

Experiment Number-1

Submitted by: Name: MD SAIFUL ISLAM ID: 18-36363-1 Course: Digital Electronic

Title: Construction of Diode Logic Gates.

Introduction:

A diode is a two-terminal electrical device that allows current to flow in one direction but not the other. It is like a pipe with an internal valve that allows current to flow freely in one direction but shuts down if the water tries to flow backward. The diode's two terminal area called anode and cathode. In this diode symbol, the arrow points from the anode toward the cathode.

The device operates by allowing current to flow from anode to cathode, basically in the direction of the triangle. Recall the current is defined to flow from the more positive voltage toward the more negative voltage. If the diode anode is at a higher voltage than the cathode, the diode is said to be forward biased, its resistance is very low, and current flows. If the anode is at a lower voltage than the cathode, the diode is reverse-biased, its resistance is very high, and no current flows. The diode is not a perfect conductor, so there is a small voltage drop, approximately 0.7V, across it.

In this group of experiments we will implement some logic function using the DL circuit and discover the potential benefits and problems of using the DL logic.

Block Diagram:

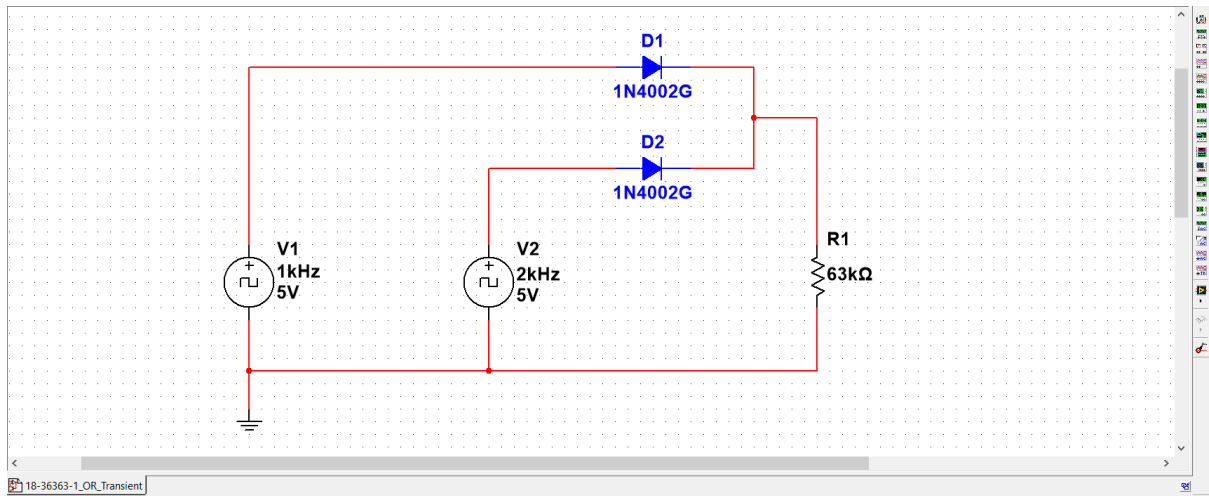


Figure 1: DL-OR Gate

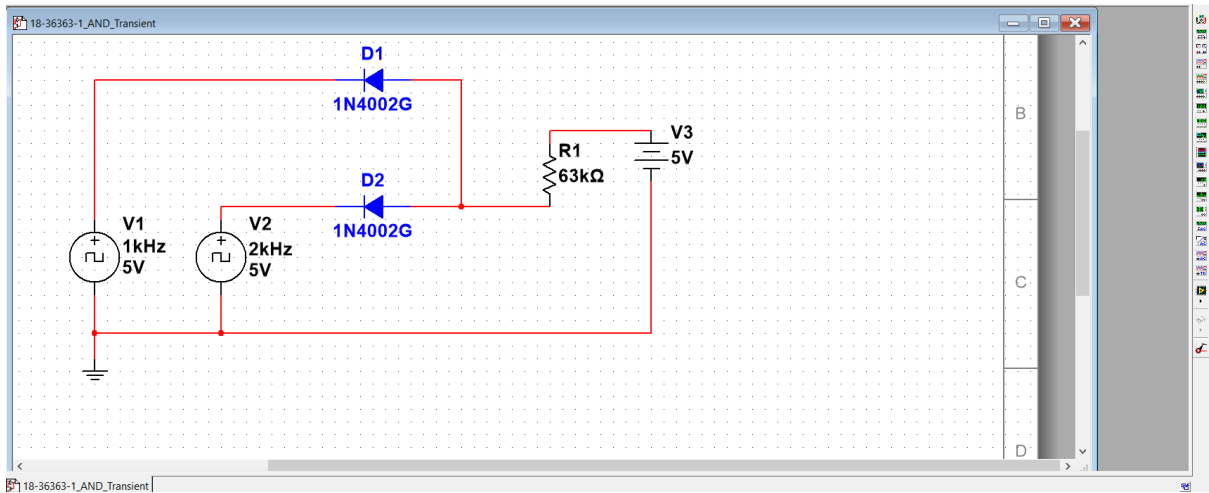


Figure 2: DL-AND Gate

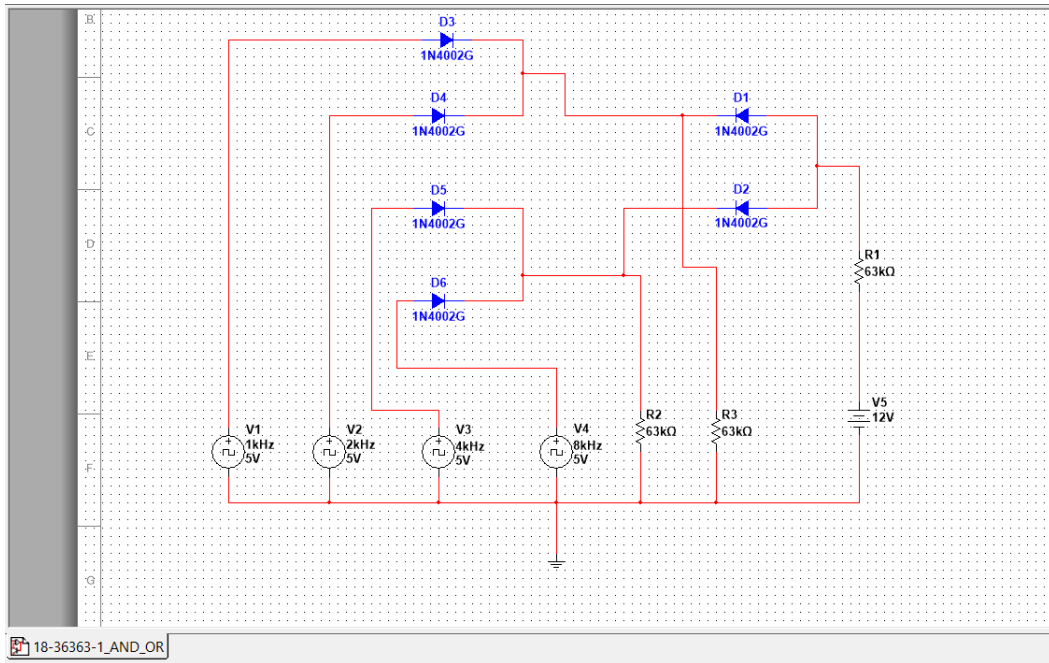


Figure 3: DL-AND-OR Gate

Graph:

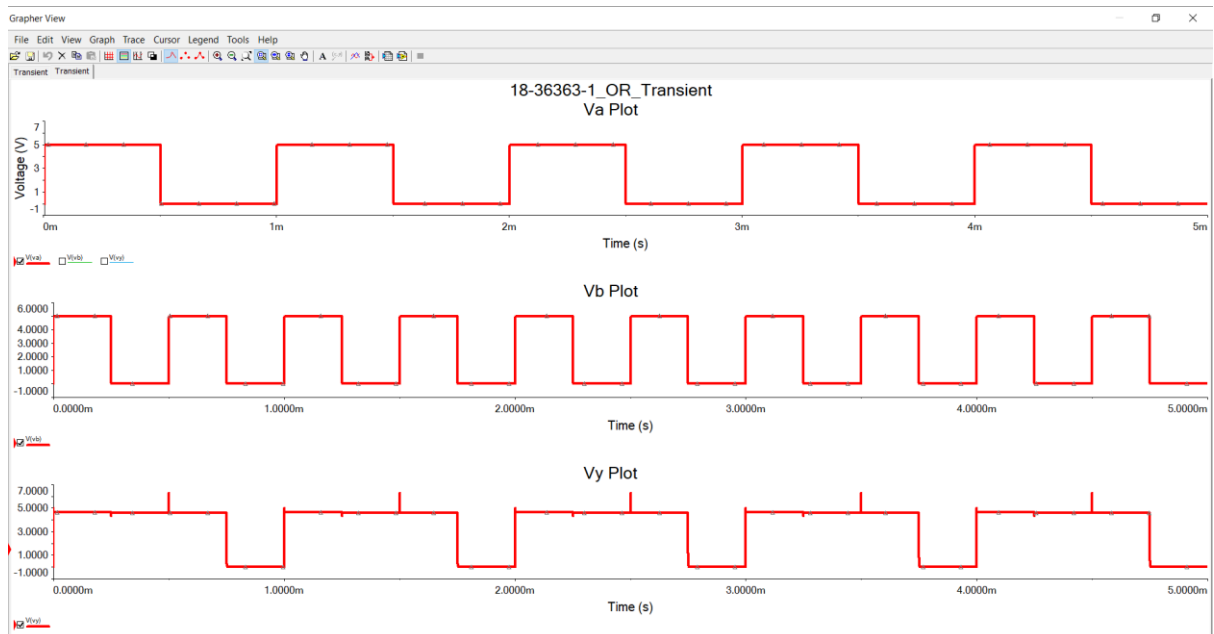


Figure 4: DL-OR Gate Graph

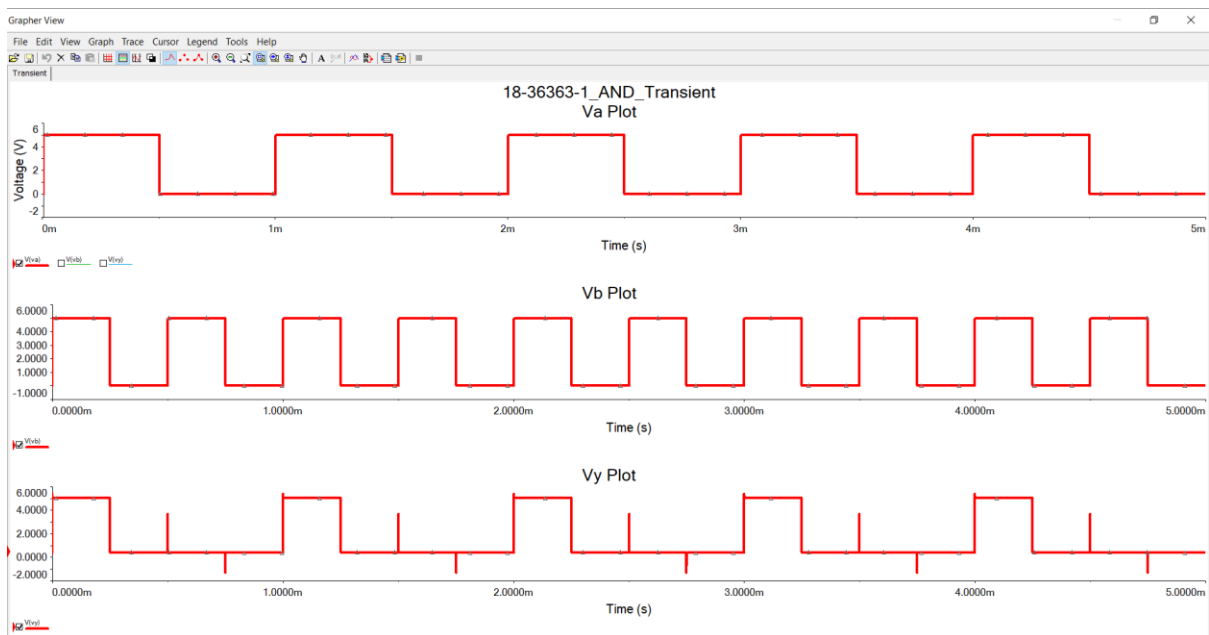


Figure 5: DL-AND Gate Graph

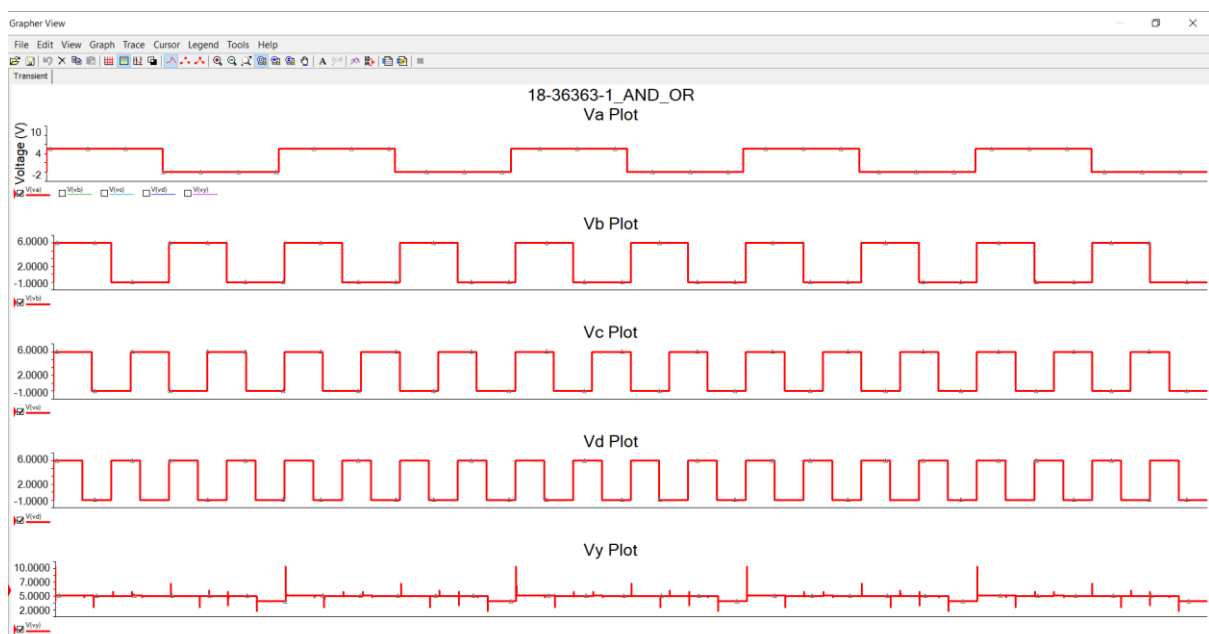


Figure 6: DL-AND-OR Gate Graph

TruthTable:

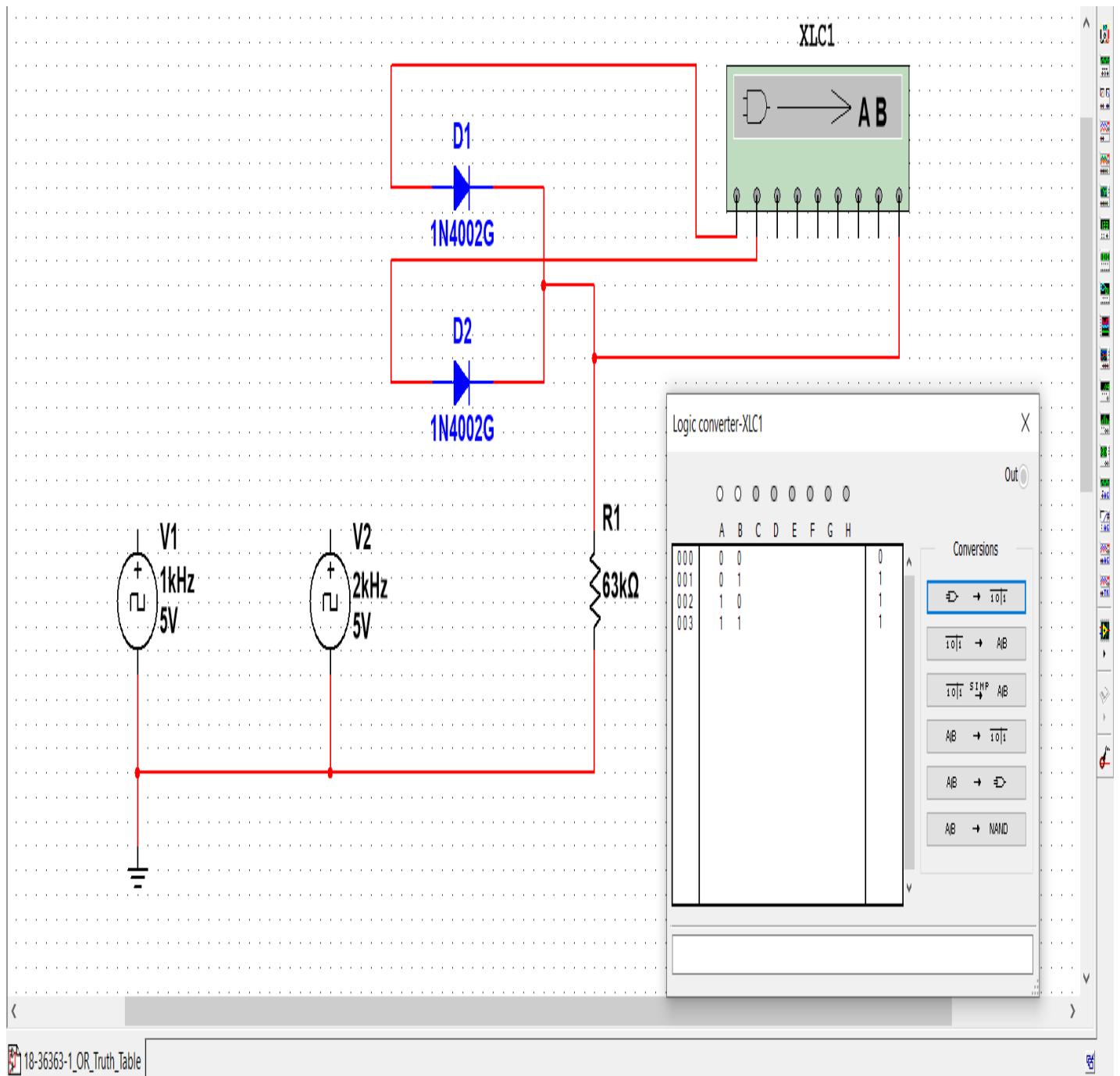


Figure 7: DL-OR Gate Truth Table.

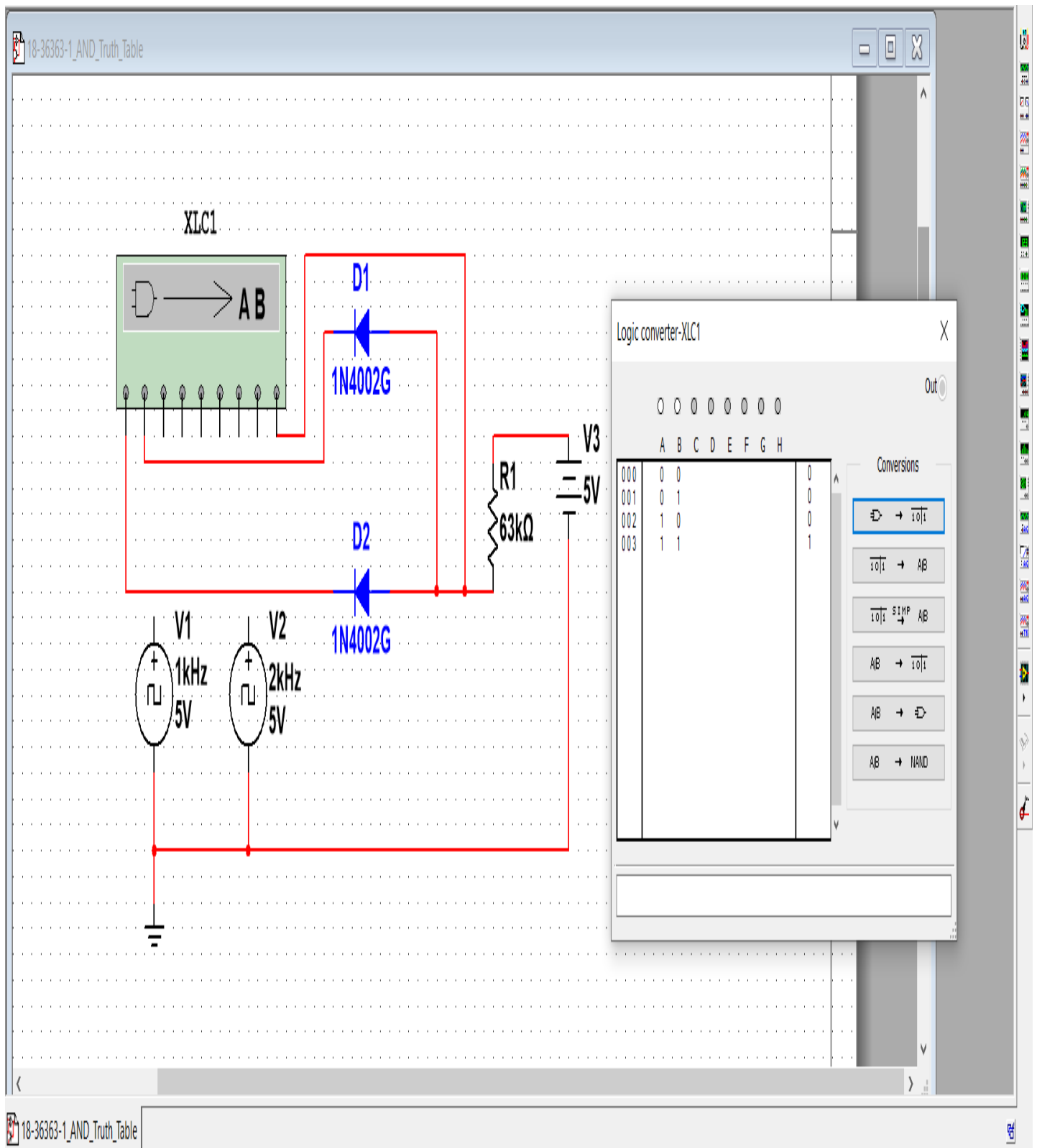


Figure 8: DL-AND Gate Truth Table.

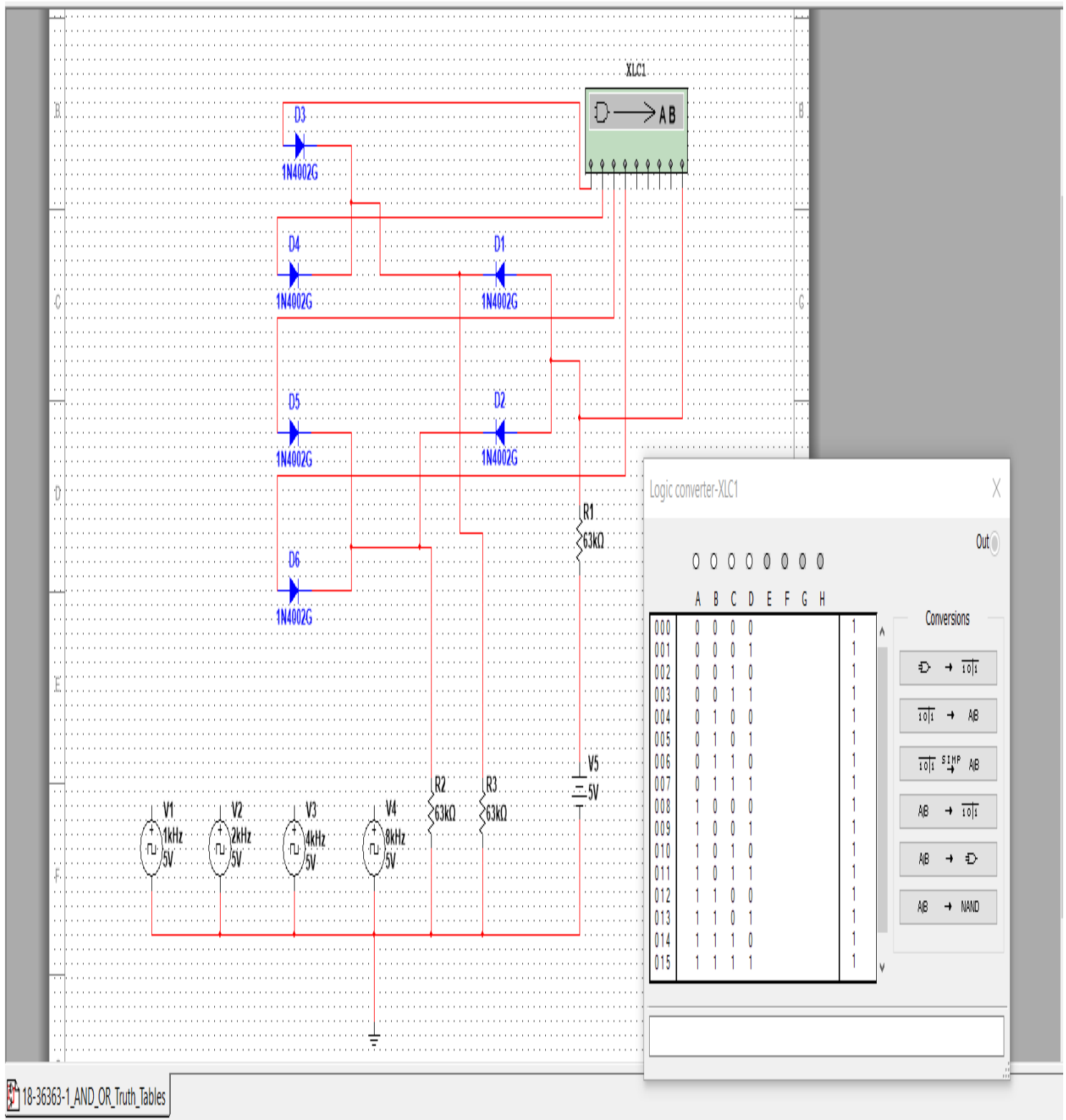


Figure 9: DL-AND-OR Gate Graph

Pre - Lab Homework:

1. Explain how a p-n junction or diode work? when does it conduct?

A diode (p-n) junction in a electrical circuit allows current to flow more easily in one direction than another. Forward biasing means putting a voltage across a diode that allows current to flow easily, while reverse biasing means putting a voltage across a diode in the opposite direction.

The transfer of electrons from the N side of the junction to holes annihilated on the P side of the junction produces a barrier voltage. This is 0.6 to 0.7 V in silicon and varies with other semiconductors. A forward-biased PN junction conducts a current once the barrier voltage is overcome.

2. What is a wired logic?

Wired logic a form of digital logic in which some logic functions are implemented by directly connecting together the outputs of one or more logic gates. The success of this technique depends on the electronic characteristics of the gates involved.

3. Explain the operation of depletion region for different biasing conditions.

Depletion region is an insulating region within a conductive, doped semiconductor material where the mobile charge carriers have been diffused away, or have been forced away by an electric field. The only elements left in the depletion region are ionized donor or acceptor impurities.

The region of uncovered positive and negative ions called the depletion region due to the depletion of carriers in this region. It is formed from a conducting region by removal of all free charge carriers, leaving none to carry a current.