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=500Ω.
   a. Find the current i_{D1} and i_{D2}
   b. Determine the state of the diodes D_1 and D_2.

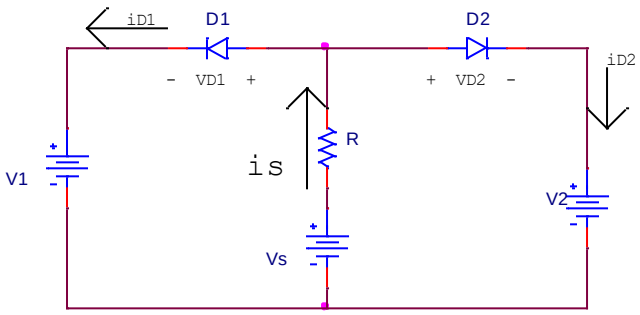

Figure 1

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 V1=2V. then find i_D and V_D.

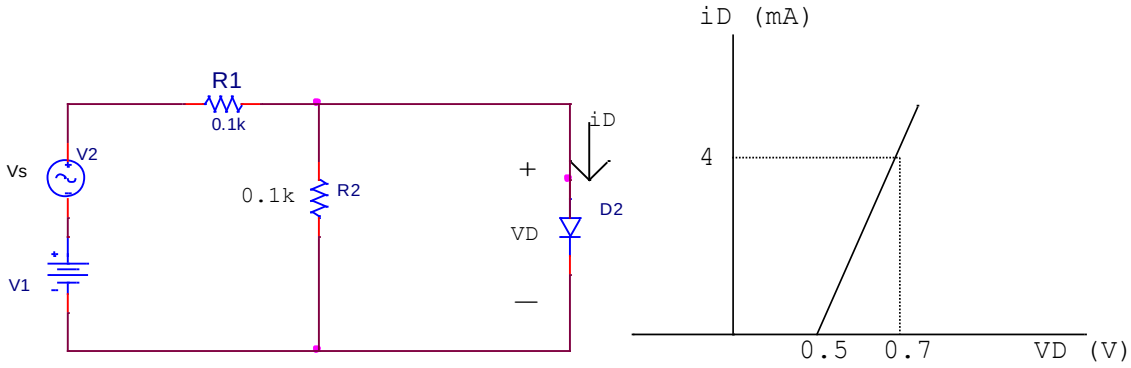

Figure 2

3. The two Zener diodes shown in the Figure 3 have negligible forward drop and both regulate at constant V_z for $50mA \leq i_2 \leq 500mA$. 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.

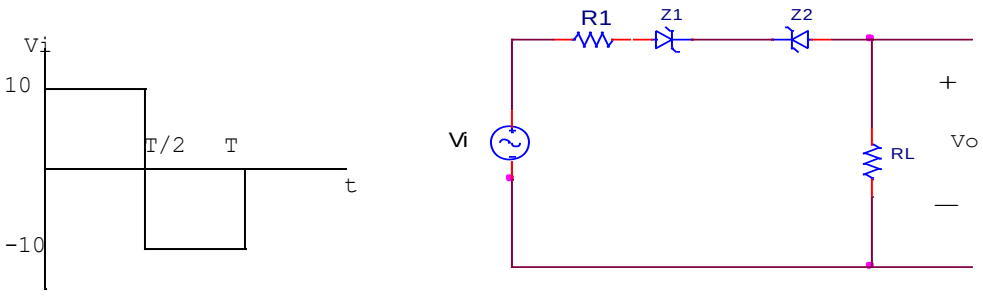

Figure 3

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

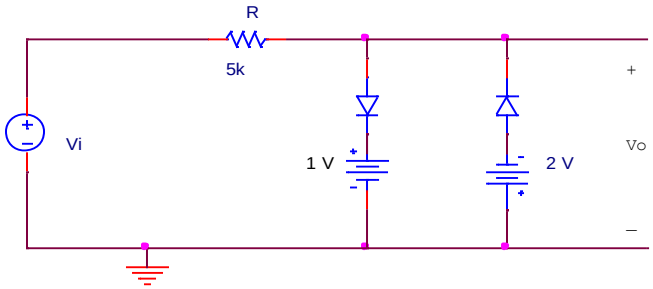

Figure 4

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

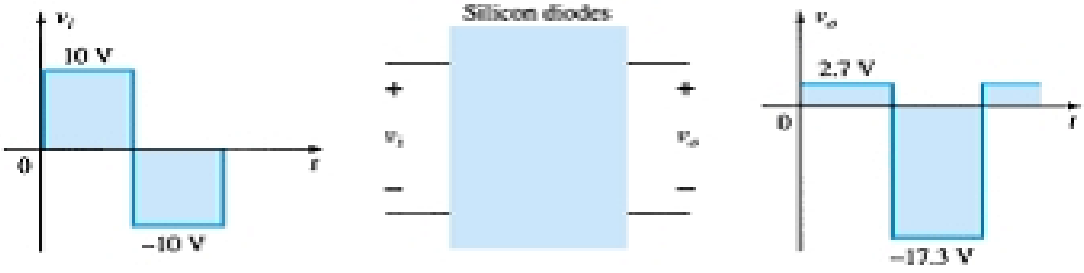

Figure 5

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

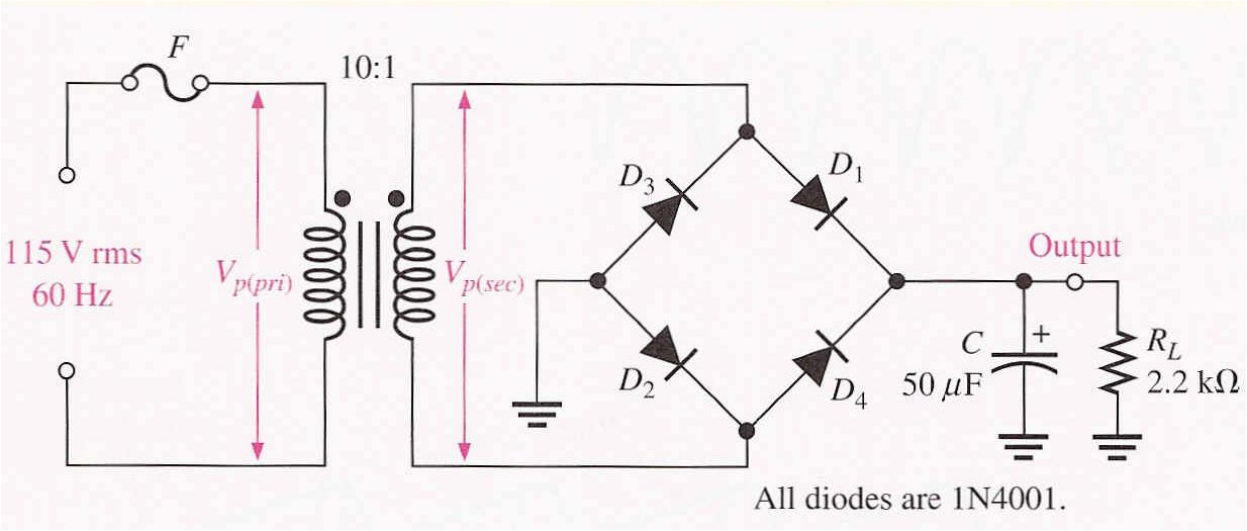

Figure 6

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 2.7V and a small-signal resistance of 5Ω. Assuming $V_D, on \approx 0.8V$ for D_1, determine the line and load regulation of the circuit.

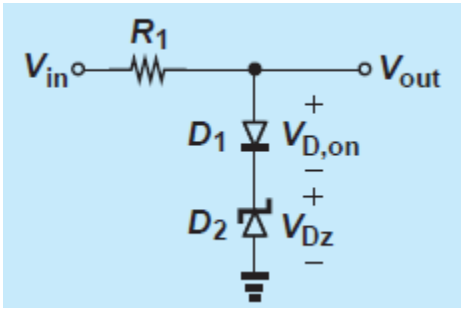

Figure 7

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

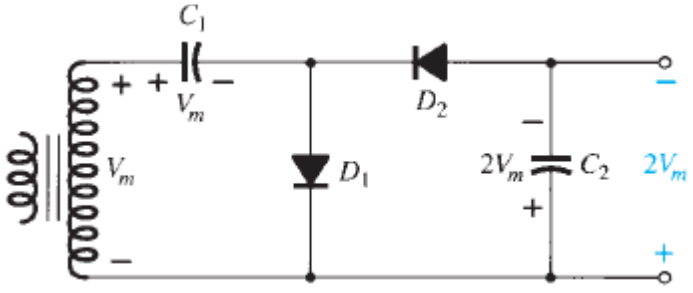

Figure 8