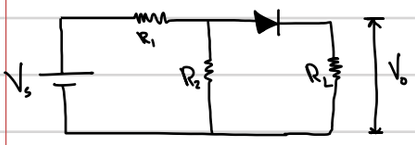
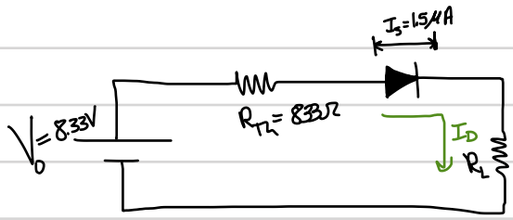
Study - 1) In the circuit shown below, the Si diode is a practical device biased for forward conduction. $R_1 = 1K\Omega$; $R_2 = 5K\Omega$ and $V_s = 10V$. At room temperature, the diode exhibit a reverse saturation current (I_s) of $1.5\mu A$. What is the load resistance R_L? Calculate the ratio of power dissipated in the diode and the power dissipated in the load (R_L). Express your answer in dB.



$R_1 = 1K$
$R_2 = 5K$
$V_S = 10V$
$I_S = 1.5\mu A$
$RL = ?$
$P_D = P_L$

$$V_{th} = \left(\frac{R_2}{R_1 + R_2}\right) V_s = \left(\frac{5K\Omega}{1K\Omega + 5K\Omega}\right) 10V = 8.33V$$

$$R_1 \| R_2 = \frac{1}{\frac{1}{5K\Omega} + \frac{1}{1K\Omega}} = 833\Omega$$



$$I_D = I_s e^{\frac{V_f}{0.026}} = 1.5\mu A\, e^{\frac{8.33V}{0.026}} =$$

$$R_L = \frac{V_o}{I_D} =$$