Silicon Diode Characteristics
• Lab objectives
  ➢ Characterize I-V characteristics of pn rectifier diode and Zener diode
  ➢ Characterize both forward and reverse biased diode characteristics
  ➢ Become familiar with the actual diode characteristics of real diodes
• **Diodes exhibit different behavior during forward voltage**
  - Recombination controls behavior at lower voltages (n ~ 1.5 to 2.0)
  - Diffusion then controls behavior at intermediate voltages (n ~ 1.0)
  - Finally high-level injection controls behavior at high voltages (n ~ 2.0)
  - Ohmic effects eventually turn over diode characteristics at even higher voltages and extremely high currents

• **Reverse bias also generates gradually increasing current at increasing reversed bias**
  - Depletion width increases with increasing reversed bias
  - Increases generation current with increasing bias
Linear (left) and semilogarithmic (right) plots of I-V characteristics of a commercially available Si pn junction diode.
Forward and reversed biased semilogarithmic plots of a real diode showing various operating regimes (left) and semilogarithmic plot (right) of an I-V characteristic for a forward biased diode.
Forward biased test configuration for Zener diode.
Forward I-V characteristics and ideality factors and resistances for Zener diode.
Reverse biased test configuration for Zener diode.
Reverse bias diode characteristics for Zener diode.