

# Individual Assignment on Electronics Circuit I

(Submission Date: 22.03.2023)

1. In the circuit shown in Figure 1 considering  $D_1$  and  $D_2$  are ideal diodes. Given that  $V_1=5V$ ,  $V_2=3V$ ,  $V_S=5V$  and  $R=500\Omega$ .
  - a. Find the current  $i_{D1}$  and  $i_{D2}$
  - b. Determine the state of the diodes  $D_1$  and  $D_2$ .

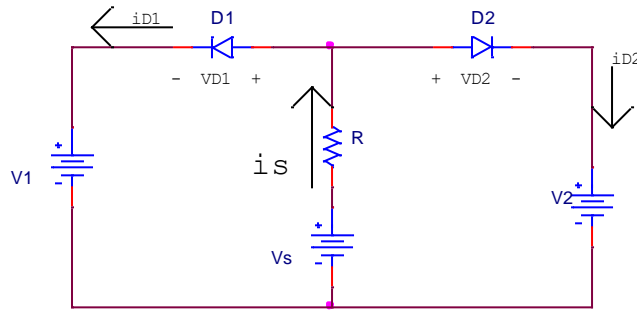


Figure 1

2. The diode in the circuit of Figure 2 has a non-linear terminal characteristic shown in figure 3. Given  $V_S = 0.1 \cos \omega t V$  volts and  $V_1=2V$ . then find  $i_D$  and  $V_D$ .

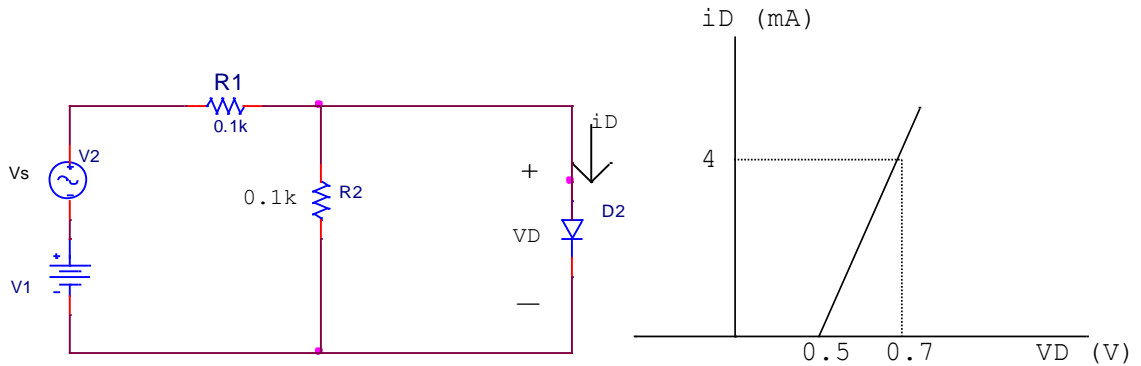


Figure 2

3. The two Zener diodes shown in the Figure 3 have negligible forward drop and both regulate at constant  $V_Z$  for  $50mA \leq i_z \leq 500mA$ . If  $R_1 = R_L = 10\Omega$ ,  $V_{Z1} = 8V$  and  $V_{Z2} = 5V$ . Find the average value of the load voltage when  $V_i$  is a 10V square wave.

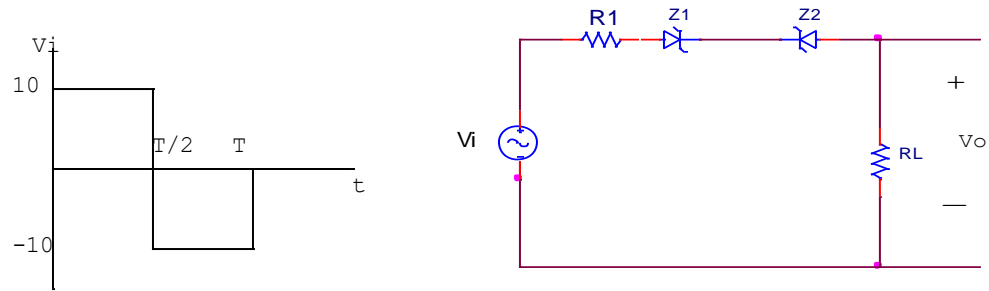


Figure 3

4. For the network shown in Figure 4, draw
  - a. V-I characteristics
  - b. Transfer characteristics i.e., output versus input voltage
  - c. The output voltage for parallel or combined clipper

*Assume the diodes are ideal*

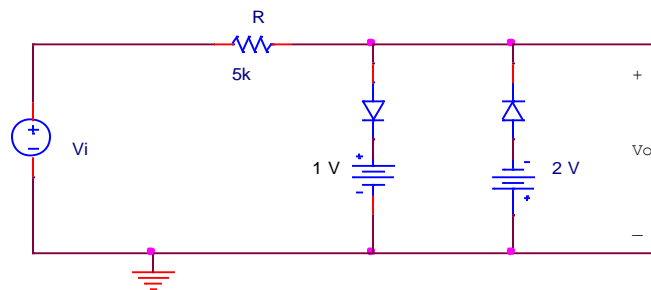


Figure 4

5. Design a clamper to perform the function indicated in Figure 5

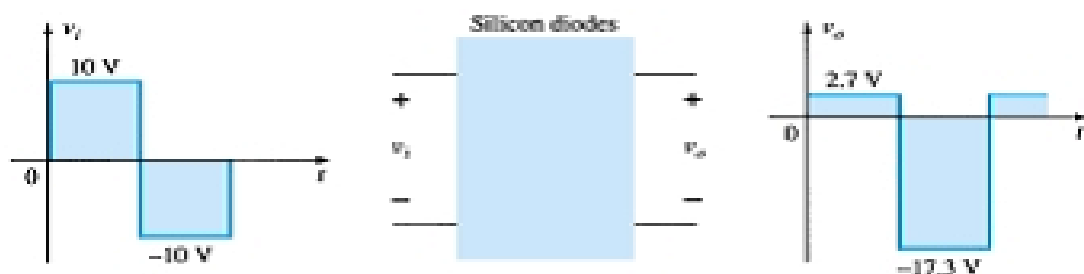


Figure 5

6. Design a cellphone charger. The charger converts the line ac voltage at 220V and 50Hz to a dc voltage of 3.5V. List all necessary components with explanation!

7. Determine the ripple factor for the filtered bridge rectifier with load as indicated in Figure 6

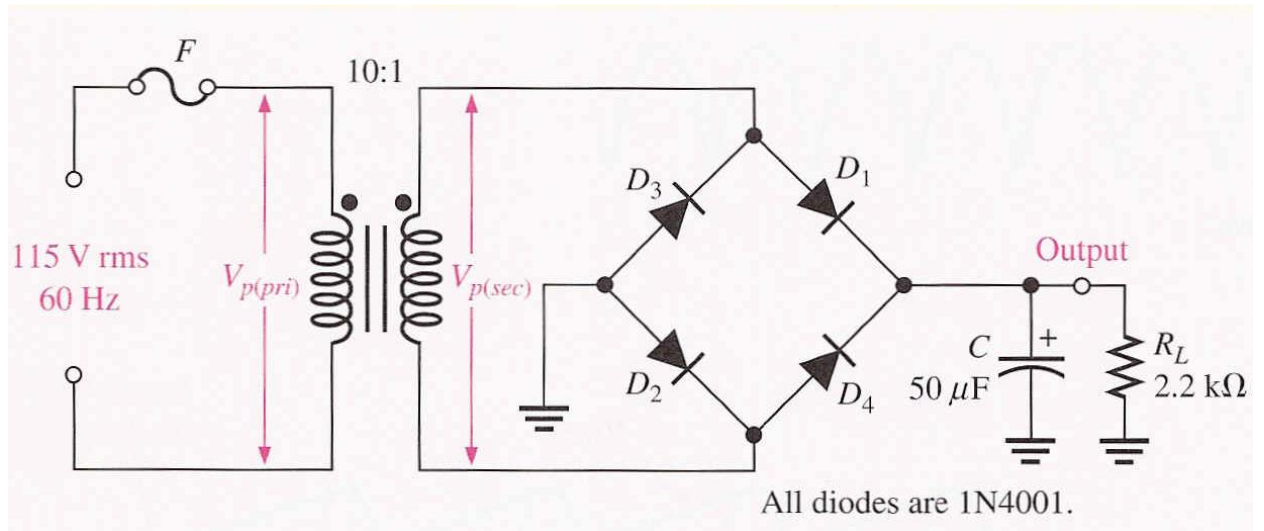


Figure 6

8. In the circuit of Figure 7,  $V_{in}$  has a nominal value of 5 V,  $R_1 = 100 \Omega$ , and  $D_2$  has a reverse breakdown of 2.7 V and a small-signal resistance of 5 Ω. Assuming  $V_{D,on} \approx 0.8 V$  for  $D_1$ , determine the line and load regulation of the circuit.

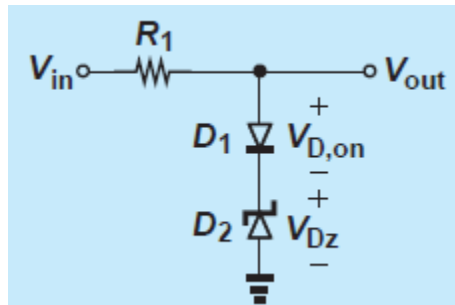


Figure 7

9. Determine the voltage available from the voltage doubler of Figure 8 if the secondary voltage of the transformer is 120 V(rms) and also determine the required PIV ratings of the diodes in terms of the peak secondary voltage  $V_m$ .

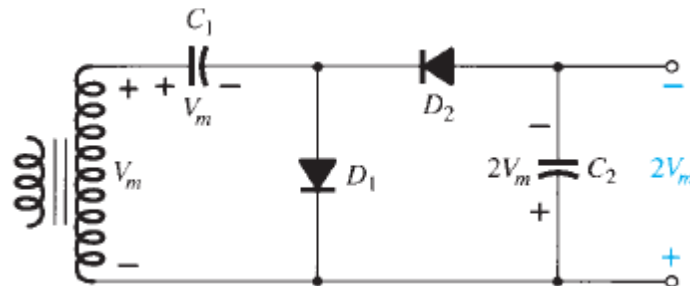


Figure 8

