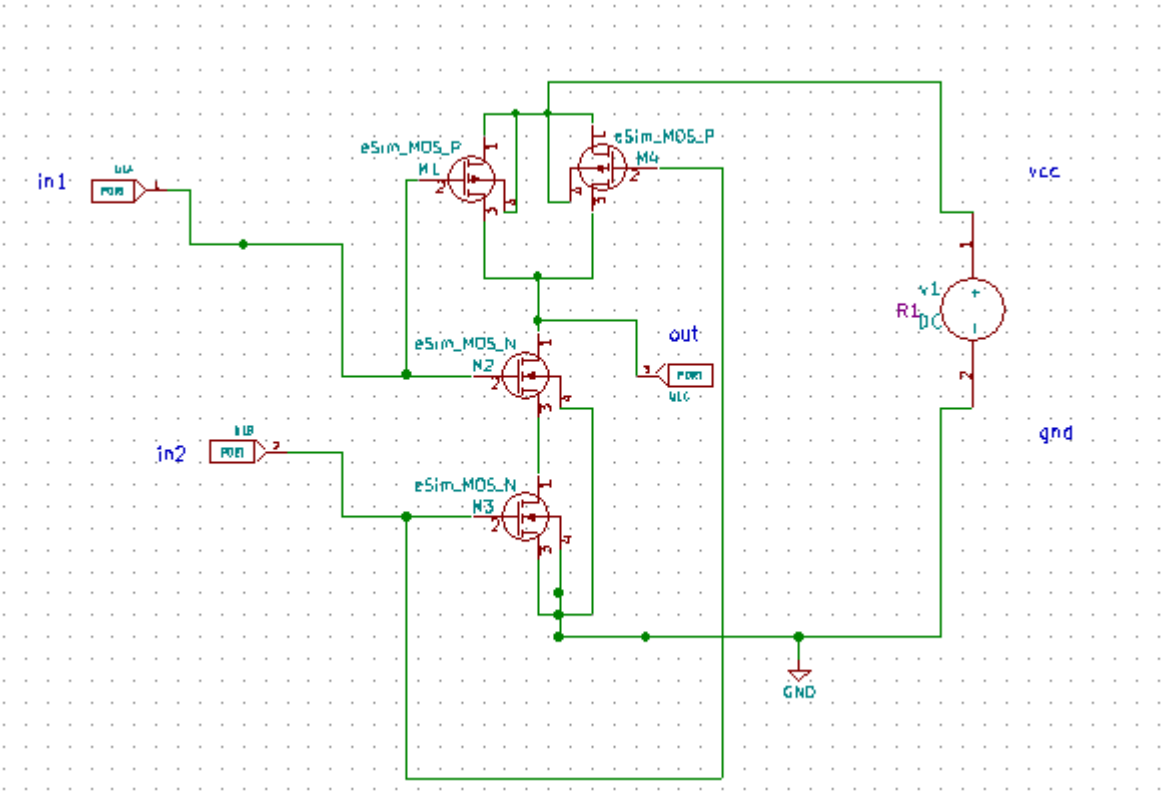
Truth table:

XOR gate is a digital logic gate that gives a true output when the number of true inputs is odd. An XOR gate implements an exclusive or; that is, a true output results if one, and only one, of the inputs to the gate is true. If both inputs are false and both are true, a false output results. XOR gate (sometimes EOR, or EXOR and pronounced as Exclusive OR) is a digital logic gate that gives a true (1 or HIGH) output when the number of true inputs is odd. An XOR gate implements an exclusive or; that is, a true output results if one, and only one, of the inputs to the gate is true.

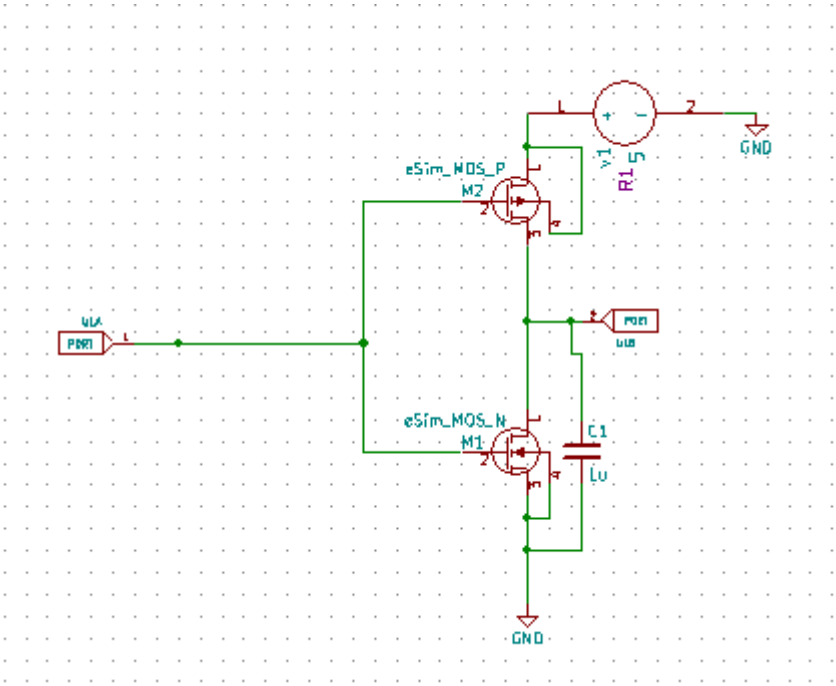
A	B	A **XOR** B
0	0	0
0	1	1
1	0	1
1	1	0



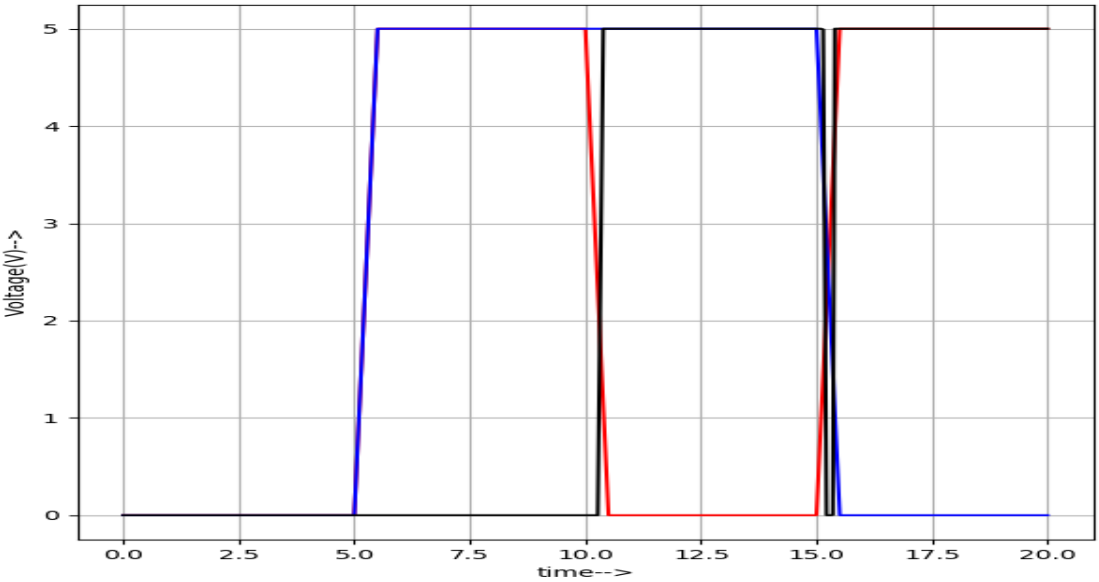
Schematic of CMOS XOR using sub-circuits CMOS inverter and CMOS NAND



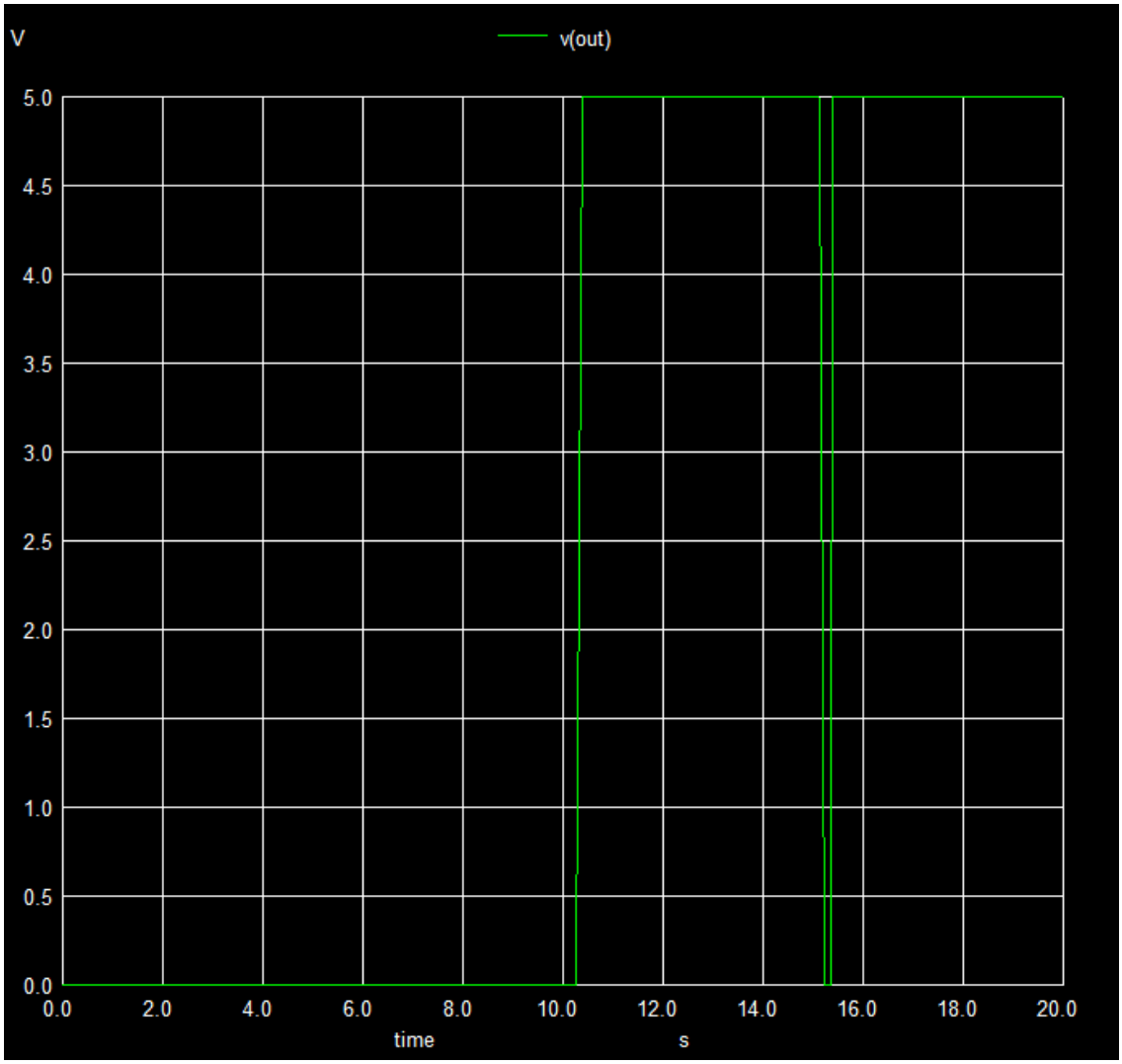
Schematic of sub-circuits CMOS NAND



Schematic of sub-circuits CMOS inverter



Results in python Window



Results in ngspice window

Conclusion: Hence we studied could make the schematic and test the working of CMOS XOR gate with two input and it is showing correct results.

Reference:https://www.researchgate.net/figure/CMOS-XOR-gate-circuit-diagram_fig2_45146180