

Lab Report: 1

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Experiment 1:- Familiarisation with Digital Test Kit and Binary Logic Levels

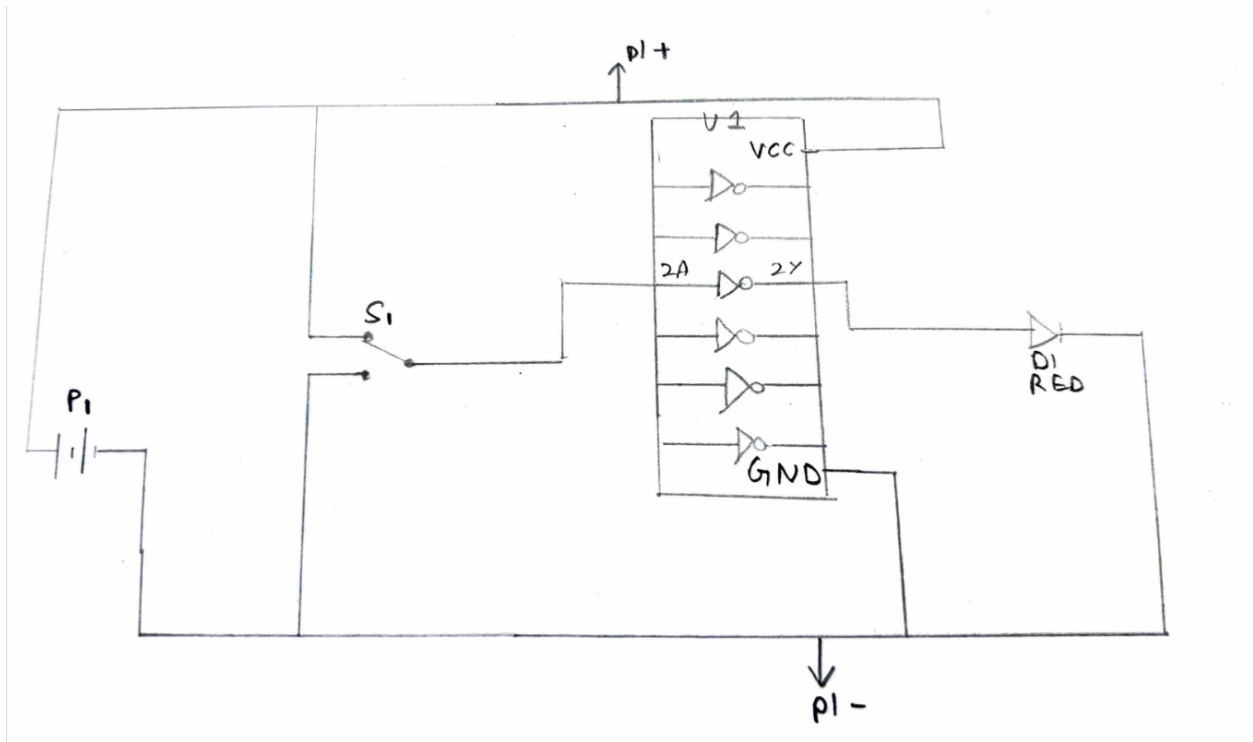
Objective:

- Getting familiar with the schematic and the usage of the breadboard
- Implementing the truth table of a NOT GATE using the Digital Test Kit

Electronic Components Required:

- Digital Test Kit–
 - Power Supply
 - Slide switch
 - Red LED
 - Resistor
 - Breadboard
- 7404 IC NOT Gate(Hex Inverter)
- Voltage Supply
- Connecting wires

The Reference Circuit:



Procedure:

- We turned on the VCC Supply after moving the clock control switch to the FAST position. We noticed that the CLK-R LED began to glow as soon as the power supply was turned on.
- We measured the voltage between the VCC and GND pins using a digital multimeter (in the DC VOLTAGE mode).
- By monitoring the voltages at these pins for both locations of the input switches, we were able to confirm that all of the input pins IP1–IP12 were functioning properly.

- By applying an input from one of the input pins to the output pins DP1–DP8, we were able to further confirm that all of the LED displays were operational. We did this by watching the LEDs as the input was switched.
- Then we connect 7404 IC (Hex Inverter) to the breadboard.
- We connect the VCC supply and Gnd of the test kit to the top/bottom (+ and – respectively) of the breadboard.
- Using RED and BLACK wires, we attach the VCC and Gnd pins of the IC to the VCC and Gnd lines on the top and bottom of the breadboard, respectively.
- We connect the input pin of any one gate in the IC to the IP1 input switch, and the corresponding output pin of the IC to the DP1 display point provided in the Test Kit.

Conclusion:

When the input signal is turned off, the Green LED is supposed to light. Our observations show that it illuminates when the IP1 input switch is turned on. On the other hand, when the input signal is turned on, the Red LED is supposed to shine. We have noticed that it illuminates when the IP1 input switch is off. As a result, we can say that the hex inverter is a NOT gate that merely inverts the logic of the input to the output.

Link to the TinkerCad Simulation:

<https://www.tinkercad.com/things/dvSHecS4yQY-dsmlab1exp1/editel>

Experiment 2:- Familiarization with Arduino IDE and microcontroller

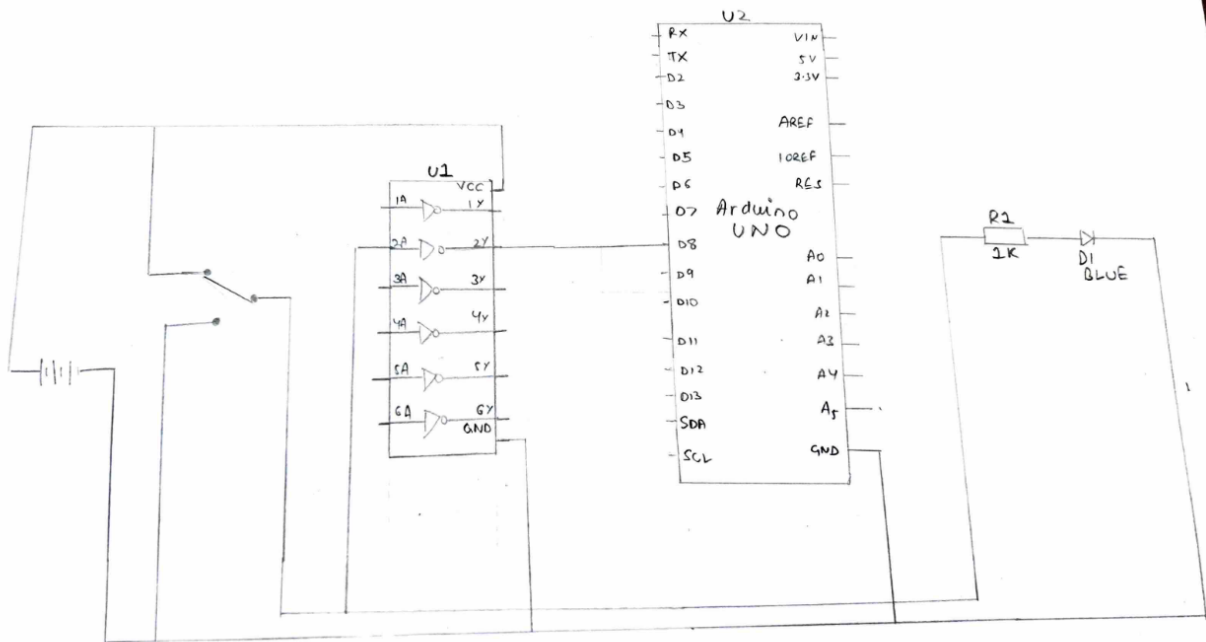
Objective:

- Application of the NOT Gate.
- Using the Arduino ISP to write and compile C code for the ATmega328P.
- Importing this file, running the program, and evaluating the results on the microcontroller.

Electronic Components required:

- Digital Test Kit:
 - Power Supply
 - Slide switch
 - Red LED
 - Resistor
 - Breadboard
- Hex Inverter
- Connecting Wires
- Arduino UNO
- Laptop with Arduino IDE

The Reference Circuit:



Procedure:

- We connect 7404 IC (Hex Inverter) to the breadboard.
- The test kit's Gnd and VCC supply are connected to the top and bottom (+ and -, respectively) of the breadboard. Using RED and BLACK wires, we attach the VCC and Gnd pins of the IC to the VCC and Gnd lines on the top and bottom of the breadboard, respectively.
- The IP1 input switch is connected to the input pin of any one of the IC's gates, and the appropriate output pin of the IC is connected to Digital pin 8 of the Arduino UNO.

- We connect the GND pin of the Arduino to the GND pin of the IC.
- The next step is to upload the code to the Arduino using the IDE. When the IC output enters the Digital Pin of the Arduino is not 0, we print "Hello World," and when the output is 0, we print "Off."

Arduino IDE Code:

```
const int notGateOutputPin = 8;
void setup() {
    pinMode(notGateOutputPin, INPUT);
    Serial.begin(9600);
}

void loop() {
    int not Gate Value=digital Read (not Gate Output
    Pin);
    if (notGateValue == HIGH) {
        Serial.println("Hello World");
    }
    else {
        Serial.println("0");
    }
    delay (1000);
}
```

Conclusion:

According to our observations, the serial monitor shows "Off" when the IP1 input switch is activated. When the IP1 input switch is turned off, however, it shows "Hello World". As a result, we can say that the hex inverter is a NOT gate that merely inverts the logic of the input to the output.

Link to the TinkerCad Simulation:

<https://www.tinkercad.com/things/kGeayp1gCjF-dsmlab1exp2/editel>