

(DE3 -11) AND Gate

Aim of experiment

The examination of the operation of the AND logic gate and compare the expected outputs to the truth tables for this device.

Apparatus

Prototyping Board– DC Power Supply 5V or 9V Battery – Light Emitting Diode (LEDs) – Digital ICs: 7408 AND Gate – Connection Wires.

Theory of experiment

All logic gates have two or more inputs and one output. These logic gates accept digital logic levels on their inputs and will provide a digital logic level output which is dependent on the type of logic gate and the inputs applied to the gate. For the TTL logic family, any gate input that is not connected will be treated as if logic 1 is present on that input. The number of different possible combinations of inputs is 2^n where n is the number of inputs. Therefore, four unique combinations of inputs are possible for a two input gate.

The AND function is similar to the multiplication in mathematics, and provides a logic 1 output only when all the inputs of the gate are at logic 1, and logic 0 output for all other input combinations. *Figure 1* contains the logic symbols and truth table for the AND function. The Boolean Equation for a 2 input AND gate, is presented in *figure 1*.

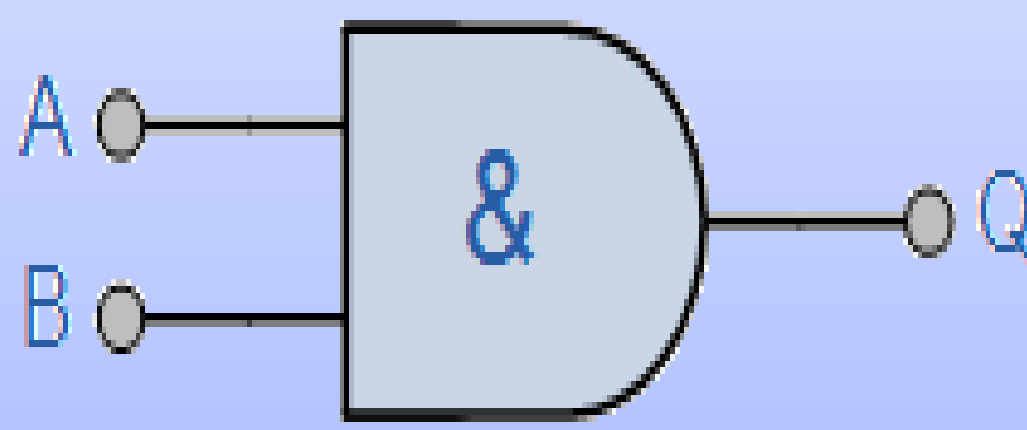
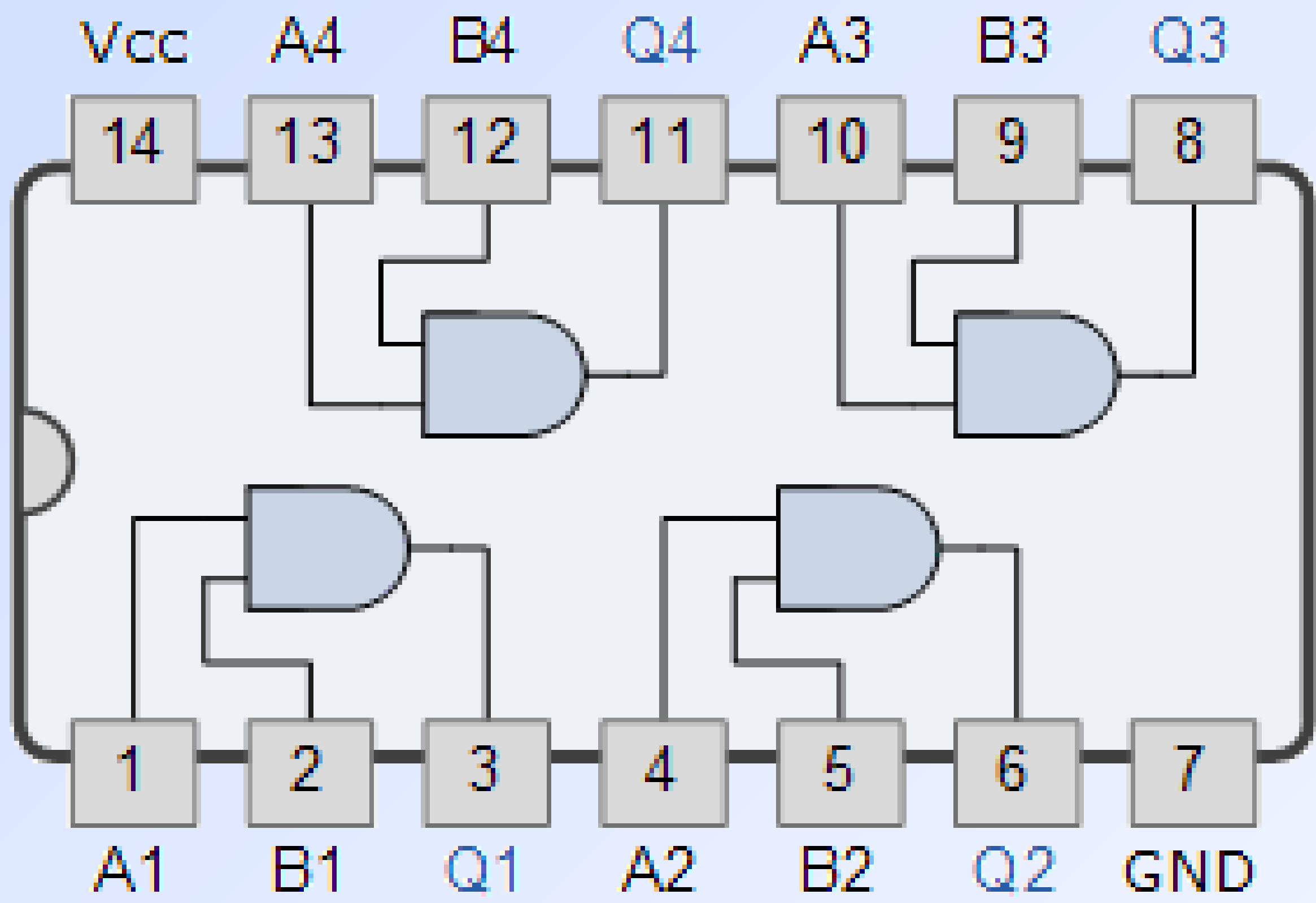
Symbol	Truth Table		
	B	A	Q
 2-input AND Gate	0	0	0
	0	1	0
	1	0	0
	1	1	1
Boolean Expression $Q = A.B$		Read as A AND B gives Q	

Figure 1. Logic symbols and truth table for the AND function

Procedures

1. Put the 7408 AND Gate shown in the Prototyping board.
2. Connect the pin 14 to 5 V and pin 7 to ground.
3. Connect pin 1 and 2 to input switches in Prototyping board, and connect pin 3 to output LED.
4. Change switches 1 and 2 on and off and show the output of LEDS.
5. Record the results in the following table.



Results

Switch 1	Switch 2	LED output
0	0	
1	0	
0	1	
1	1	