

CENG 215 Circuits and Electronics

LAB #8 Feuille

Place: PC Lab

Aim

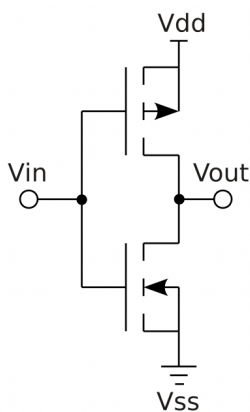
To build and analyze CMOS based logic gates.

Materials/Devices:

PySpice

Work to be done:

- A. Consider the NOT gate implementation using N-type and P-type MOSFETs (Vdd=3.3 volts and Vss=0 volt).



The PySpice implementation of this circuit is given below:

```
circuit = Circuit('NOT Gate')
circuit.model('mynmos','NMOS', level=1)
circuit.model('mypmos','PMOS', level=1)

# Define the DC supply voltage value
HIGH = 3.3@u_V
LOW = 0@u_V

circuit.V(1,'Vdd',circuit.gnd, HIGH)
circuit.V(2,'in',circuit.gnd, LOW)
circuit.MOSFET(1, 'out', 'in', 'Vdd', 'Vdd', model='mypmos')
circuit.MOSFET(2, 'out', 'in', circuit.gnd, circuit.gnd, model='mynmos')

simulator = circuit.simulator(temperature=25, nominal_temperature=25)
analysis = simulator.operating_point()

print("=== NETLIST ===")
```

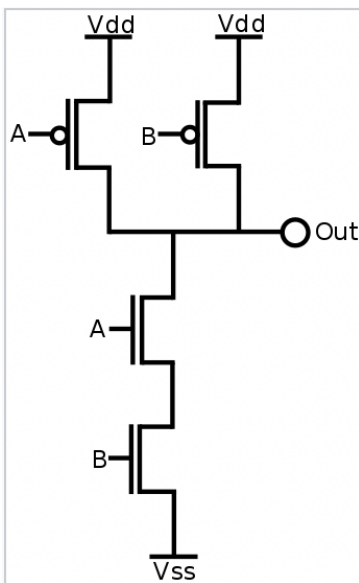
```

print(circuit)
print("=== ANALYSIS RESULTS ===")
for node in analysis.nodes.values():
    print('Node {}: {:.3f} V'.format(str(node), float(node)))
for node in analysis.branches.values():
    print('Branch {}: {:.6f} A'.format(str(node), float(node)))

```

Run this code for different input levels (LOW and HIGH) and verify the NOT function.

B. The following is the implementation of another logic gate.



Simulate this circuit in PySpice. Draw the truth table for this gate. Which logic gate is this?

Final Remarks

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