

CMPE 314 Midterm Exam 1

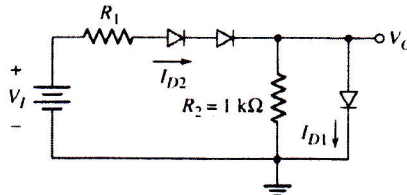
(March 11, 2010)

Problem 1. (20 points)

- How to make a p-type semiconductor? How to determine the concentrations of the majority and minority carriers (specify electrons or holes)?
- Draw configurations of forward and reverse biasing of a pn junction diode (show p and n regions). What kinds of carriers (electrons or holes from p or n regions) contribute most to the diode current in each situation? Sketch the diode's current and voltage characteristic, including the breakdown effect.

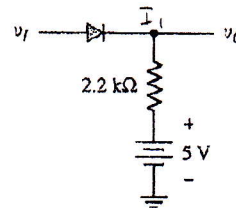
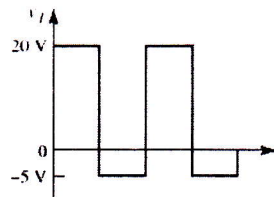
Problem 2. (20 points)

Assume all diodes in the circuit shown have the same reverse-saturation current (only information of diode). Write down the full set of equations that lead to solving v_o , I_{D1} and I_{D2} .



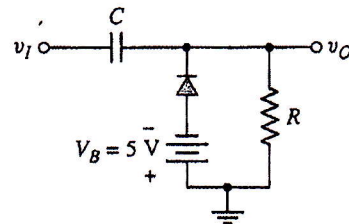
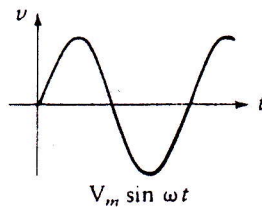
Problem 3. (20 points)

Find and plot v_o for the circuit and input shown. Assume $r_f = 0$, $V_\gamma = 0$, and the RC time constant is large.



Problem 4. (20 points)

Find and plot v_o for the circuit and input shown. Assume $r_f = 0$, $V_\gamma = 0$, and the RC time constant is large.



Problem 5. (20 points)

In the circuit shown, $V_I = 20$ V, $V_{Z0} = 10$ V, $r_z = 10$ Ω , $R_i = 200$ Ω , and $R_L = 400$ Ω . Determine the power dissipated by the Zener diode. (If you cannot solve this problem, you may take $r_z = 0$, but receive fewer points.)

