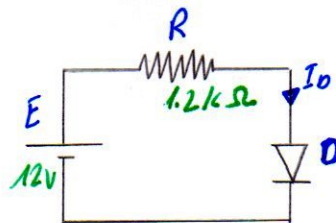


1. פתרון



2. פתרון

1. פתרון

$$I_D = \frac{E_{TH}}{R_{TH}} = \frac{3.529}{0.3529} = 10 \text{ mA}$$

$$V_D = 0.6 \text{ V}$$

$$I_D = \frac{E_{TH} - V_D}{R_{TH}} = \frac{3.529 - 0.6}{0.3529} = 8.299 \text{ mA}$$

$$V_D = 0.6 \text{ V}, R_F = 0.1 \text{ k}\Omega$$

$$I_D = \frac{E_{TH} - V_D}{R_{TH} + R_F} = \frac{3.529 - 0.6}{0.3529 + 0.1} = 6.467 \text{ mA}$$

$$V_D = V_D + I_D \cdot R_F = 1.246 \text{ V}$$

2. פתרון

$$I_D = \frac{E}{R} = \frac{12}{1.2} \Rightarrow I_D = 10 \text{ mA}$$

$$V_D = 0.6 \text{ V}$$

$$I_D = \frac{E - V_D}{R} = \frac{12 - 0.6}{1.2} \Rightarrow I_D = 9.5 \text{ mA}$$

$$R_F = 100 \Omega, V_D = 0.6 \text{ V}$$

$$I_D = \frac{E - V_D}{R + R_F} = \frac{12 - 0.6}{1.2 + 0.1}$$

$$I_D = 8.769 \text{ mA}$$

$$V_D = V_D + I_D \cdot R_F = 0.6 + 8.76 \cdot 0.1$$

$$V_D = 1.476 \text{ V}$$

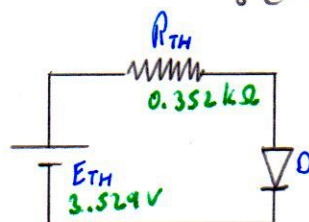
3. פתרון

פתרון

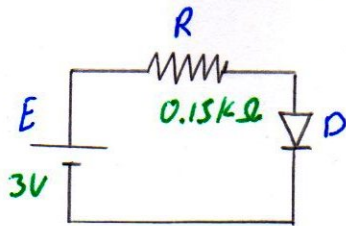
$$R_{TH} = 0.5 \parallel 1.2 \Rightarrow R_{TH} = 0.3529 \text{ k}\Omega$$

$$E_{TH} = 12 \cdot \frac{0.5}{0.5 + 1.2} \Rightarrow E_{TH} = 3.529 \text{ V}$$

פתרון



2 פירוט



1c פירוט

$$I_D = -\frac{1}{R} V_D + \frac{E}{R}$$

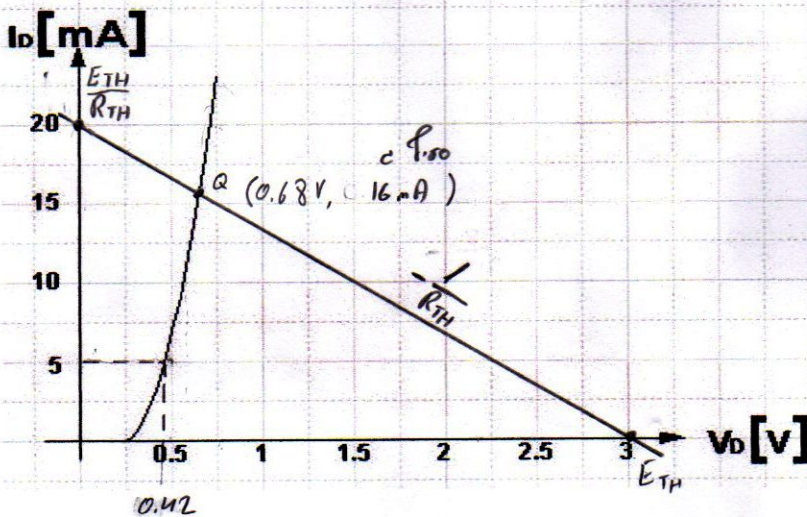
$\Downarrow$

$$I_D = -\frac{1}{0.15} V_D + \frac{3}{0.15}$$

$\Downarrow$

$$I_D = -6.666 V_D + 20$$

2 פירוט



2 פירוט

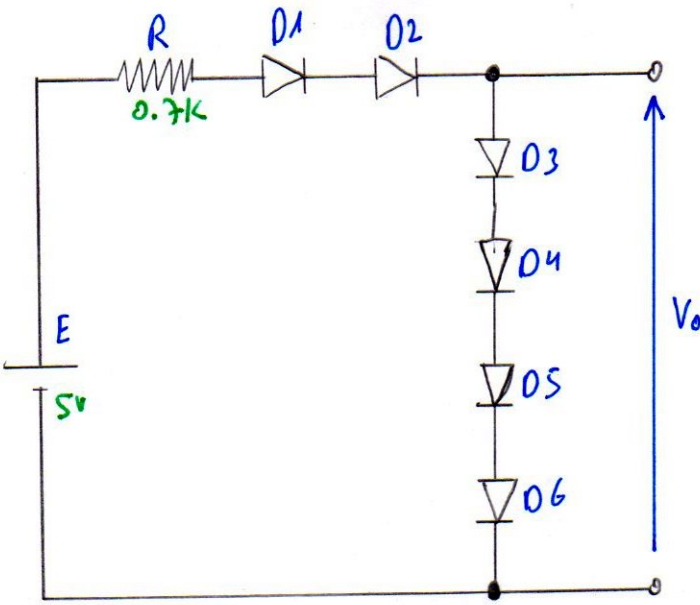
התנגדות קיבלת

$$R_F = \frac{\Delta V}{\Delta I} = \frac{0.68 - 0.42}{16 - 5} = 23.6 \Omega$$

התנגדות קיבלת

$$R_D = \frac{V_Q}{I_Q} = \frac{0.68}{16} = 42.5 \Omega$$

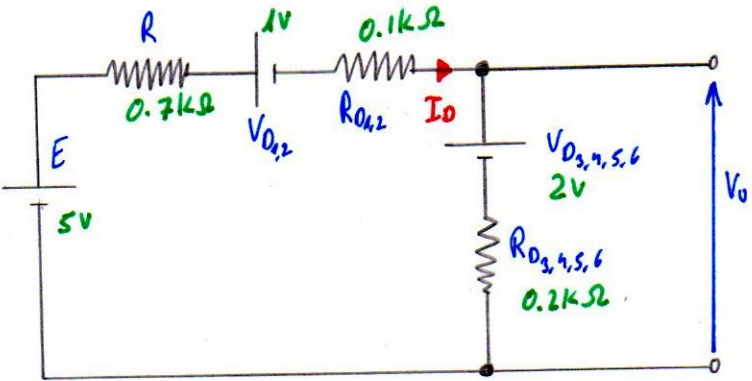
3 שלב



∴ חלף מן הסדר  
 $V_{D1} = 0.5 \text{ V}$

$$R_D = \frac{\Delta V}{\Delta I} = \frac{0.7 - 0.5}{4 - 0} = 0.05 \text{ k}\Omega : 2$$

∴ קצת מורכב יותר חלף מן הסדר



∴ 1 ק.ס

$$I_D = \frac{E - V_{D1+2} - V_{D3+6}}{R + R_{D1+2} + R_{D3+6}} = \frac{5 - 1 - 2}{0.7 + 0.1 + 0.2}$$

$$\Downarrow$$

$I_D = 2 \text{ mA}$

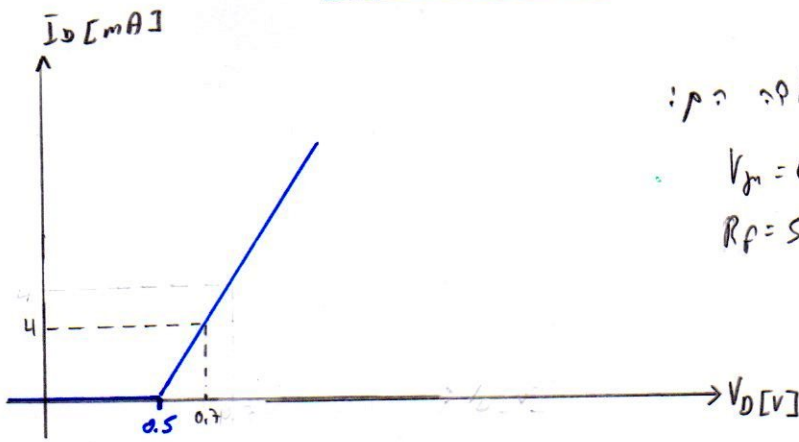
∴ 2 ק.ס

$$V_0 = V_{D3+6} + I_D \cdot R_{D3+6} = 2 + 2 \cdot 0.2$$

$$\Downarrow$$

$V_0 = 2.4 \text{ V}$

4 שאלות



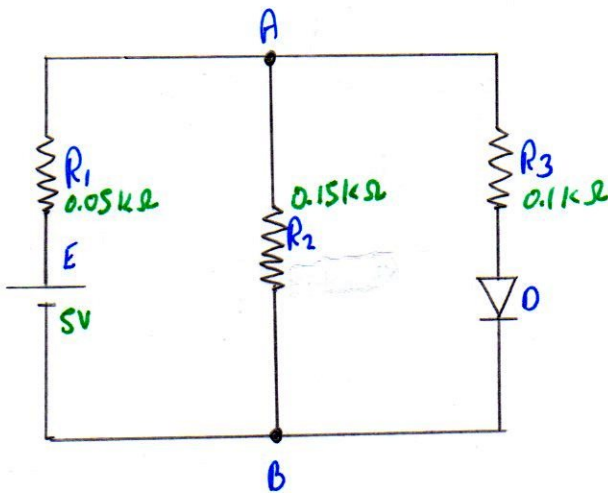
: 10 1.00

נחשון הקיפות הקיפות:

$$V_{Dm} = 0.5$$

$$R_F = 50 \Omega$$

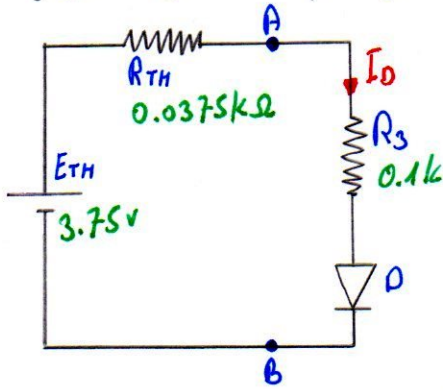
: 2 1.00



$$E_{TH} = U_{AB} = E \cdot \frac{R_2}{R_1 + R_2} = 5 \cdot \frac{0.15}{0.20} = 3.75 \text{ V}$$

$$R_{TH} = R_1 || R_2 = \left( \frac{1}{0.05} + \frac{1}{0.15} \right)^{-1} = 0.0375 \text{ k}\Omega$$

לכן נחשון הקיפות הקיפות



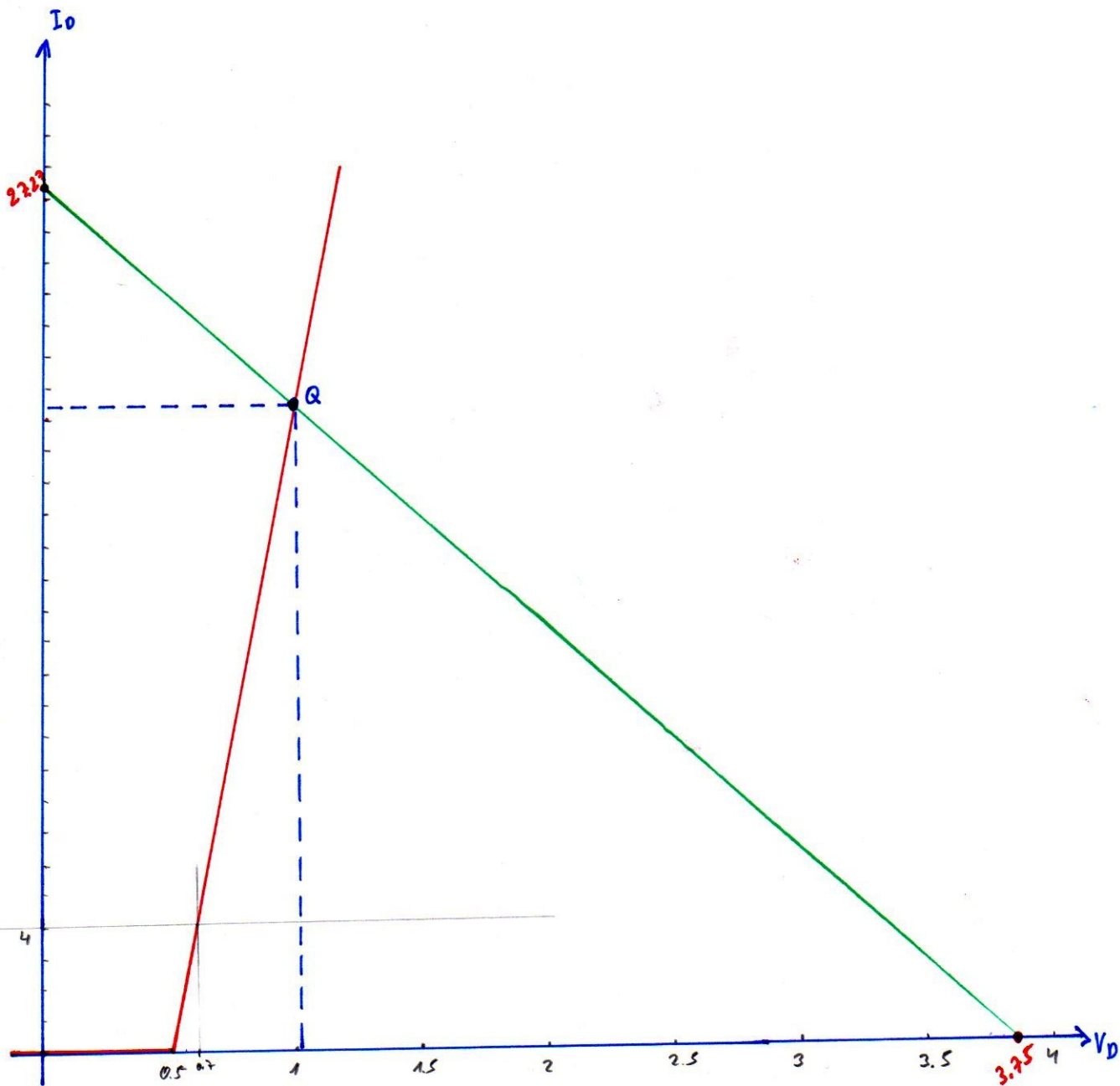
$$I_D = \frac{E_{TH} - V_{Dm}}{R_{TH} + R_3 + R_F} = \frac{3.75 - 0.5}{0.0375 + 0.1 + 0.05} = 17.333 \text{ mA}$$

: 2 1.00

$$I_D = -\frac{1}{R_{TH} + R_3} V_D + \frac{E_{TH}}{R_{TH} + R_3} = -\frac{1}{0.0375 + 0.1} V_D + \frac{3.75}{0.0375 + 0.1}$$

$$I_D = -7.272 V_D + 27.272$$

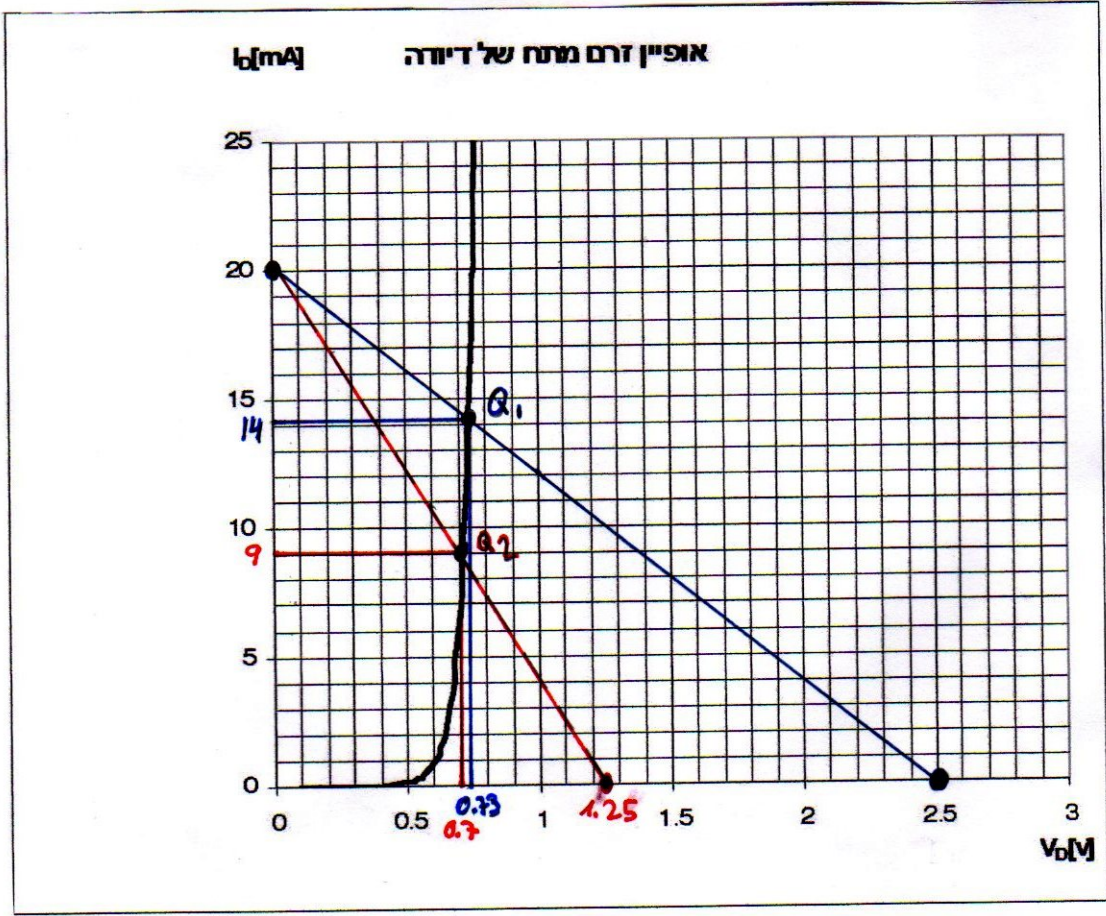
תדירות ו (המשקל)



$I_D \approx 20 \text{ mA}$  :  $I_D$  ו  $V_D$

$V_D \approx 1 \text{ V}$

שאלה 5



פירוט:

$V_D = 0.73V$  (הקו הכחול) זרם הדיודה  
 $I_D = 14mA$

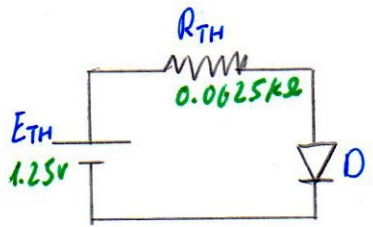
פירוט:

$P_D = V_D \cdot I_D = 0.73 \cdot 14 = 10.22mW$

פירוט:

$$R_D = \frac{V_D}{I_D} = \frac{0.73}{14} = 0.052k\Omega$$

פירוט:



$$E_{TH} = E \cdot \frac{R_1}{R_1 + R_2} = 2.5 \cdot \frac{0.125}{0.125 + 0.125}$$

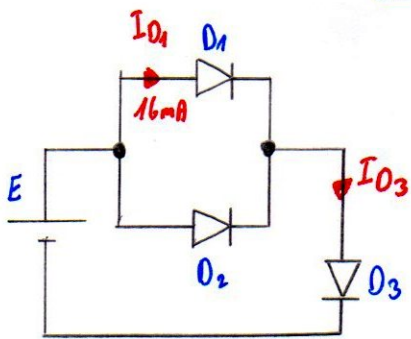
$\Leftarrow E_{TH} = 1.25$

$$R_{TH} = R_1 || R_2 = 0.0625A$$

$$I_D = -\frac{1}{R_D} V_D + \frac{E_{TH}}{R_{TH}}$$

$$I_D = -\frac{1}{0.0625} V_D + \frac{1.25}{0.0625} \Rightarrow \boxed{I_D = -16V_D + 20} \quad \text{זרם הדיודה}$$

# 6 סימון



∴ כן

$$V_{D1} = 0.6V \text{ ; } \text{הכח } \text{ } \Leftarrow I_{D1} = 16mA$$

$$I_{D2} = 0 \text{ ; } \text{הכח } \text{ } \Leftarrow V_{D1} = V_{D2} = 0.6V$$

∴

$$I_{D1} = I_{D3}$$

∴

$$V_{D3} = 0.7 \text{ ; } \text{הכח } \text{ } \Leftarrow$$

∴ כן

$$E = V_{D1} + V_{D3} = 0.6 + 0.7$$

∴

$$E = 1.3V$$

∴ כן

$$I_D = I_0 \left( e^{\frac{V_D}{2 \cdot V_T}} - 1 \right)$$

$$16 = I_0 \left( e^{\frac{0.6}{2 \cdot 0.025}} - 1 \right)$$

∴

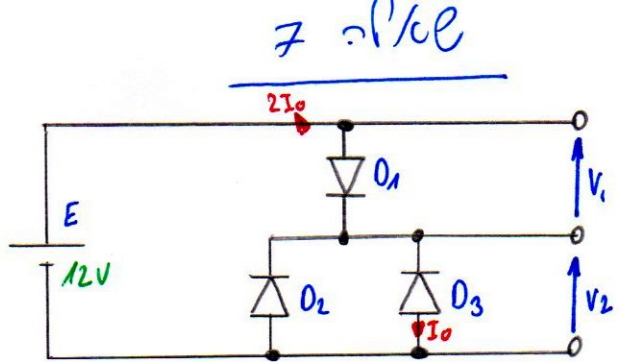
$$I_0 = \frac{16}{\left( e^{\frac{0.6}{2 \cdot 0.025}} - 1 \right)}$$

∴

$$I_0 = 98.3 \mu A$$

הכח הכח ! כן

$$I_0 = 0.155 \mu A$$



$$I_{D1} = 2 I_0$$

$$V_T = \frac{25 + 273}{11600} = 0.025$$

$$U_{D1} = 2 \cdot V_T \cdot \ln \left( \frac{I_{D1}}{I_0} + 1 \right)$$

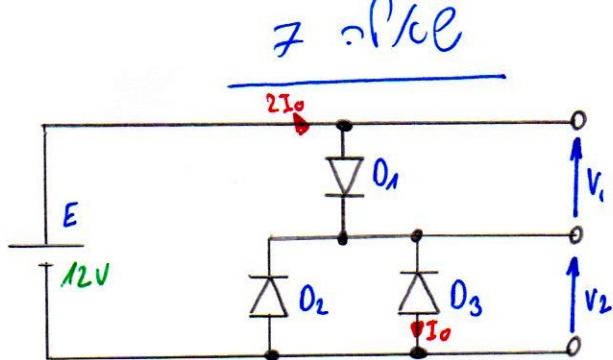
$$U_{D1} = 2 \cdot 0.025 \ln \left( \frac{2 I_0}{I_0} + 1 \right)$$

$$U_{D1} = 2 \cdot 0.025 \ln (2 + 1)$$

⇓

$$\boxed{V_1 = U_{D1} = 0.054 \text{ V}}$$

$$V_2 = E - V_1 = 12 - 0.054 \Rightarrow \boxed{V_2 = 11.946 \text{ V}}$$



$$I_{D_1} = 2 I_0$$

$$V_T = \frac{25 + 273}{11600} = 0.025$$

$$U_{D_1} = 2 \cdot V_T \cdot \ln \left( \frac{I_{D_1}}{I_0} + 1 \right)$$

$$U_{D_1} = 2 \cdot 0.025 \ln \left( \frac{2I_0}{I_0} + 1 \right)$$

$$U_{D_1} = 2 \cdot 0.025 \ln (2 + 1)$$

⇓

$$\boxed{V_1 = U_{D_1} = 0.054 \text{ V}}$$

$$V_2 = E - V_1 = 12 - 0.054 \Rightarrow \boxed{V_2 = 11.946 \text{ V}}$$