Electrotechnology Lab report #5

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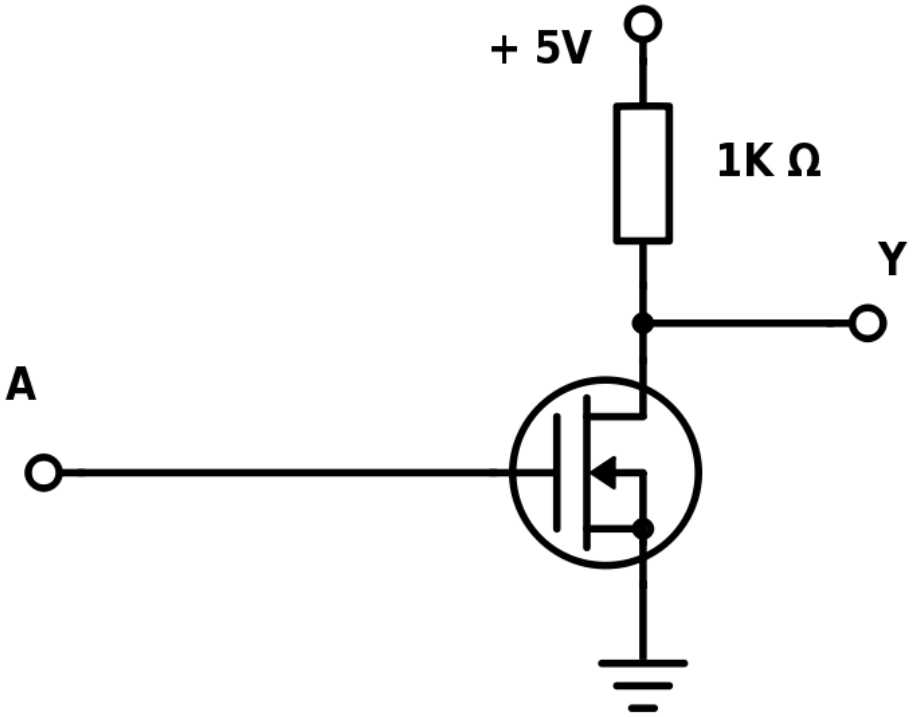
Mosfet based inverter

Method:

1. The circuit was set up as shown in the diagram.
2. After this the circuit was tested by changing the input (A)
3. The output and input voltage was then noted for every possibility

Circuit Diagram:



Results:

The resulting input and output voltages were:

Input (A)	Output (Y)
0 (0 V)	1 (1.7 V)
1 (1.7 V)	0 (0 V)

Interpretation:

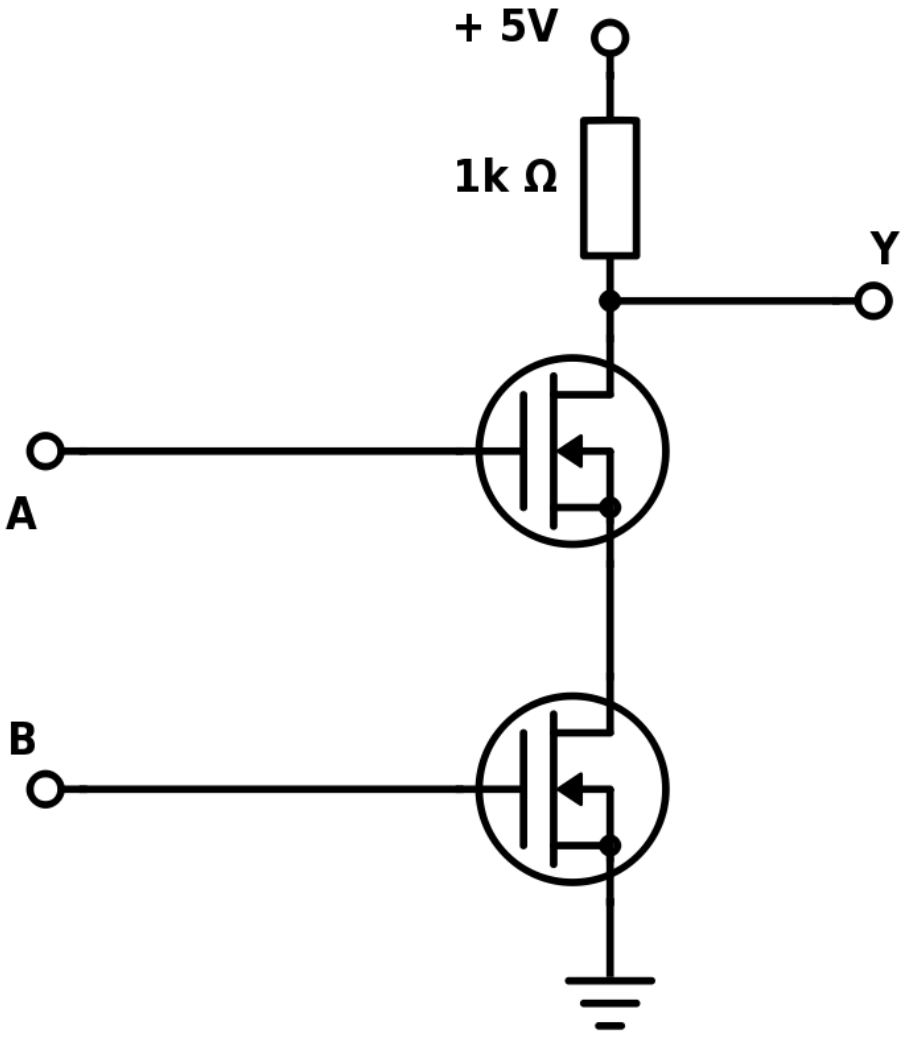
The voltages are not at 5V due to the 1k resistor at the source of power. At 0 V, when A is turned off and there is no voltage going into the mosfet, the 1.7 V from the power source travels directly to Y avoiding the transistor. This is because the transistor at this time is closed. When A is switched on, the transistor is activated and the source voltage passes through it instead of going to the output Y. This results in the voltage 0 V. The truth table is one of an inverter.

Mosfet based NAND gate

Method:

1. The circuit was set up as shown in the diagram
2. The circuit was then tested by changing the input voltages A and B
3. The input and output voltage was noted for each of the possibilities of inputs.

Circuit Diagram:



Results:

The input and output voltages resulted in the following table:

Input 1 (A)	Input 2 (B)	Output (Y)
0 (0 V)	0 (0 V)	1 (1.7 V)
0 (0 V)	1 (1.7 V)	1 (1.7 V)
1 (1.7 V)	0 (0 V)	1 (1.7 V)
1 (1.7 V)	1 (1.7 V)	0 (0 V)

Interpretation:

When both A and B are off the voltage freely flows to the output, this is because it has nowhere else to go. When either A or B are on but the other is off, the voltage can still only flow to the output Y. It is only when A and B are off that the voltage can flow to ground, resulting in the output voltage 0V. This is the truth table of a NAND gate.

If the resistor is changed from 1k to 5k, the voltage will just be lowered. It is only if the parts which control the mosfets (A and B) have voltages that are too small that the mosfets wont operate. Similarly if the voltages going into the mosfet are too high, the transistor will break.