

**Project Name: IC TESTER**

**Course Name: Digital LOGIC DESIGN (DLD)**

**Course Code: EE1005**

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**Introduction:**

The main purpose of this project is to check logic gate IC, whether the IC is working properly or not. The checking of the IC will be done using Arduino UNO which will be programed such that it checks all possible combination for each of the gates mention and by displaying truth table for each gate. The main IC that are going to be checked are OR (7432), AND (7408), NAND (7400), EXOR (7486) and XNOR (747266).

**Components: Price:**

|  |  |
| --- | --- |
| Arduino Uno SMD | RS 1600 |
| LCD (16x2) | RS 550 |
| 2xBread Board | RS 500 |
| IC Holder | RS 30 |
| Power Bank | **-** |
| Arduino power cable | RS 200 |
| Potentiometer | RS 30 |
| 40xJump Wire | RS 200 |
| 3xIC(NAND,XOR,XNOR) | RS 240 |
| 5x220-ohm Resistors | RS 25 |
| 5xLED | RS 25 |

The software used to code Arduino Uno SMD is Arduino IDE.

Arduino Uno have 14digital pins from which 4 pins are used to display the truth table of the gate by passing value to LEDs, 1 pin is used to check whether the IC is working properly or not by-passing value to LED, 2 pins are used to give an input to IC and 1 pin to read the output value of the IC. The remaining 6 pins are used to connect the Arduino to LCD display ( which shows the IC number and gate which is being checked).

Bread Board is used as the base of the project as all the implementation is done on breadboard.

IC holder is used to place an IC which needs to be checked.

Power bank is used as source of power supply as this project requires 5v or else the Arduino will burn.

Potentiometer is used to set the voltage which controls the contrast of the LCD display.

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. The resisters are protecting LED.

**Working:**

Arduino code for IC Tester.

#include<LiquidCrystal.h>

LiquidCrystal lcd(4, 5, 0, 1, 2, 3);

int gatevalue;

int inputPin = 8;

int Output1Pin = 6;

int Output2Pin = 7;

int led = 13;

int led2 = 12;

int led3 = 11;

int led4 = 10;

int led5 = 9;

void setup() {

  Serial.begin(9600);

  lcd.begin(16, 2);

  lcd.print("IC TESTER");

  pinMode(Output1Pin, OUTPUT);

  pinMode(Output2Pin, OUTPUT);

  pinMode(inputPin, INPUT);

  pinMode(led, OUTPUT);

  pinMode(led2, OUTPUT);

  pinMode(led3, OUTPUT);

  pinMode(led4, OUTPUT);

  pinMode(led5, OUTPUT);

  gatevalue = 0;

}

void loop() {

  gatevalue = gatevalue + (check\_Gate(false, false) \* 8);

  gatevalue = gatevalue + (check\_Gate(false, true) \* 4);

  gatevalue = gatevalue + (check\_Gate(true, false) \* 2);

  gatevalue = gatevalue + (check\_Gate(true, true) \* 1);

//truth table for AND,OR,XOR,XNOR,NAND

  if (gatevalue == 1) {

    Serial.println("The gate is an AND gate.");

    lcd.setCursor(0,0);

    lcd.print("AND GATE IC");

    lcd.setCursor(0,1);

    lcd.print("IC# 7408");

    digitalWrite(led, LOW);

    digitalWrite(led2, LOW);

    digitalWrite(led3, LOW);

    digitalWrite(led4, LOW);

    digitalWrite(led5, HIGH);

  }

  else if (gatevalue == 14) {

    Serial.println("The gate is a NAND gate.");

    lcd.setCursor(0,0);

    lcd.print("NAND GATE IC");

    lcd.setCursor(0,1);

    lcd.print("IC# 7400");

    digitalWrite(led, LOW);

    digitalWrite(led2, HIGH);

    digitalWrite(led3, HIGH);

    digitalWrite(led4, HIGH);

    digitalWrite(led5, LOW);

  }

  else if (gatevalue == 6) {

    Serial.println("The gate is an XOR gate.");

    lcd.setCursor(0,0);

    lcd.print("XOR GATE IC");

    lcd.setCursor(0,1);

    lcd.print("IC# 7486");

    digitalWrite(led, LOW);

    digitalWrite(led2, LOW);

    digitalWrite(led3, HIGH);

    digitalWrite(led4, HIGH);

    digitalWrite(led5, LOW);

    }

  else if (gatevalue == 7) {

    Serial.println("The gate is an OR gate.");

    lcd.setCursor(0,0);

    lcd.print("OR GATE IC");

    lcd.setCursor(0,1);

    lcd.print("IC# 7432");

    digitalWrite(led, LOW);

    digitalWrite(led2, LOW);

    digitalWrite(led3, HIGH);

    digitalWrite(led4, HIGH);

    digitalWrite(led5, HIGH);

    }

  else if (gatevalue == 9) {

    Serial.println("The gate is an XNOR gate.");

    lcd.setCursor(0,0);

    lcd.print("XNOR GATE IC");

    lcd.setCursor(0,1);

    lcd.print("IC# 7466");

    digitalWrite(led, LOW);

    digitalWrite(led2, HIGH);

    digitalWrite(led3, LOW);

    digitalWrite(led4, LOW);

    digitalWrite(led5, HIGH);

    }

  else {

    Serial.println("ERROR: Gate Not Present.");

    lcd.setCursor(6,0);

    lcd.print("ERROR");

    lcd.setCursor(0,1);

    lcd.print("THERE IS NO GATE");

    digitalWrite(led, HIGH);

    digitalWrite(led2, LOW);

    digitalWrite(led3, LOW);

    digitalWrite(led4, LOW);

    digitalWrite(led5, LOW);

    }

    gatevalue=0;

    delay(1000);

}

int check\_Gate(int output1, int output2){

int x;

digitalWrite(Output1Pin, output1);

digitalWrite(Output2Pin, output2);

delay(5);

x = digitalRead(inputPin);

return x;

}

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Description automatically generated

In this project when there is no IC present Arduino return a value 1 to green LED hence it becomes on. When you place another IC Arduino checks all possible combination and if the IC is AND, NAND, OR, XOR, XNOR it checks that they are working properly and displays the truth table by sending the values to the red LEDs for that particular IC if working properly and the green LED turns off and LCD display shows the IC number of the inserted gate. If any other IC is inserted except the mentioned IC the green LED remains on.

