ECE255

Homework # 4

1.24 A piecewise linear model of a diode is created by drawing a straight line on a plot of the nonlinear ideal diode equation. This PWL model intersects the plot at V_D= 0.55, I_D= 30mA and V_D= 0.9, I_D= 200mA. (a) draw the schematic for this PWL model and include component value(s); (b) use the model you created in part (a) to determine the loop current for two of these diodes in series and connected in series with a 5 volt battery and a 7.7 Ω resistor. Assume both diodes are connected so they are forward biased.

1.xx. A diode is modeled by I_S=10 fA, n=1, V_{BR} = 4 V and R_Z = 50 Ω. (a) Calculate the operating point of the diode. Check your answer with SPICE. Hand in Spice circuit with nodes labeled and output with all node voltages and diode currents. (b) Calculate the operating point and check the result with SPICE. Use Spice parameters of IS= 10f, n=1, bv=4 and ibv=1e-5. Hand in Spice circuit with nodes labeled and output with all node voltages and diode currents. How do the results compare.

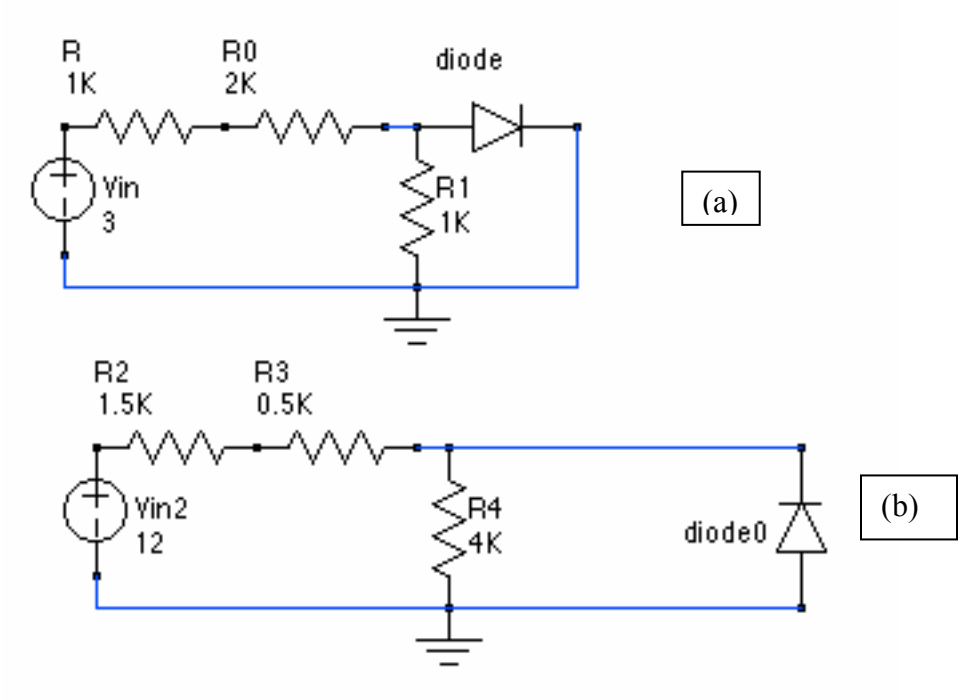

Fig. 1.xx

1.44 Design a diode electronic voltage attenuator to operate at 27°C that will let 90% of a small 60 Hz sine-wave signal source signal pass when a first control voltage level is applied and let only 50% of the signal pass when a second control voltage level is applied. For the diode I_S=20pA and n= 1.05.