

ENGR 305 – Midterm study objectives

1. Calculate the intrinsic carrier concentration in a semiconductor. **(Chapter 3, HW 1)**
2. Determine minority and majority carrier concentrations in a semiconductor (electron and hole concentrations). **(Chapter 3, HW 1)**
3. Calculate the built-in potential of a pn junction. **(Chapter 3, HW 1)**
4. Calculate the depletion region width of a pn junction. **(Chapter 3)**
5. Given the voltage and current for a forward-biased diode, be able to calculate the current at a different value of voltage (or the voltage at a different value of current). **(Section 4.2, HW 2)**
6. Be able to determine voltages and currents at points in a diode circuit, using either the ideal diode model (zero volts across the diode) or the constant voltage drop model (0.7 volts across the diode). **(HW 2, Chapter 4)**
7. Understand operation of half-wave rectifiers **(Chapter 4, Lab 3)**
8. Be able to calculate resistivity and conductivity in a semiconductor. **(Section 3.3)**
9. Drain current calculations for NMOS and PMOS transistors. Know difference between the triode region of operation and the saturation region of operation. **(Chapter 5)**
10. Discuss/explain the effect in a MOSFET when the channel pinches off and moves away from the drain **(Section 5.2.4 Finite Output Resistance in Saturation)**.
11. Be able to design an NMOS circuit with DC voltages. This may require determining resistor values needed or voltages and currents in the circuit. **(Section 5.3 in Sedra and Smith, HW 4, Lab 5)**