



The Islamic University of Gaza
Faculty of Engineering
Department of Computer Engineering

Digital Electronics Laboratory
[Lab 09]

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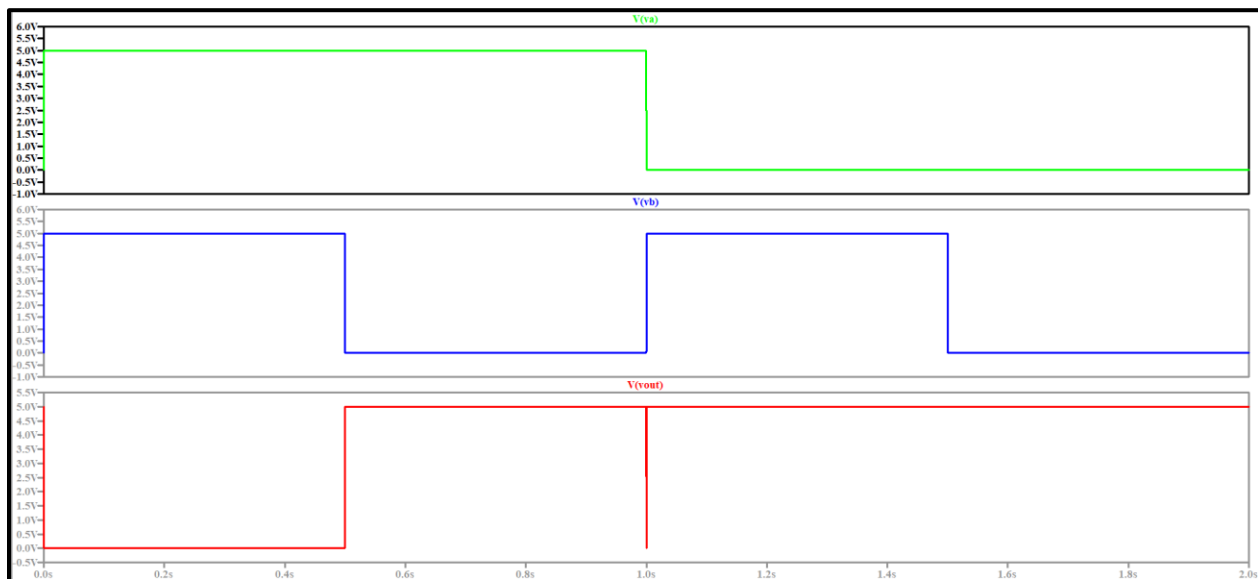
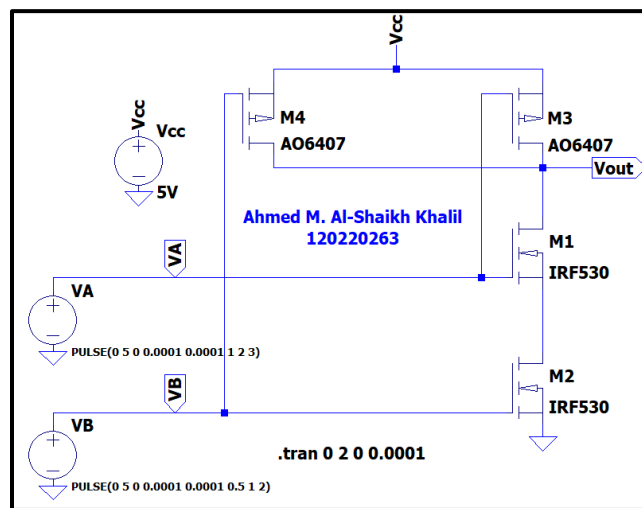
Supervisor
Eng. Saja Nabeel Nabhan

➤ Objectives:

- To study CMOS logic gates.
- To find the truth table of the CMOS NAND gate.
- To draw the VTC curve using DC sweep.
- To determine V_{IL} , V_{IH} , V_{OL} , V_{OH} , and V_M .

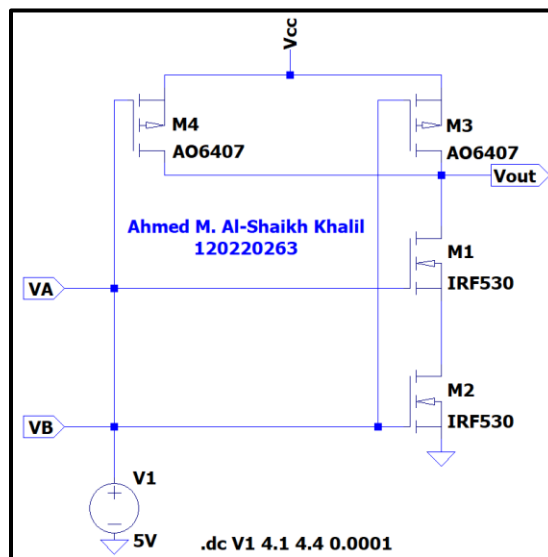
➤ Part 1: C-MOS NAND Gate:

1. Using LTspice, find the **Truth table** of the Circuit shown in **Figure (9-2)** using Transient analyses.

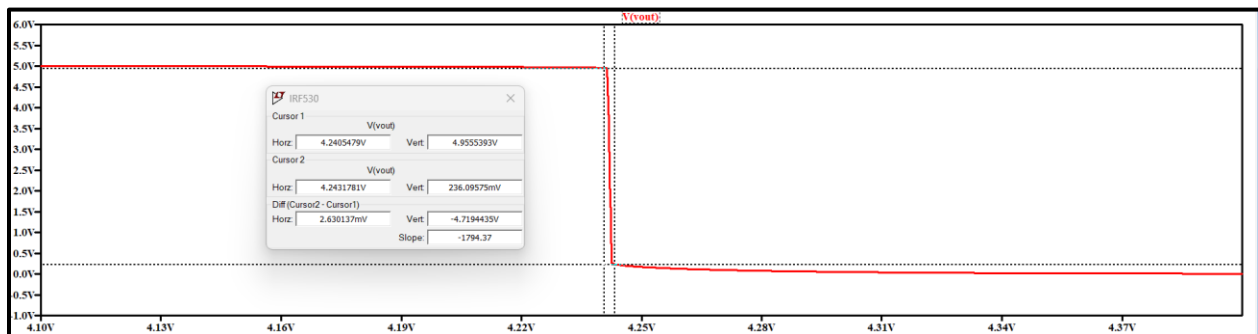


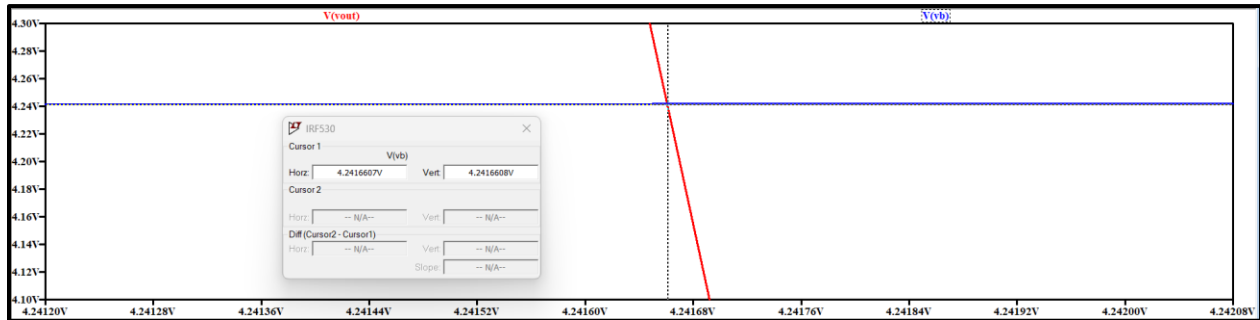
<i>A</i>	<i>B</i>	<i>O</i>
1	1	0
1	0	1
0	1	1
0	0	1

2. Find the VTC for the same circuit, use DC-Sweep and V_{in} (4.1-4.4V) then graph V_{out} , attach your schematic and the result.



VTC



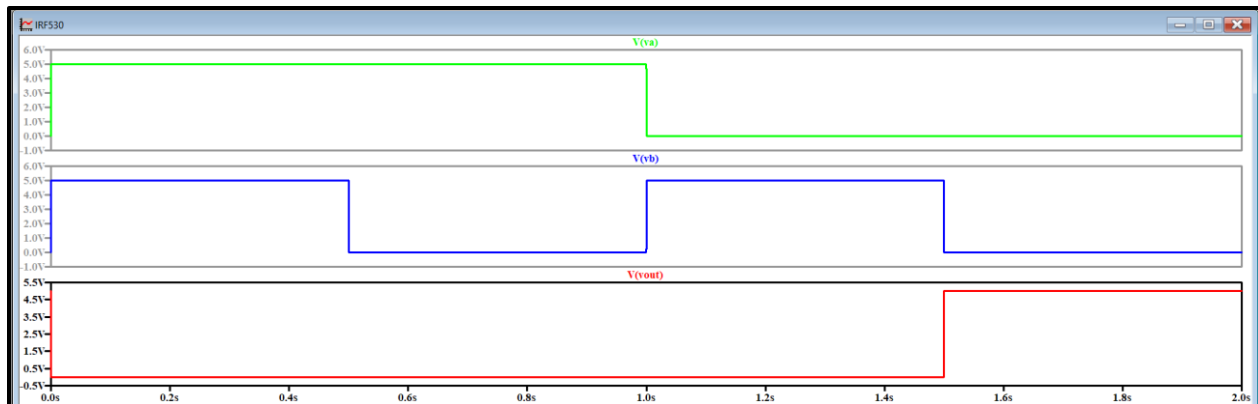
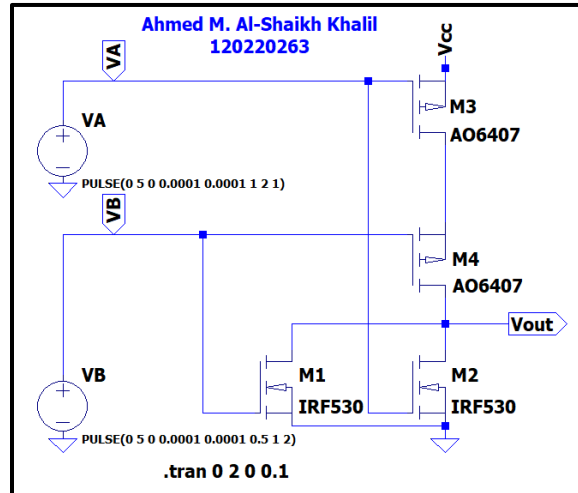


3. Determine the following:

V_{il}	4.2405479V
V_{ih}	4.2431781V
V_{ol}	236.09575mV
V_{oh}	4.9555393V
V_M	4.2416607V

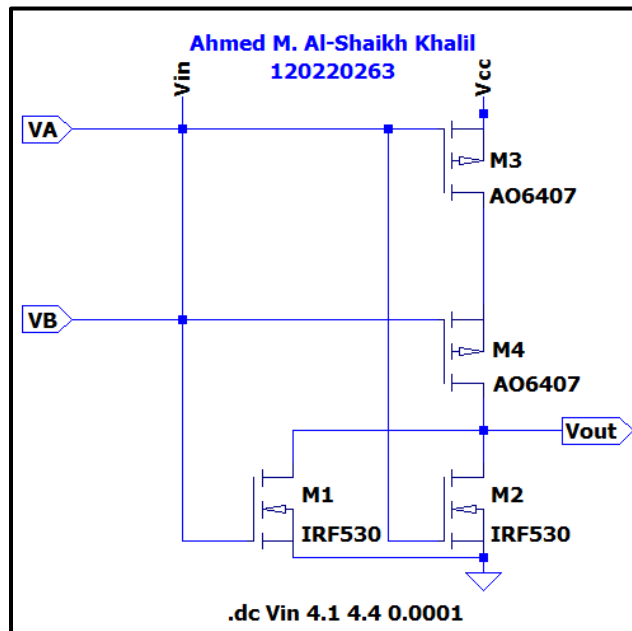
➤ Part 2: C-MOS NOR Gate:

1. Using LTspice, find the **Truth table** of the Circuit shown in **Figure (9-3)** using Transient analyses.

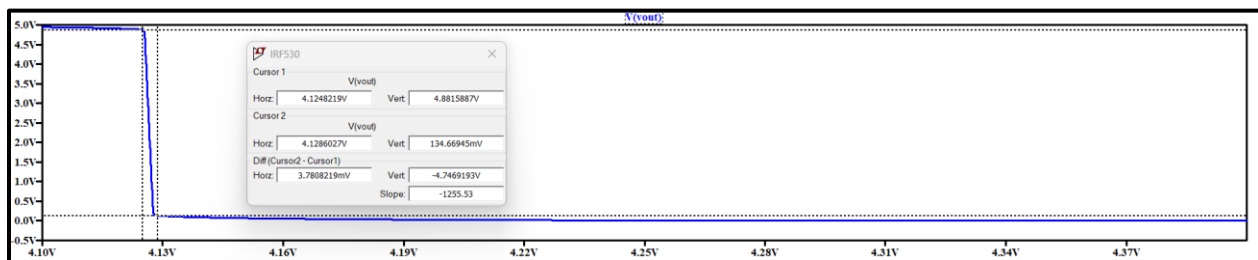


<i>A</i>	<i>B</i>	<i>O</i>
1	1	0
1	0	0
0	1	0
0	0	1

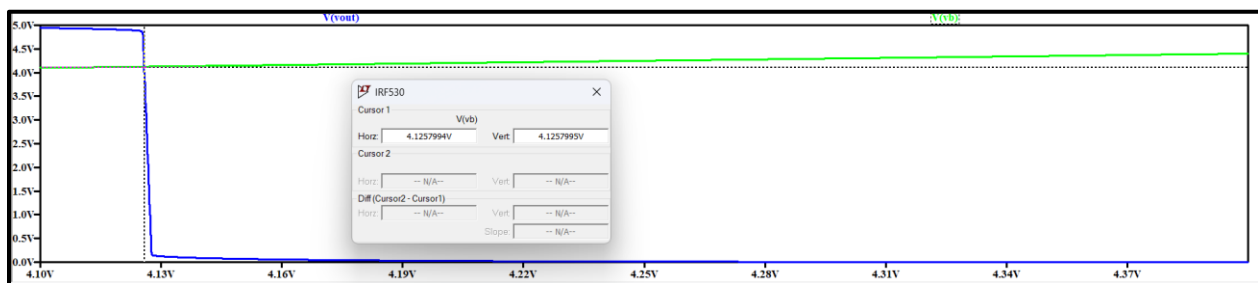
2. Find the VTC for the same circuit, use DC-Sweep and V_{in} (4.1-4.4V) then graph V_{out} , attach your schematic and the result.



VTC



VM



3. Determine the following:

V_{il}	4.1248219V
V_{ih}	4.1286027V
V_{ol}	134.66945mV
V_{oh}	4.8815887V
V_M	4.1257995V