יעל בלוק
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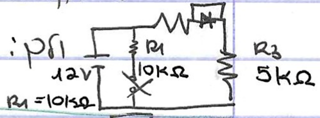
פיזיקה ומל"מ - תרגיל בית 6

שאלה 2: בדיודה העליונה המתח על האנודה גדול מהקתודה ולכן ימשיך לזרום זרם כרגיל, בדיודה האנכית המתח על הקתודה גדול מהאנודה מה שאומר לנתק. ולכן גם R_2 ינותק מהמעגל ונשאר לנו:

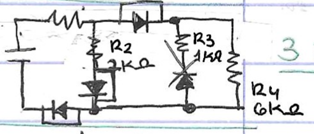
ולכן:



$U=12V$ | $R_T=R_1+R_3=10k\Omega+5k\Omega=15k\Omega$ | $I=\frac{U}{V}$

$\Rightarrow I=\frac{12}{15}=0.8mA$

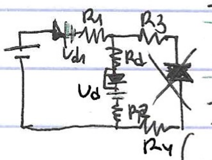
שאלה 3:



$R_{2,4}=\frac{3\cdot6}{3+6}=\frac{18}{9}=2k\Omega$ | $R_T=10+2=12k\Omega$ | $I=\frac{U}{R_T}=\frac{12}{12}=1mA$

$I_{R4}=I\cdot\frac{R2}{R2+R4}=1\cdot\frac{3}{9}=\frac{1}{3}=0.333mA$

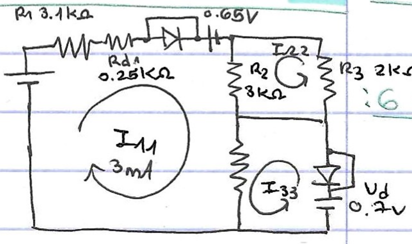
שאלה 5:



$U=E-U_{d1}-U_{d2}=12-0.7-0.7=10.6V$ | $R_T=R_1+R_{d2}+R_2=10.6k\Omega$ | $I=\frac{10.6}{10.6}=1mA$

$I_{R1}=\frac{U_{R1}}{R_1}=\frac{9.3}{3.1}=3mA=I_{11}$

שאלה 6:



$$\begin{cases} E-U_{d1}=R_1\cdot I_{11}+R_{D1}\cdot I_{11}+R_2(I_{11}+I_{22})+R_4(I_{11}+I_{33}) \\ 0=R_2\cdot(I_{11}+I_{22})+R_3\cdot I_{22} \\ U_{d2}=R_4(I_{11}+I_{33})+ \end{cases}$$

$$\begin{cases} E=9.3+0.75+9+3I_{22}+1.5+0.5I_{33}+0.65 \\ 0=9+5I_{22} \\ 0.7=1.5+0.5I_{33} \end{cases}$$

$E=21.2+3I_{22}+0.5I_{33} \Rightarrow E=21.2+5.4-0.8$

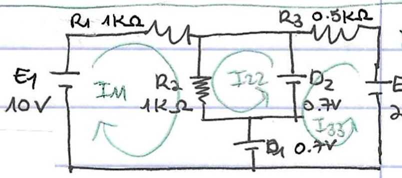
$I_{22}=\frac{-9}{5}=-1.8$

$I_{33}=-1.6$

$\Downarrow$

$E=15V$

שאלה 9:



$$\begin{cases} E_1-D_1=R_1\cdot I_{11}+R_2\cdot(I_{11}+I_{22}) \\ D_2=R_2\cdot(I_{11}+I_{22}) \\ E_2-D_1-D_2=0.5I_{33} \end{cases}$$

$$\begin{cases} 9.3=2I_{11}+I_{22} \\ 0.7=I_{11}+I_{22} \\ 18.6=0.5I_{33} \end{cases}$$

$$\begin{cases} 3.\ 9.3=2I_{11}+0.7-I_{11} \\ 2.\ I_{22}=0.7-I_{11} \\ 1.\ I_{33}=\frac{18.6}{0.5}=37.2 \end{cases}$$

$\rightarrow I_{11}=8.6$

$\downarrow$

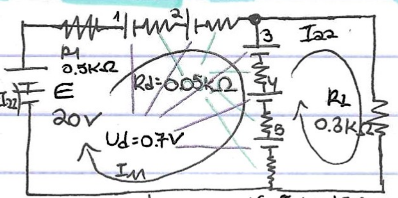
$I_{22}=0.7-8.6=-7.9$

$I_{R1}=I_{11}=8.6mA$ | $I_{D1}=I_{11}+I_{33}=45.8mA$

$I_{R2}=I_{11}+I_{22}=8.6+(-7.9)=0.7mA$

$I_{R3}=I_{33}=37.2mA$ | $I_{D2}=I_{33}-I_{22}=45.1mA$

שאלה 10:



$$\begin{cases} E-U_{d1}-U_{d2}-U_{d3}-U_{d4}-U_{d5}=(R_1+R_{d1}+R_{d2})I_{11}+(R_3+R_4+R_5)(I_{11}-I_{22}) \\ U_{d3}+U_{d4}+U_{d5}=(R_3+R_4+R_5)(I_{22}-I_{11})+R_L\cdot I_{22} \end{cases}$$

$$\begin{cases} 16.5=0.6I_{11}+0.15I_{11}-0.15I_{22} \\ 2.1=0.15I_{22}-0.15I_{11}+0.3I_{22} \end{cases}$$

$$\begin{cases} 16.5=0.75I_{11}-0.15I_{22} \\ 2.1=0.45I_{22}-0.15I_{11} \end{cases}$$

$I_{11}=\frac{16.5+0.15I_{22}}{0.75}$

$2.1=0.45I_{22}-0.15\frac{16.5+0.15I_{22}}{0.75}$

$2.1=0.45I_{22}-0.2(16.5+0.15I_{22})$

$2.1=0.45I_{22}-3.3-0.03I_{22}$

$5.4=0.42I_{22}$

$I_{22}=12.857mA$ $\leftarrow$ $I_{RL}=I_{22}=12.857mA$

$I_{11}=24.5714mA$

$U_{RL}=I_{RL}\cdot R_L=12.857\cdot0.3=3.85V$