

Lab 5
Logic Circuits (EET 241)
Total Points: 100

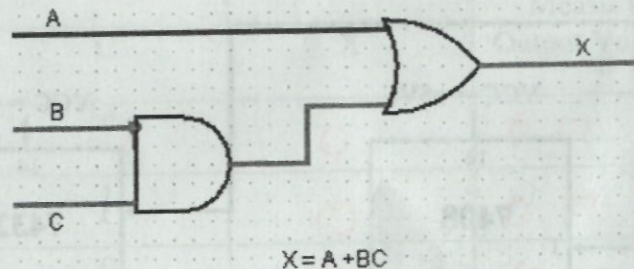
Objective: Implementation of a circuit from given expressions.

Materials Needed:

7408 Quad 2-Input AND Gate- 1 piece
7432 Quad 2-Input OR Gate- 1 piece
330-ohm resistor - 1 piece
Light Emitting Diodes (LEDs)-1 piece
DC power supply

resistor

Theory: You need to implement a circuit from given expression $X = A + BC$ and construct a truth table. The logic diagram for the expression $X = A + BC$ has been shown:



A truth table shows the output for all possible values of the input variables. The procedure requires that you evaluate the Boolean expression for all possible combinations of values for the input variables. There are three input variables (A, B, and C) and therefore eight ($2^3 = 8$) combinations of values are possible.

To evaluate the expression $A + BC$, first find the values of the variables that make the expression equal to 1, using the rules for Boolean addition and multiplication. In this case, the expression equals 1 if either $A = 1$ or $BC = 1$ or if both A and BC equal 1 because

$$A + BC = 1 + 0 = 1$$

$$A + BC = 0 + 1 = 1$$

$$A + BC = 1 + 1 = 1$$

To summarize, the expression $A + BC = 1$ when $A = 1$ regardless of the values of B and C or when $B = 1$ and $C = 1$ regardless of the value of A. The expression $A + BC = 0$ for all other value combinations of the variables. The truth table for $X = A + BC$ is shown here:

Input			Output
A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Procedure:

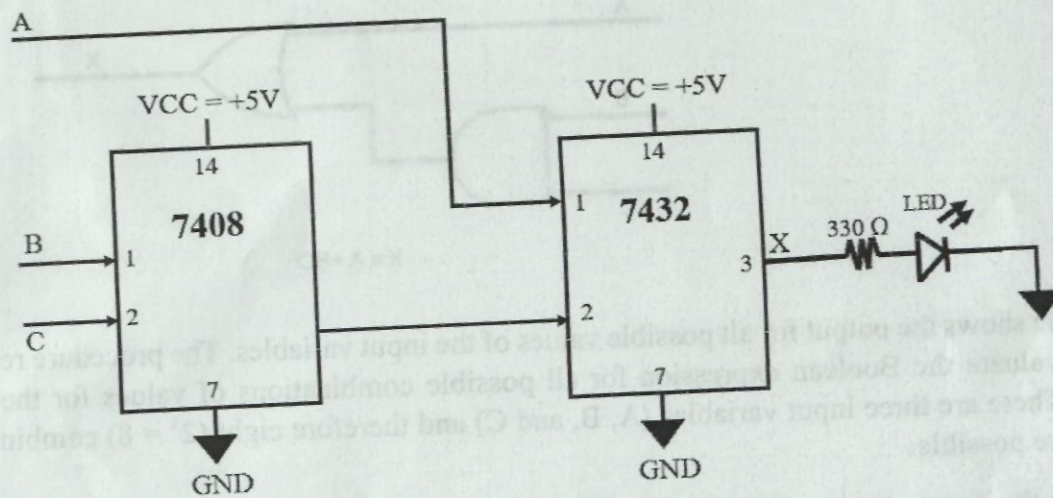


Figure: Connection Diagram

- Find the pin diagram for the 7408 quad 2 input AND gate and 7432 quad 2 input OR gate. (Pin diagram has been provided). Apply V_{cc} and ground to the appropriate pins (Connect pin 7 to ground (0V) and pin 14 to $V_{cc} = +5V$). Connect the circuit according to connection diagram above.
- You need to connect output pin to a 330-ohm resistor, and the other end of the 330-ohm resistor will be connected to the positive terminal of LED. Finally, the negative terminal of the LED will be connected to ground (0V). If the output is logic 1, LED will turn ON and if the output is logic 0, LED will turn OFF.
- Test all possible combinations of inputs, as listed in Table 1 of the report. Apply a logic 1 by connecting to V_{cc} and a logic 0 by connecting directly to ground. Use digital multimeter (DMM) to measure the output voltage. Tabulate your results in Table 1.

Lab 5 report

Name: Derek White

Data and Observations:

Table 1 Truth Table for $X = A + BC$

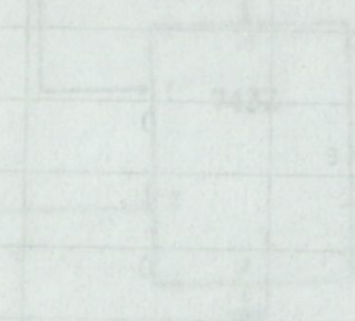
Input			Output	Measured Output Voltage
A	B	C	X	
0	0	0	0	0.17
0	0	1	0	0.17
0	1	0	0	0.17
0	1	1	1	2.631
1	0	0	1	2.631
1	0	1	1	2.631
1	1	0	1	2.631
1	1	1	1	2.631

Submission Process

You do not need to submit tutorial or procedure. You just need to submit lab 5 report and screenshot of the breadboard connection.

I would suggest you create a folder and name it as lab5 and copy your lab 5 report and screenshots. Then you will zip the Lab5 folder. Finally, upload the zipped Lab5 folder on the blackboard.

Figure 1: Truth Table for $Z = A \cdot B$



Measured Output Z (V)	Output Z	A	B
0.17	0	0	0
0.11	0	0	1
0.17	0	1	0
1.85	1	1	1
18V.5	1	0	0
15V.5	1	1	0
15V.5	1	0	1

- Find the pin diagram for the 7432 quad 2 input AND gate and 7432 quad 2 input OR gate. (Pin diagram for 7432 is provided in the lab manual). Apply V_{cc} and ground to pins 1 and 14. Connect pin 7 to ground (0V) and pin 14 to V_{cc} (+5V). Connect the circuit according to connection diagram above.
- You need to connect output pin 3 to a 2.2k-ohm resistor, and the other end of the 2.2k-ohm resistor will be connected to the positive terminal of LED. Finally, the negative terminal of the LED will be connected to ground (0V). If the output is logic 1, LED will turn ON. If the output is logic 0, LED will turn OFF.
- Test all possible combinations of inputs, as listed in Table 1 of the report. Apply a logic 1 by connecting to V_{cc} and a logic 0 by connecting directly to ground. Use digital multimeter (DMM) to measure the output voltage. Tabulate your results in Table 1.

Logic Circuits (CPL 110) Total Points: 100

Objective: Implement

Materials Needed:

7400 Quad 2-input

7432 Quad 2-input

375 ohm resistor

Light Emitting Diode

DC power supply

Theory: You will

truth table. The

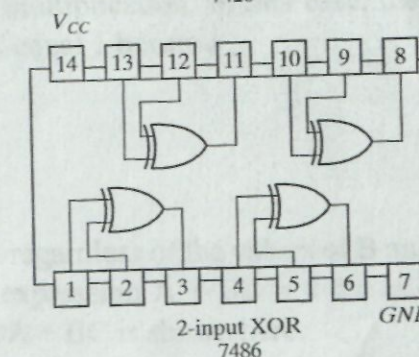
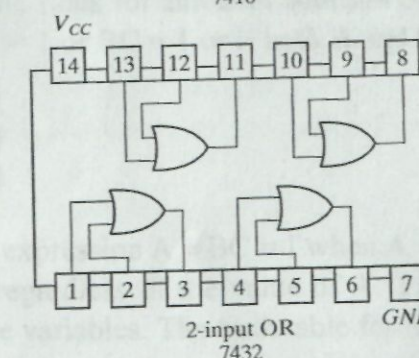
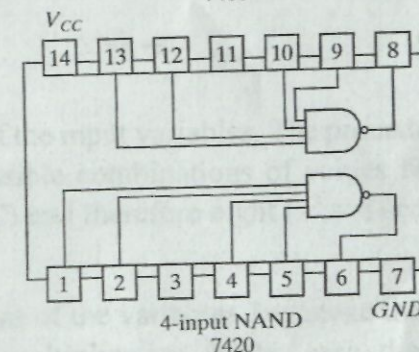
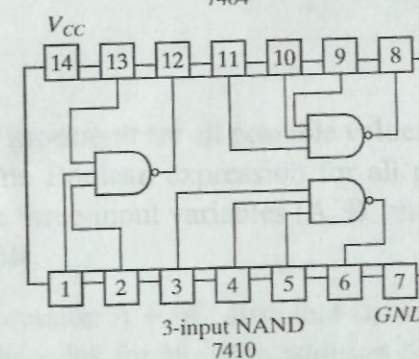
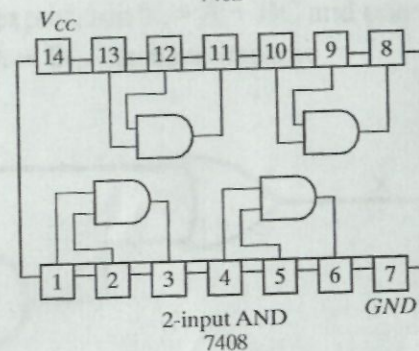
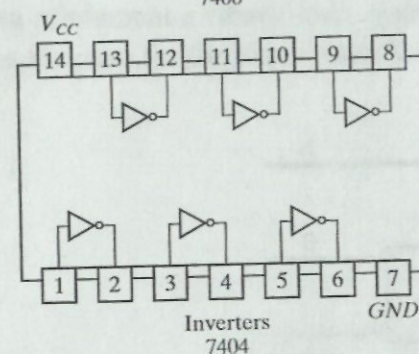
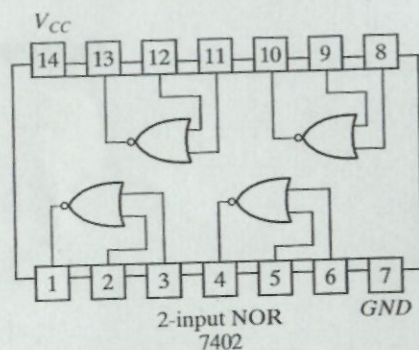
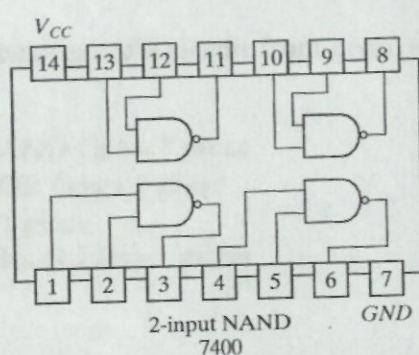


FIGURE 9.1

Digital gates in IC packages with identification numbers and pin assignments