SANTA CLARA UNIVERSITY	ELEN 115 – Spring 2023	S. Krishnan
Homework #5		

1. The diodes in Figure 1 provide a certain output voltage at Vout.
   For ***each case***

   (i) draw the i-v curve of diodes D1 and D2

   (ii) the value of the voltage Vout

   Case 1:Diode D1 and D2 are ideal.
   Case 2:Diodes are represented by a piece wise linear model with V_{D0} and r_D.
   For Diode D1 V_{D0}= 0.7V and r_D= 10Ω.
   For Diode D1 V_{D0}= 0.8V and r_D= 20Ω.
   Case 3:Diode D1 has a voltage of 0.6V at 1mA current
   Diode D2 has a voltage of 0.7V at 1mA current
   For both diodes the voltage changes by 0.1V/decade change in current.

Figure 1

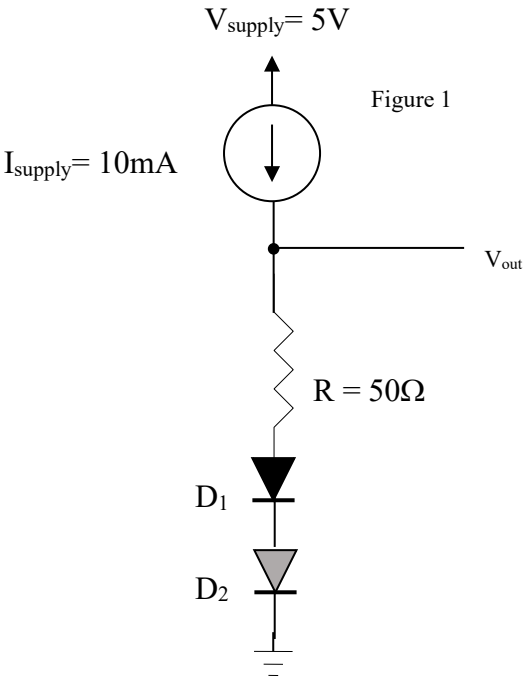
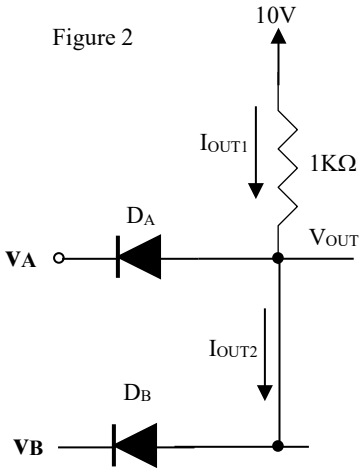


Figure 2



2. The diodes in Figure 2 are ideal and provide a certain output voltage at Vout.
   (a) For ***each case find***
   (ii) the value of the voltage V_{OUT}
   (iii) the value of the current I_{OUT1}
   (iv) the value of the current I_{OUT2}
   Case 1: v_A = 2V, v_B= 5V.
   Case 2: v_A = 3V, v_B= 1V.
   Case 2: v_A = 1V, v_B= 0V
   (b) From part (a) what can you say about how diodes conduct when they have their anodes connected?

3. Figure 3 (c) shows a circuit that is to be used to switch on and off an LED whose specs are given in Figures 3 (a) and 3 (b). V_{in} is pulsed between 2.5V and GND.

Figure 3 (a)

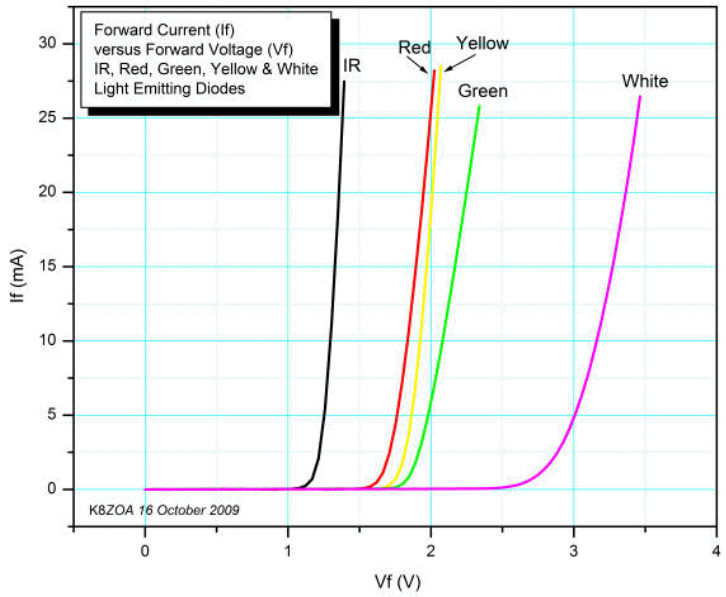
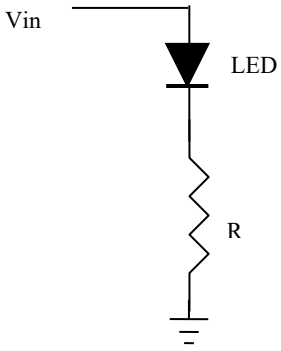


Figure 3 (b)

LED Color	Forward Voltage
Red	1.63 ~ 2.03V
Yellow	1.72~ 2.18V
Green	1.82 ~ 2.35V
White	2.75 ~ 3.45V

Figure 1(c)



(a) Design the circuit (find R) to light up the ***green*** LED.

(b) Using the value for R you found in (a), the LED is switched to a ***red*** LED. Will the LED be brighter? Explain why or why not.

(c) Can the ***white*** LED be used in the circuit? Explain why or why not.