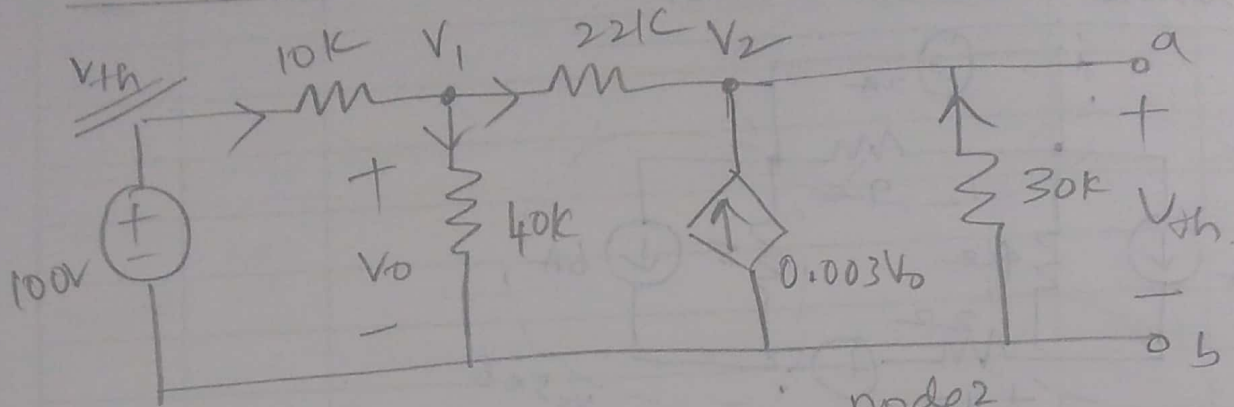


Thevenin



node 1

$$\frac{100 - V_1}{10K} = \frac{V_1}{40K} + \frac{V_1 - V_2}{22K}$$

$$10 - 0.1V_1 = 0.025V_1 + 0.045V_1 - 0.045V_2$$

$$10 = 0.17V_1 - 0.045V_2 \rightarrow \textcircled{1}$$

solving $\textcircled{1}$ and $\textcircled{2}$,

$$V_1 = -61.302 \text{ V}$$

$$V_2 = -246.63 \text{ V} = V_{th}$$

node 2

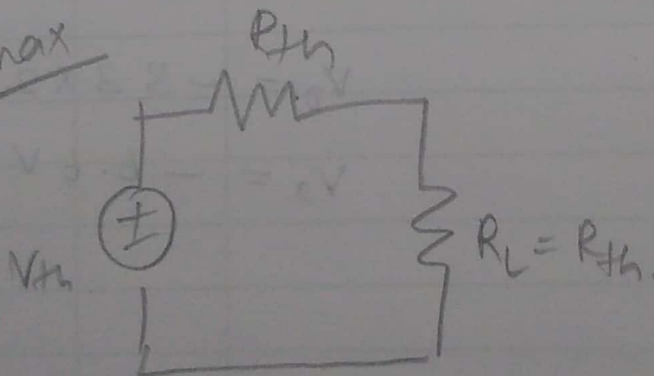
$$\frac{V_1 - V_2}{22K} + 0.003V_0 + \frac{0 - V_2}{30K} = 0$$

$$0.045V_1 - 0.045V_2$$

$$+ 0.003V_1 - 0.033V_2 = 0$$

$$3.045V_1 - 0.078V_2 = 0 \rightarrow \textcircled{2}$$

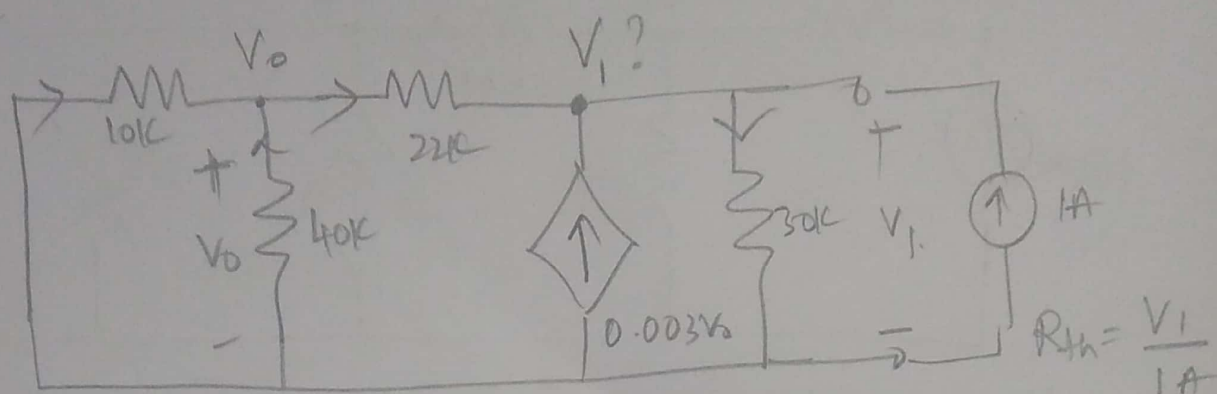
Pmax



$$P_{max} = \frac{246^2}{4 \times 1373}$$

$$= 11.0189 \text{ W}$$

Req



pt node 1

$$\frac{0 - V_0}{10k} + \frac{0 - V_0}{40k} = \frac{V_0 - V_1}{22k}$$

$\times 1000$

$$-0.1V_0 - 0.025V_0 = 0.045V_0 - 0.045V_1$$

$$0 = 0.17V_0 - 0.045V_1$$

solving, we get

node 2

$$\frac{V_0 - V_1}{22k} + 0.003V_0 = 1 = \frac{V_1}{30k}$$

$\times 1000$

$$\frac{V_0 - V_1}{22} + 3V_0 + 1000 = \frac{V_1}{30}$$

$$V_0 \left(3 + \frac{1}{22} \right) - V_1 \left(\frac{1}{22} + \frac{1}{30} \right) = -1000$$

$$3.045V_0 - 0.078V_1 = -1000$$

$$V_0 = -363.59$$

$$V_1 = -1373.57 \text{ V}$$

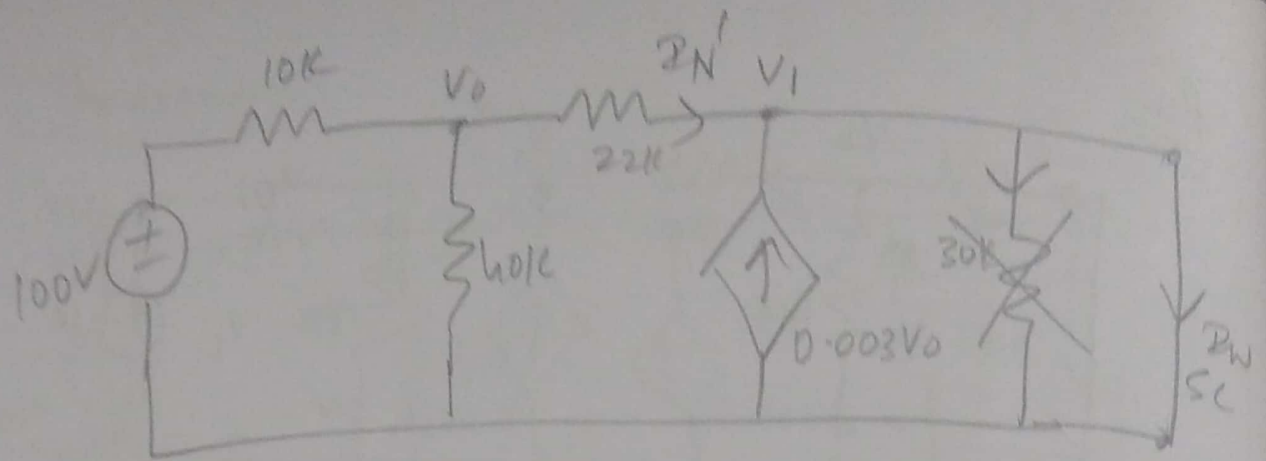
$$R_{th} = -1373.57 \Omega$$

Ans

$$V_{th} = -246 \text{ V}$$

$$R_{th} = -1374 \Omega$$

$$P_N = 0.178 \text{ A}$$



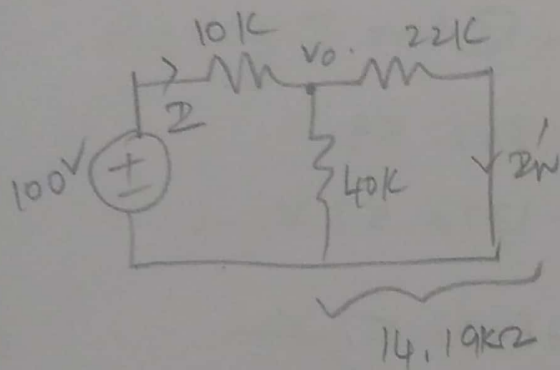
node 1 eqn same

$$10 = 0.17V_0 - 0.045V_1$$

node 2 eqn

$$\frac{V_0 - V_1}{22k} + 0.003V_0 = \frac{V_1}{30k} + I_N$$

Superposition $\rightarrow I_N = I_N' + 0.003V_0$



$$\therefore I_N = 2.667 \text{ mA} + 0.003 \times 58.667$$

$$I_N = 0.178 \text{ A}$$

$$I = \frac{100}{24.19k\Omega} = 4.133 \text{ mA}$$

$$I_N' = 4.133 \text{ mA} \times \frac{40k}{62k} = 2.667 \text{ mA}$$

$$\frac{V_{th}}{R_{th}} = \frac{-246}{-1373}$$

$$I_N = 0.179 \text{ A}$$

$$V_0 = 2.667 \text{ mA} \times 22k$$

$$V_0 = 58.667 \text{ V}$$