

Physics 517/617 Experiment 3 Diodes and Op Amps I

Basic Experiment - Physics 517/617

- 1) Measure and graph the reverse bias characteristics of a diode. Use a DC power supply, resistor(s) and multimeters.

- 2) Build a clipping circuit that limits the voltage swing from -6 to 3 Volts. Use a 1 K Ω input resistor. Apply a 1 KHz sine wave. Vary the amplitude of the input voltage and sketch the input and output waveforms. What happens when one applies a triangular wave ?

- 3) Build a full wave rectifier. Plot the output voltage vs. input voltage. Make a modification so that the output voltage approximates D.C.. Use a transformer to couple the input voltage to your circuit. What is the ripple factor both measured and expected for your circuit ? Note: if the ripple is too small to be measured, increase the load to where you can measure something.

- 4) Measure the transfer function (magnitude and phase vs. frequency) for two non-inverting amplifiers with gains of 10 and 100. Make a measurement at DC and scan the frequency range from 10 Hz (or as low as you can go on your function generator) to 1 MHz. Record AC measurements on Bode plots. Discuss and compare the two amplifiers.

Additional for 617/extra credit

- 5) Measure and compare in detail the I-V characteristics of a diode in the lab to the theoretically predicted dependence:

$$I = I_0 \left(e^{qV/kT} - 1 \right).$$