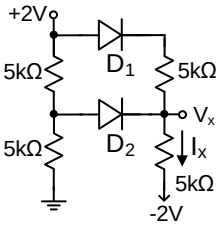
EECE 2412 – Homework 3 – Fall 2018

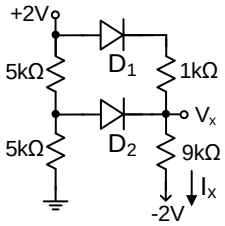
Due: Wednesday, October 3, 2018

1) Problem 3.7 on page 190 in the textbook (Allan R. Hambley, Electronics, 2nd edition, Prentice Hall, 1999).

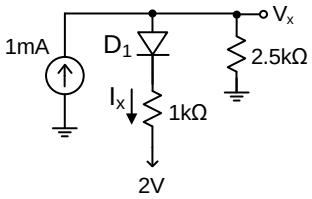
2) Use the ideal diode model to determine the labeled voltages and currents in the circuits below.



a)



b)



c)

3) Repeat the analyses of the circuits in problem 2, but use the constant voltage drop (CVD) model with a voltage drop of 0.7V for forward-biased diodes.

4) Read Section 3.8 of the textbook before solving this problem. A silicon diode is operating with a temperature of 50ºC and has a measured voltage drop of 0.736V across its terminals while passing a current of 2.5mA. According to the datasheet, the diode has an emission coefficient (n) of 1. What is the saturation current (I_S) of this diode?

5) A 9.1V Zener diode exhibits its nominal voltage (9.1V) at a test current of 28mA. At this current, the incremental resistance (r_z) is specified as 5Ω. Find V_{ZO} of the Zener model. Find the voltage across the Zener diode terminals at a current of 10mA and at 100mA.

6) Source V1 is the input voltage of the circuit shown below, and the output voltage is taken at the node labeled "Out".
   a. Assuming a constant voltage drop diode model (with a 0.7V drop when diodes are forward-biased), find the output voltage V_o (at node "Out") with V1 = 1.5V using hand calculations.
   b. Simulate the circuit in PSPICE to verify your results from parts a) using the "Dbreak" diode model in the PSPICE library. Make sure that all DC voltages and currents that result from V1 = 1.5V are displayed in the schematic before you print it out for submission.
   c. Determination of the transfer characteristics at the output and internal nodes: Perform a DC sweep of V1 from 0V to 3V with 0.01V increments to plot VOUT, V2, V3, and V4 vs. V1 in the same figure. Before printing the plot for submission with the homework, place labels at the voltage levels where the diodes turn on or off.