

# Logical Expression through avr-gcc

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## TABLE I

### 3 SOLUTION :

#### 3.1 Theoretical Solution

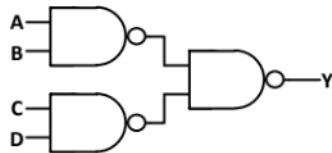
Based on Demorgans Law

$$\overline{AB} = \overline{A} + \overline{B} \quad (1)$$

$$\overline{\overline{A}} = A \quad (2)$$

### 1 PROBLEM STATEMENT

**Question-14 :** In the logic circuit shown in the figure, Y is given by



As per the boolean circuit A,B,C and D are inputs and Y is the output. The equivalent expression of the boolean logic is

$$Y = \overline{\overline{AB} \cdot \overline{CD}}$$

- (a)  $Y = ABCD$
- (b)  $Y = (A + B)(C + D)$
- (c)  $Y = A + B + C + D$
- (d)  $Y = AB + CD$

By using equation(1) then the output Y is

$$Y = \overline{\overline{AB} + \overline{CD}}$$

### 2 COMPONENTS

| Component             | Value   | Quantity |
|-----------------------|---------|----------|
| Resistor              | 220 Ohm | 1        |
| Arduino               | UNO     | 1        |
| Seven Segment Display |         | 1        |
| Decoder               | 7447    | 1        |
| Jumper Wires          | M-M     | 20       |
| Breadboard            |         | 1        |

Again by using equation(2) then the output Y is

$$Y = AB + CD$$

#### 3.2 Truth table for Boolean Logic

| A | B | C | D | Y |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

TABLE II

#### 4 CONNECTIONS

| Input   | A | B | C | D |    |
|---------|---|---|---|---|----|
| Output  |   |   |   |   | Y  |
| Arduino | 2 | 3 | 4 | 5 | 13 |

TABLE III

#### 5 PROCEDURE

##### 5.1 LED Blinking

- 1) Make connections as per TABLE-III
- 2) Connect Arduino ground to the led - resistor end
- 3) Connect Arduino 13 pin to the LED Positive
- 4) In arduino we are having pins A,B,C,D.here we are using port B pin 13 is taken as output pin.
- 5) port D pins 2,3,4,5 pins are taken as a inputs. portD pins 2,3,4,5 pins are connected vcc or gnd in breadboard as per truth table
- 6) Execute the following code
- 7) Observe the results as per below TABLE II by changing input values

**Observe the circuit and verify the program by executing the link provided below.**

<https://github.com/naveed790/FWC/>