נועה מיצאיון 1556260990

פיזיקה ומלמ / תרגיל בית 6

שאלה 2:

הדיודה שנמצאת מתחת לנגד R_2 לא זורם פה זרם ולכן גם ב- R_2 אין זרם

$$R_T = R_1 + R_3 = 10k + 5k = 15k\Omega$$

$$I = \frac{U}{R} = \frac{12}{15} = 0.8mA$$

$$I_{R_1} = I_{R_3} = I = 0.8mA$$

שאלה 3:

הדיודה שנמצאת מתחת לנגד R_3 בקטעון והיא לא מעבירה זרם =>
בנגד R_3 אין זרם

$$R_{2,4} = \frac{R_2 \cdot R_4}{R_2 + R_4} = 2k\Omega \qquad R_T = R_1 + R_{2,4} = 10 + 2 = 12k\Omega$$

$$I = \frac{U}{R} = \frac{12}{12} = 1mA$$

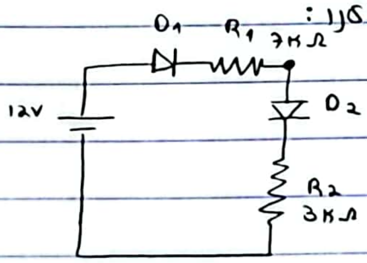
$$I_{24} = I_T = 1mA \qquad U_{24} = I_{24} \cdot R_{24} = 1 \cdot 2 = 2V$$

$U_2 = U_4 = U_{24} = 2V$ - אותו מתח

$$I_4 = \frac{U_4}{R_4} = \frac{2}{6} = 0.333mA$$

שאלה 5:

בדיודה D3 יש נתק ולכן קיבלנו:



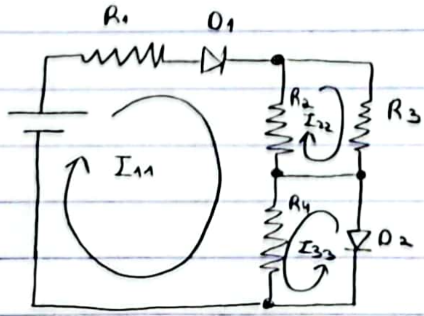
$$E = U_T - U_{d1} - U_{d2} = 12 - 0.7 - 0.7 = 10.6V$$

$$R = R_1 + R_2 + R_{D2} = 10.6\ k\Omega$$

$$I_T = \frac{E}{R} = \frac{10.6}{10.6} = 1mA$$

שאלה 6:

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



$$I_{11}\begin{cases} E-D_1 = I_{11}(R_1+R_{d1}+R_2+R_4) - I_{22}(R_2) - I_{33}\cdot R_4 \\ E-0.65 = I_{11}(3.1+0.25+3+0.5) - 3I_{22} - 0.5I_{33} \\ E-0.65 = 6.85I_{11} - 3I_{22} - 0.5I_{33} \end{cases}$$

$$I_{22}\begin{cases} 0 = -I_{11}\cdot R_2 + I_{22}(R_2+R_3) \\ 0 = -3I_{11} + 5I_{22} \end{cases}$$

$$I_{33}\begin{cases} -D_2 = -I_{11}\cdot R_4 + I_{33}\cdot R_4 \\ -0.7 = -0.5I_{11} + 0.5I_{33} \end{cases}$$

$$E-0.65 = 20.55 - 3I_{22} - 0.5I_{33}$$

$$0 = -9 + 5I_{22} \qquad I_{22} = 1.8\,mA$$

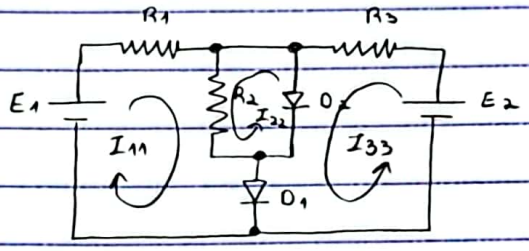
$$-0.7 = -1.5 + 0.5I_{33}$$

$$I_{33} = 1.6\,mA$$

$$E-0.65 = 20.55 - 5.4 - 0.8$$

$$E = 15\,V$$

:٩ مسألة



$$I_{11}\begin{cases} E_1 - U_{d1} = I_{11}(R_1+R_2) - I_{22}\cdot R_2 \\ E_1-0.7 = 2I_{11} - I_{22} \\ 9.3 = 2I_{11} - I_{22} \end{cases}$$

$$I_{22}\begin{cases} -U_{d2} = -I_{11}\cdot R_2 + I_{22}\cdot R_2 \\ -0.7 = -1I_{11} + I_{22} \end{cases}$$

$$E_2 - U_{d1} - U_{d2} = I_{33}\cdot R_3$$

$$20-0.7-0.7 = 0.5I_{33}$$

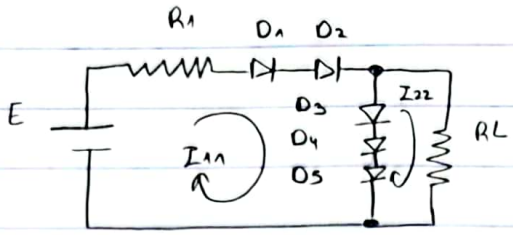
$$I_{33} = 37.2\,mA \qquad I_{11} = 8.6\,mA \qquad I_{22} = 7.9\,mA$$

$$I_{R_1} = I_{11} = 8.6\,mA \qquad I_{R_3} = I_{33} = 37.2\,mA$$

$$I_{R_2} = I_{11} - I_{22} = 8.6 - 7.9 = 0.7\,mA \qquad I_{D_1} = I_{11} + I_{33} = 8.6 + 37.2 = 45.8\,mA$$

$$I_{D_2} = I_{22} + I_{33} = 37.2 + 7.9 = 45.1\,mA$$

3



$$I_{11}\begin{cases} E - U_{d1} - U_{d2} - U_{d3} - U_{d4} - U_{d5} = I_{11}(R_1 + R_{d1} + R_{d2} + R_{d3} + R_{d4} + R_{d5}) - I_{22}(R_{d3} + R_{d4} + R_{d5}) \\ 20 - 0.7 - 0.7 - 0.7 - 0.7 - 0.7 = I_{11}(0.5 + 0.05(5)) \\ I_{22}(3(0.05)) \\ 16.5 = 0.75\, I_{11} - 0.15\, I_{22} \end{cases}$$

$$I_{22}\begin{cases} U_{d3} + U_{d4} + U_{d5} = I_{22}(R_L + R_{d3} + R_{d4} + R_{d5}) - I_{11}(R_{d3} + R_{d4} + R_{d5}) \\ 0.7 \cdot 3 = (0.3 + 3 \cdot 0.05) I_{22} - I_{11}(3 \cdot 0.05) \\ 2.1 = -0.15\, I_{11} + 0.45\, I_{22} \end{cases}$$

$I_{11} = 24.57\,mA \qquad I_{22} = 12.857\,mA$

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

$U_{RL} = I_{RL} \cdot R_L = 12.857 \cdot 0.3 = 3.85\,V$