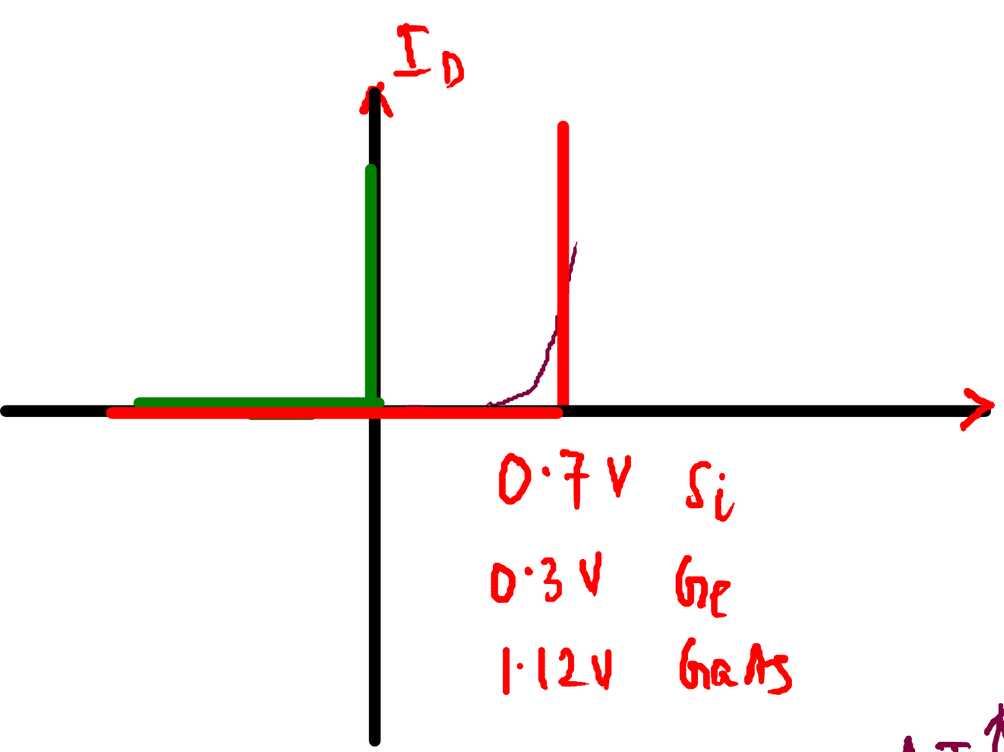
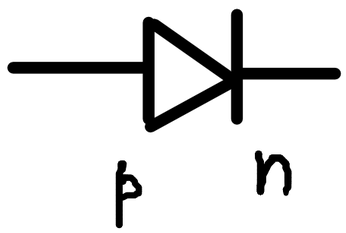
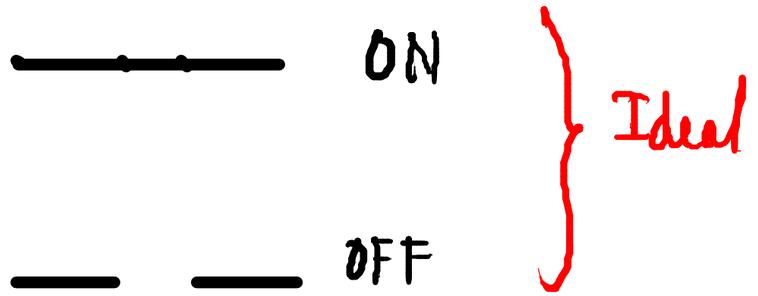
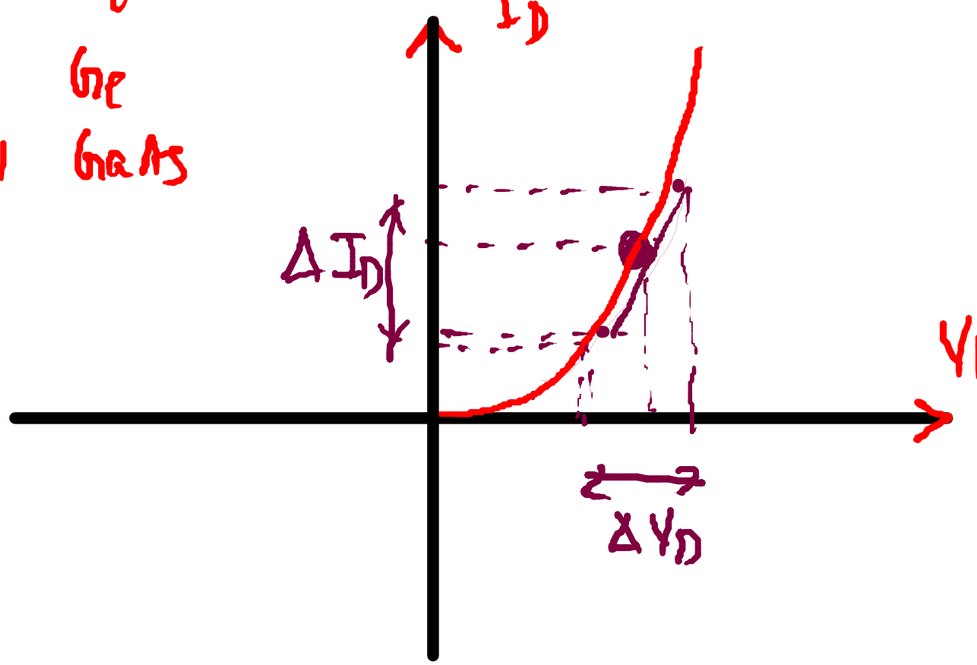


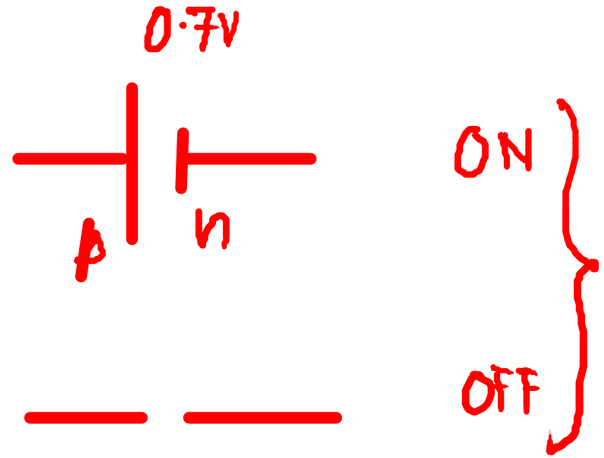






$$R_{Static} = \frac{V_D}{I_D}$$

$$R_{dynamic} = \frac{\Delta V_D}{\Delta I_D}$$



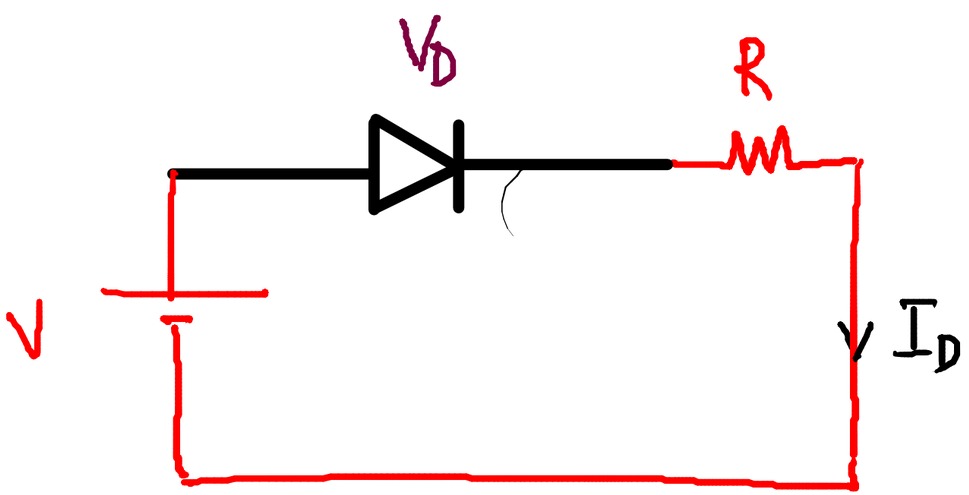
$$I_D = I_S\left[\exp\left(\frac{V_D}{\eta V_T}\right) - 1\right] \rightarrow \left(\frac{I_D}{I_S}+1\right) = e^{V_D/\eta V_T}$$

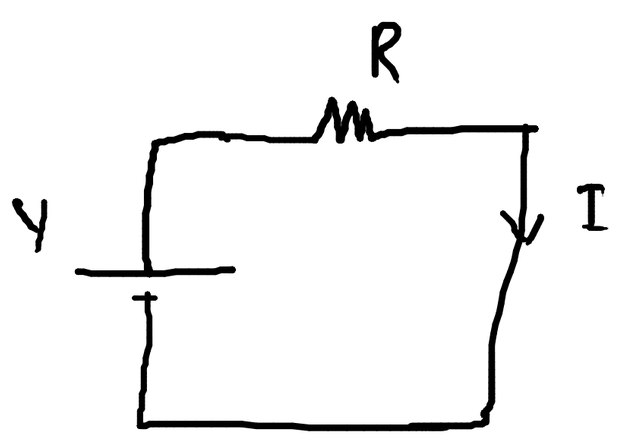
$$\frac{\partial I_D}{\partial V_D} = \frac{I_S}{\eta V_T} e^{V_D/\eta V_T}$$

$$= \frac{I_S}{\eta V_T}\left(\frac{I_D}{I_S}+1\right)$$

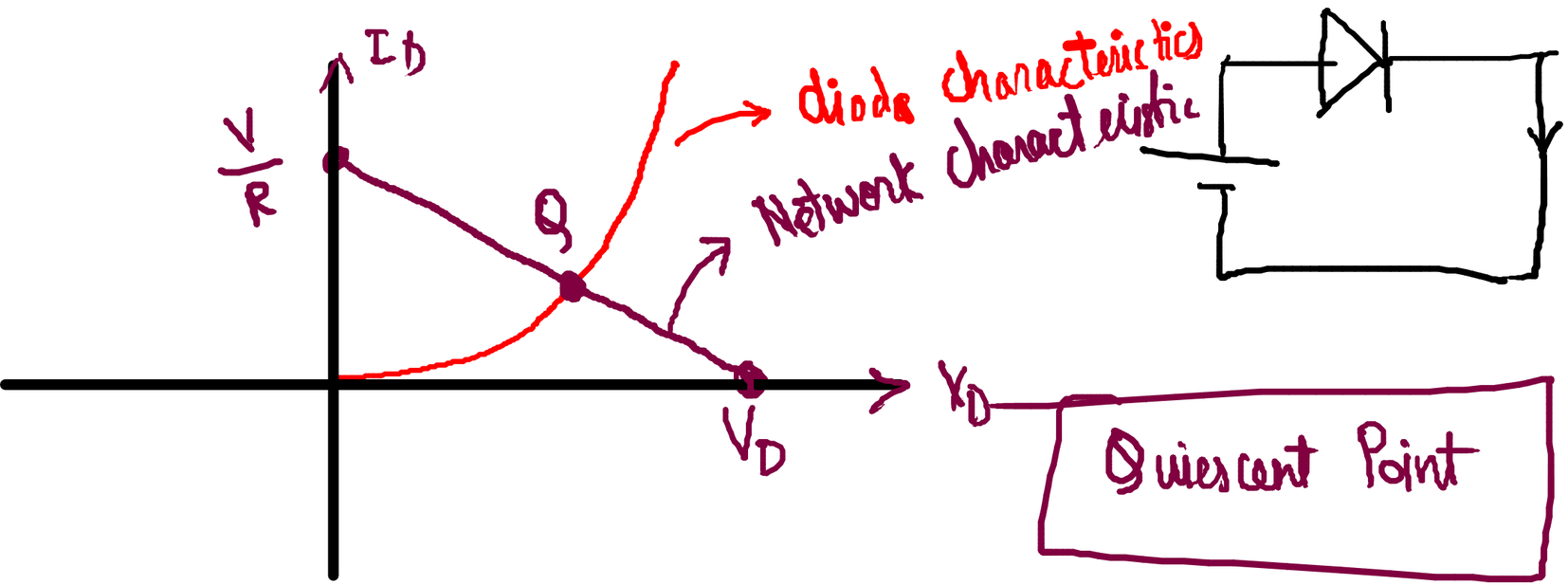
$$r_{ac} = \left(\frac{I_D}{26mV}\right)^{-1}$$

$$r_{ac} = \frac{V_T}{I_D}$$ ✓





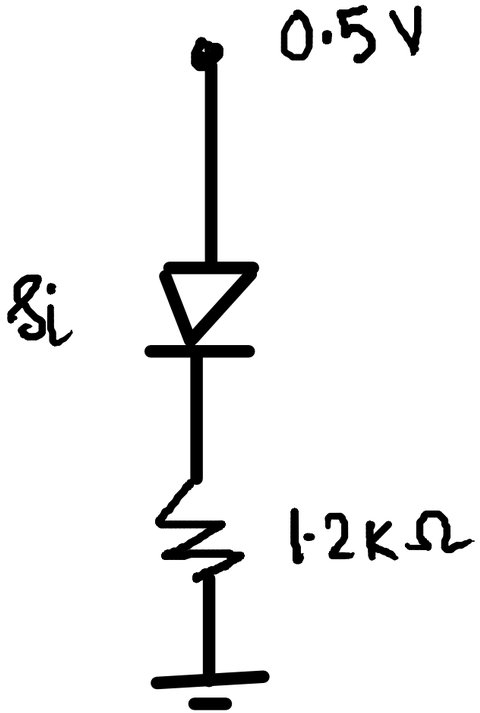
$$I = \frac{V}{R}$$



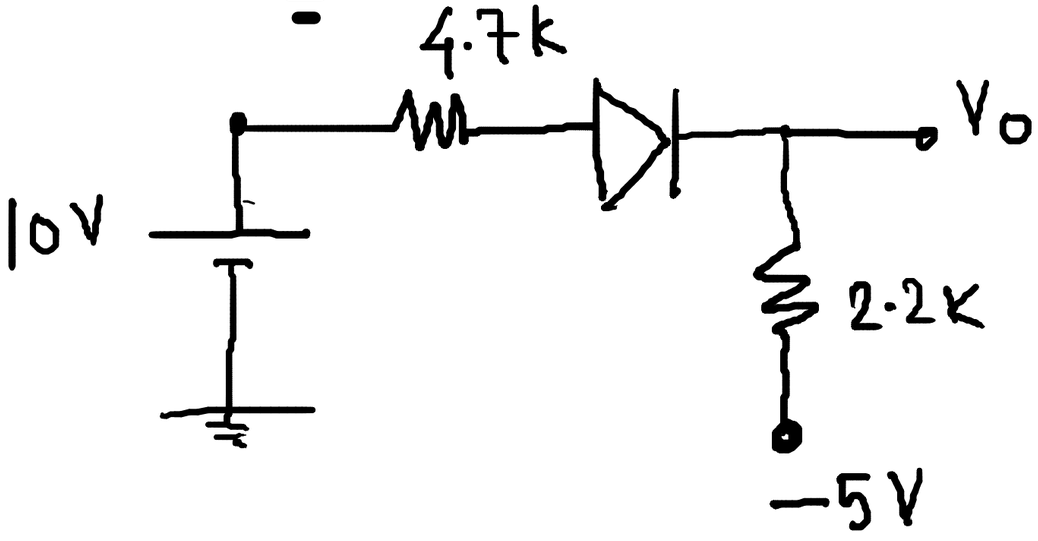
$$I_D = I_S\left[\exp\left(\frac{V_D}{\eta V_T}\right) - 1\right]$$

$$I = \frac{V - V_D}{R}$$

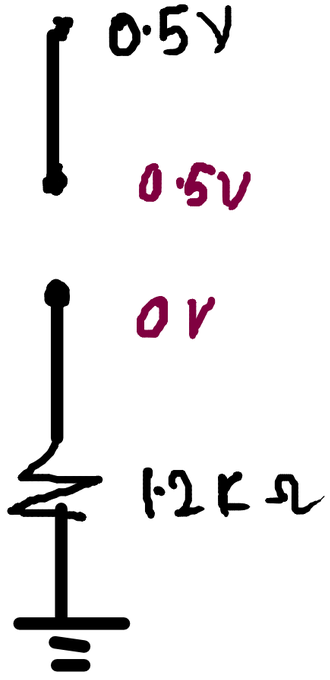
e.g



e.g



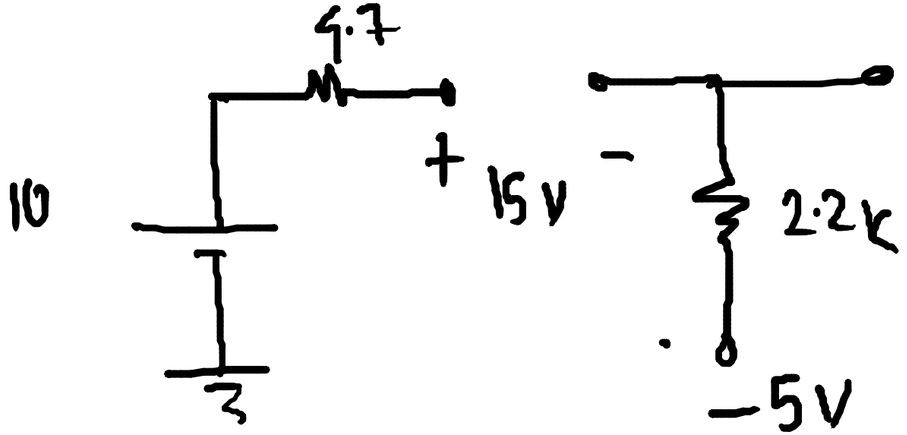
Step 1 : Determine the status of the diode.



$I_D = 0$

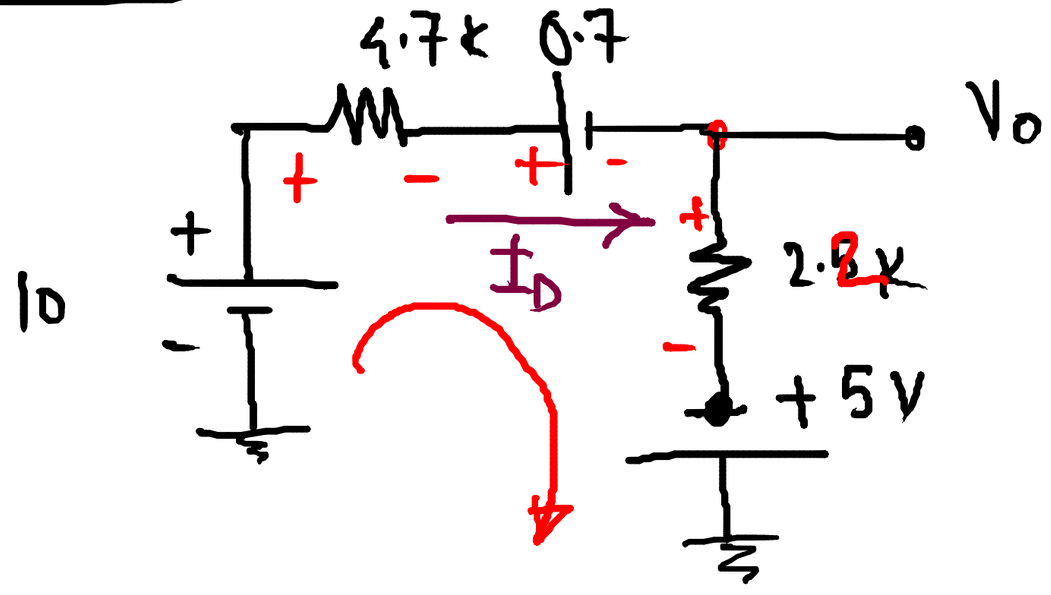
$V_D = 0.5V$

Calculate V_D, I_D, V_o



∴ Diode is ON

Step (2): Replace the diode with its equivalent



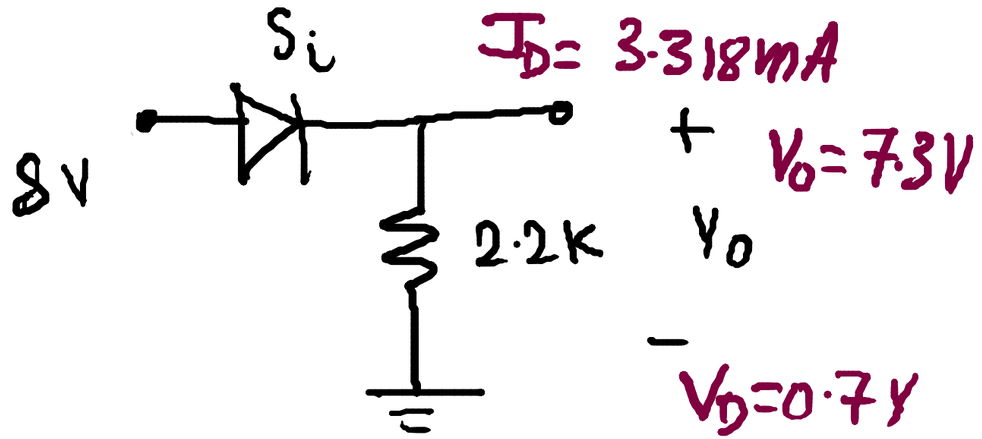
$10 - 4.7k\,(I_D) - 0.7 - 2.2k\,(I_D) + 5 = 0$

$I_D = 2.07\ mA$

$V_D = 0.7\ V$

$V_o = I_D(2.2k) - 5V = -0.45\ V$

e.g :

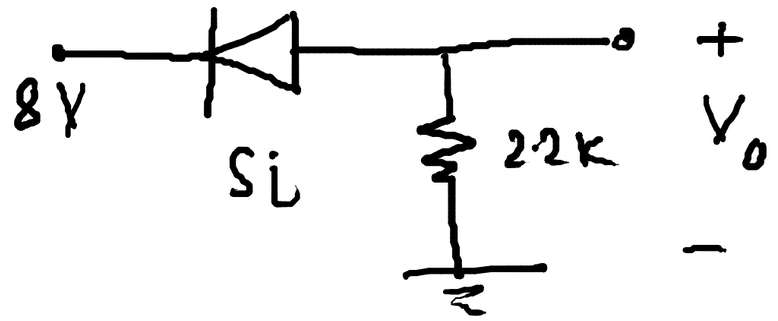


$I_D = 3.318mA$

$V_o = 7.3V$

$V_D = 0.7V$

e.g



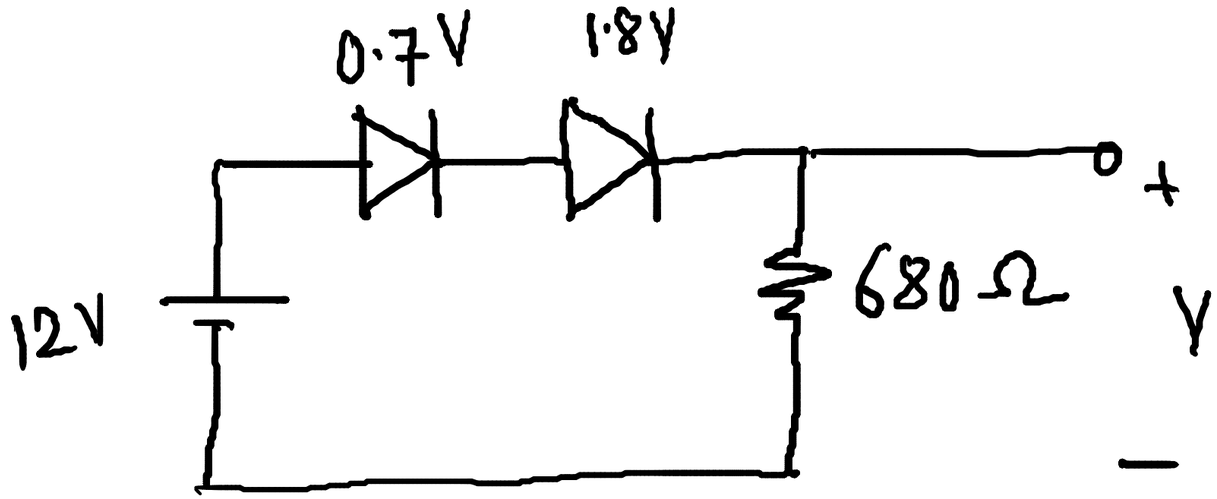
Calculate V_D, I_D, V_o

$I_D = 0$

$V_o = 0$

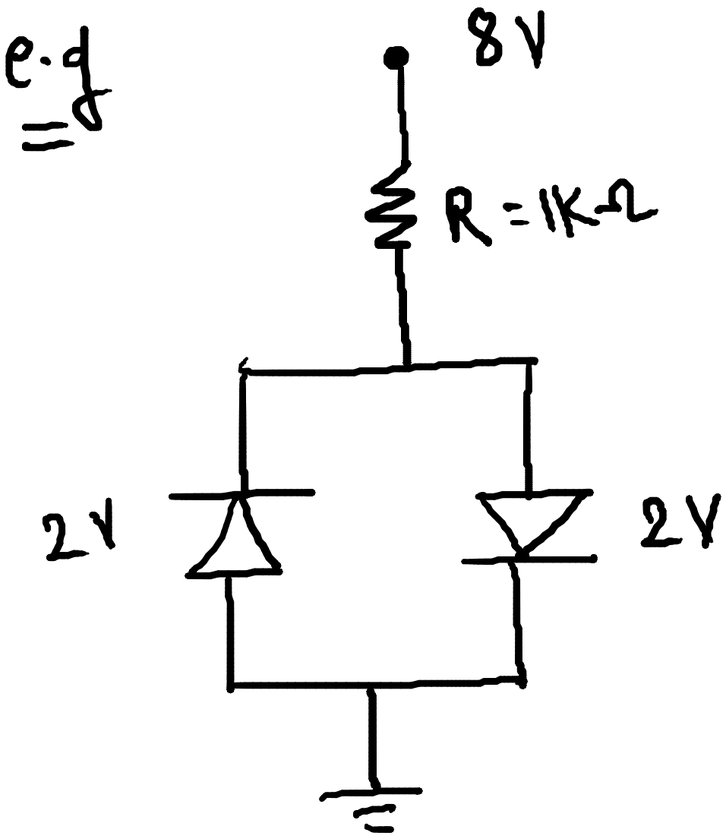
$V_D = -8V$

e.g

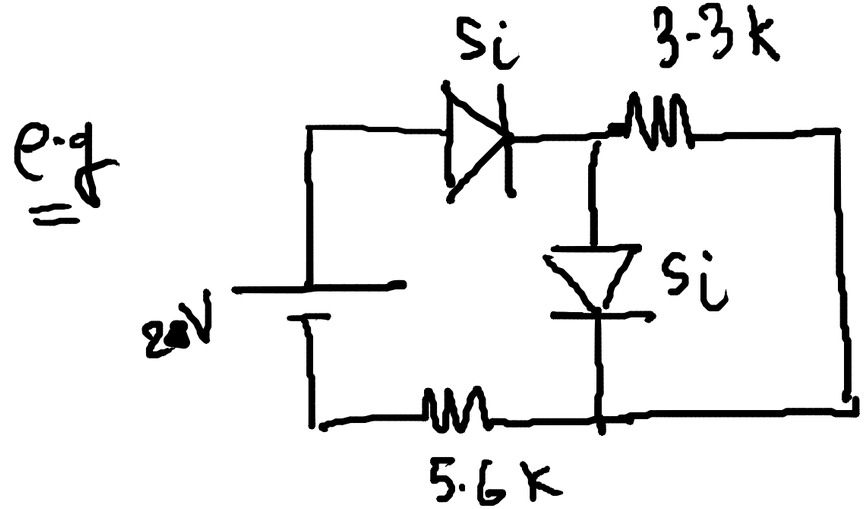


$I_D = 13.97$

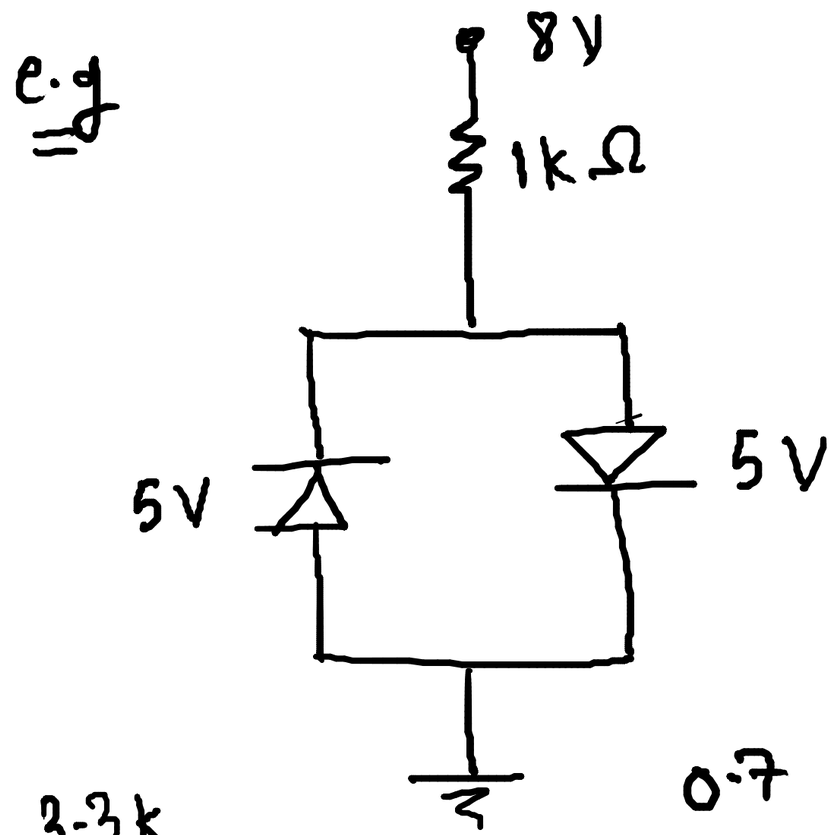
e.g



e.g



e.g



3.32 mA