LAB 4.1

Diode I-V Transfer Curve

(See Section 4.2, p. 173 of Sedra/Smith)

OBJECTIVES:

To study junction diode terminal characteristics by:

- Analyzing, simulating, and building a diode-based circuit.
- Taking measurements and applying transformations to obtain the diode I-V curve.

MATERIALS:

- Laboratory setup, including breadboard
- One junction diode (e.g., 1N4003)
- Several wires and a resistor

PART 1: SIMULATION

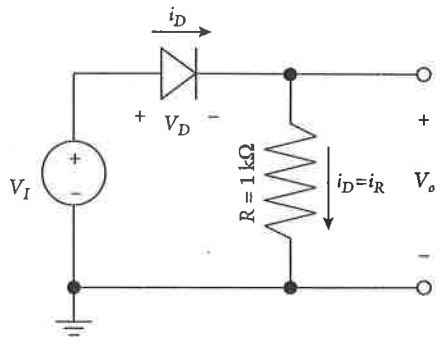

FIGURE L4.1: Circuit used to characterize junction diode terminal characteristics. Based on Fig. 4.21 p. 196 S&S.

Consider the circuit shown in Figure L4.1. Simulate the circuit by varying v_I from –3 V to +3 V in increments of 0.1 V. Generate a plot of i_D vs. v_I and v_O vs. v_I. Do you see a resemblance between the two graphs?

PART 2: MEASUREMENTS

Assemble the circuit onto a breadboard. Using a power supply, vary the input voltage from –3 V to +3 V in increments of 0.25 V. For each point, measure the output voltage v_O using a digital multimeter, and report the current consumption i_D indicated by the power supply. Measure the value of the resistor.

PART 3: POST-MEASUREMENT EXERCISE

- Generate a plot of v_O vs. v_I and a plot of i_D vs. v_I. Since $i_D = v_O/R$, do the two plots generally agree?
- Since the diode voltage is $v_D = v_I - v_O$, generate a new plot of i_D vs. v_D. Is it what you expect?

PART 4 [OPTIONAL]: EXTRA EXPLORATION

- If you have access to a semiconductor parameter analyzer, generate the i_D vs. v_D curve using the analyzer. How does it compare to the curve you generated in Part 3?