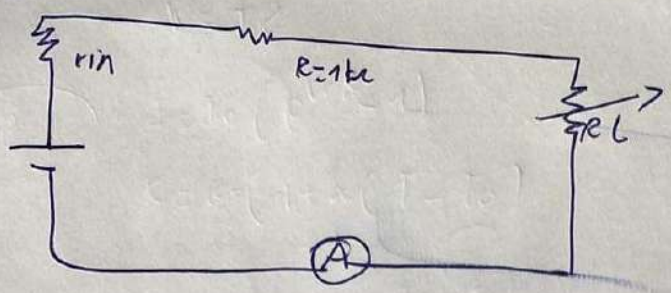
BZU-HUB

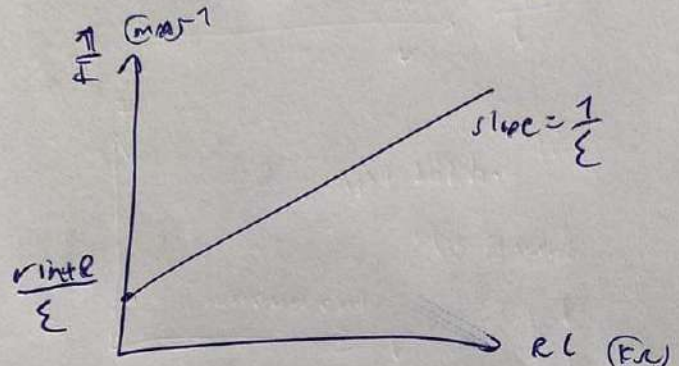
صُمِّمَ هَذا الموقع ليخدم طلبة جامعة بيرزيت، وهو موقع غير ربحي



$$\mathcal{E} = I r_{in} + I R + I R_L$$

$$\frac{1}{I} = \frac{r_{in}}{\mathcal{E}} + \frac{R}{\mathcal{E}} + \frac{R_L}{\mathcal{E}}$$

$$\frac{1}{I} = \frac{1}{\mathcal{E}} R_L + \frac{r_{in}+R}{\mathcal{E}}$$



مثال 3

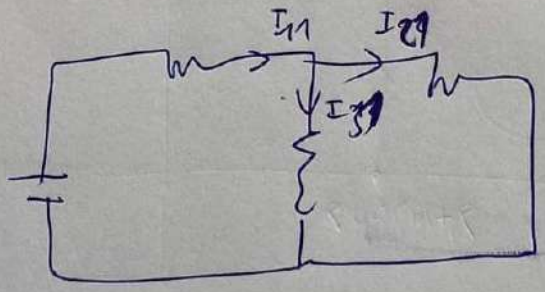
KCL

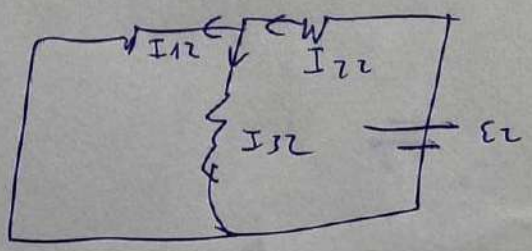
$\sum I_{in} = I_{out}$

KVL $\sum V = 0$

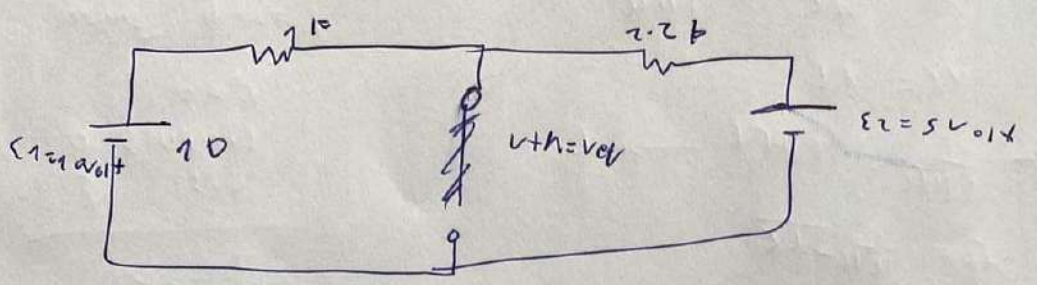
توازي $R_{eq} = nR$

توالي $R_{eq} = \frac{R}{n}$





Example : Solve for R—



$10 - I_1R_1 + V_{th} = 0$

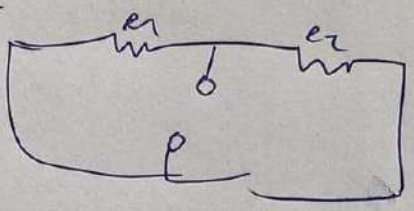
$10 - 5 - I_1R_1 - I_2R_2 = 0$

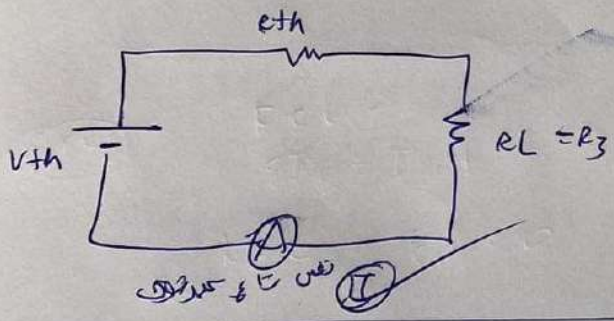
V_{th} --- ( ) .

$V_{eq} = V_{th}$

$R_{th} = R_{eq}$

$R_{eq} = R_{th} = R_1 // R_2 = \frac{R_1R_2}{R_{th}R_2}$

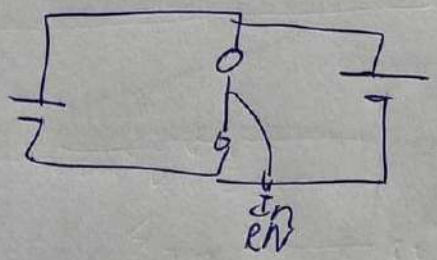


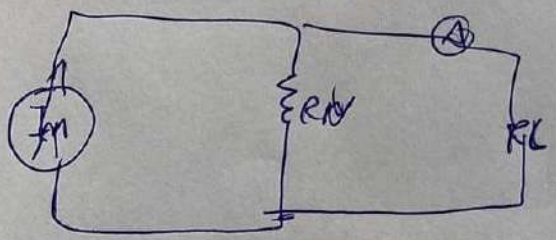


$I_N = I_g = I_{cc} =$ (

$R_n = R_{th}$

$I_N = \frac{V_{th}}{R_{th}}$



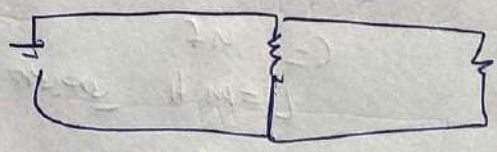


$R_{eq} = \frac{R_{th}R_L}{R_{th}+R_L}$

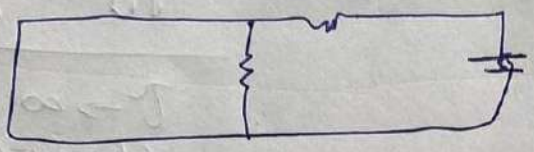
$V = I_N R_{eq}$

$V = I_N R_L$

Voltage source $V_{ثابت}$ / current source $I_{ثابت}$



$I = \frac{\mathcal{E}}{R_2 \| R_3}$



$I = \frac{\mathcal{E}}{R_1}$

$I_{eq} = \frac{\mathcal{E}_{eq}}{R_{eq}}$

$V_{RL} = V_{eq}$

$I_L R_L = (I_{eq} - I_L) R_{eq}$

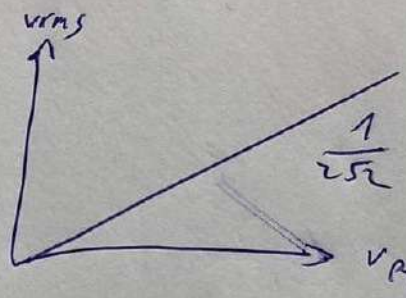
$I_L (R_L + R_{eq}) = I_{eq} R_{eq}$

$I_L = \frac{I_{eq} R_{eq}}{R_L + R_{eq}}$

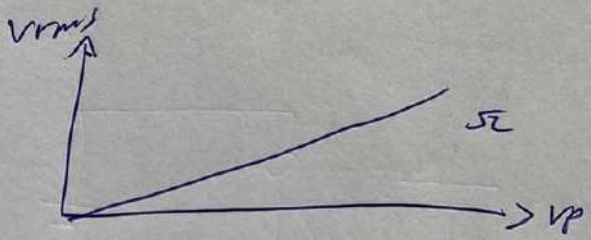
(ex 5) $V(t) = A \sin \omega t$

$V_{p-p} = A$

$V_{rms} = \frac{V_{p-p}}{2\sqrt{2}}$



$V_{rms} = \frac{V_p}{\sqrt{2}}$

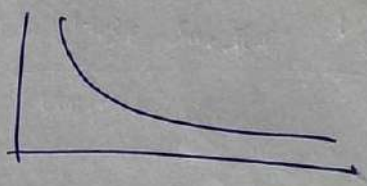


$V_c = V_{max} \left(1 - e^{-t/RC}\right)$

$\tau = 0.63 V_{max}$ charging

$V_c = V_{max} e^{-t/RC}$

$\tau = 0.37 V_{max}$ discharging



$W = 2\pi f$

$X_C = \frac{1}{WC} = \frac{1}{2\pi f C}$

$X_C = X_L$

$\frac{1}{W_C} \leftarrow \frac{1}{2\pi f C} = 2\pi f L \longrightarrow WL$

$f_p = \frac{1}{2\pi \sqrt{LC}}$

f resonance

$\tau = RC = \frac{L}{R}$

$W = \frac{1}{\sqrt{LC}}$

$C = uf$

$L = mH$ ميكرو

$\tau \to 0$

charging 0

dis ε

$\tau \to \infty$

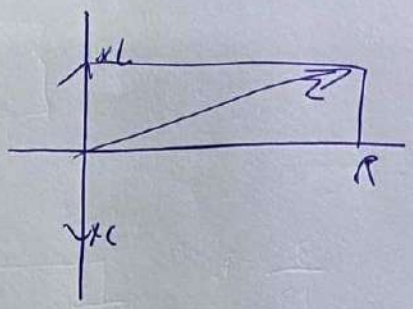
charging ε

dis 0.

ex:-

$$R^T = \sqrt{R^2 + (X_L - X_C)^2}$$

impedence — reactance



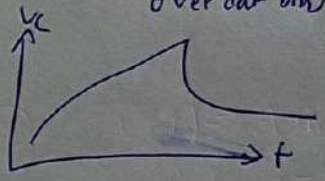
$$V^T = \sqrt{V^2 + (V_L - V_C)^2}$$

$$Q(t) = A_1 e^{\lambda_+ t} + A_2 e^{\lambda_- t}$$

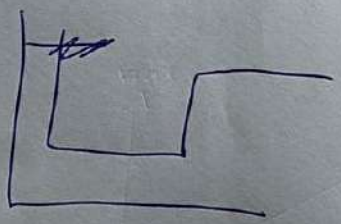
$$\lambda_+ = \frac{-R}{2L} + \sqrt{\left(\frac{R}{2L}\right)^2 - \frac{1}{LC}}$$

$$\lambda_- = \frac{-R}{2L} - \sqrt{\left(\frac{R}{2L}\right)^2 - \frac{1}{LC}}$$

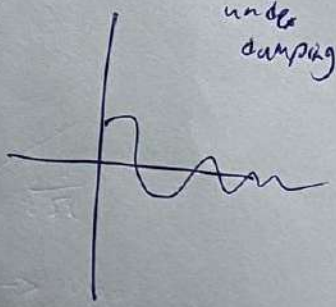
$\left(\frac{R}{2L}\right)^2 > \frac{1}{LC}$ — over damping

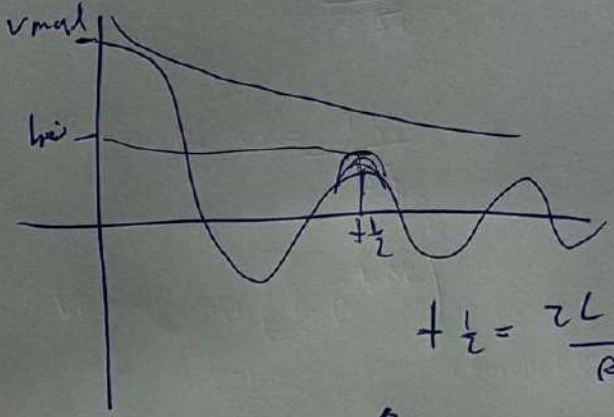


$\left(\frac{R}{2L}\right)^2 = \frac{1}{LC}$ — critical damping



$\left(\frac{R}{2L}\right)^2 < \frac{1}{LC}$ — under damping





$$\pm\frac{1}{2} = \frac{2L \ln 2}{R_0}$$

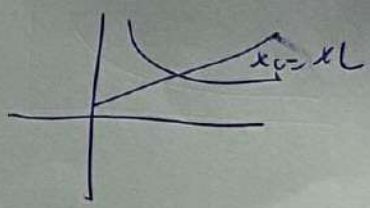
R_0 ~ 200 Ω

$$\delta_{exp} = \frac{\ln 2}{\pm\frac{1}{2}}$$

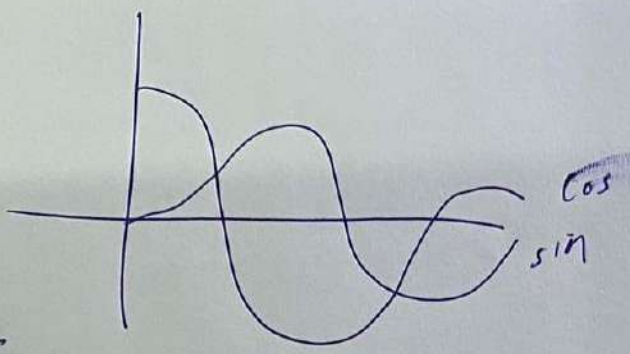
$$\delta_{th} = \frac{R_0}{2L}$$

$$R_{critical} = R_0 + R_L$$

$$w' = \sqrt{\frac{1}{LC} - \left(\frac{R}{2L}\right)^2}$$



ex. 7



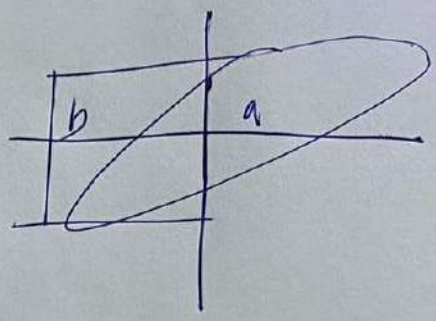
$\phi = \omega_0 T$

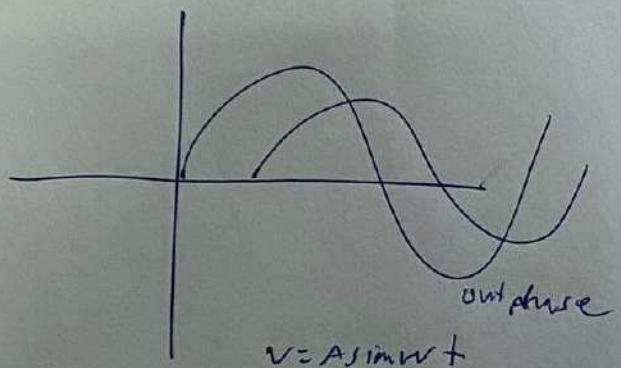
$= 2\pi f_0 t$

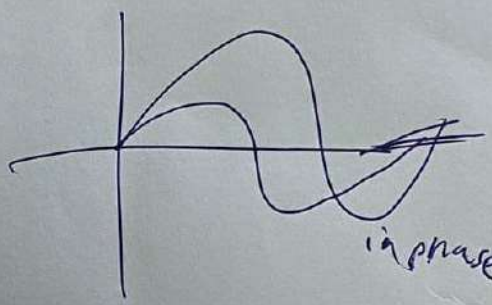
$= 2\pi \frac{1}{T} \omega t$

$\phi = \sin^{-1} \frac{a}{b}$ (degree)

at resonance $\phi = 0$





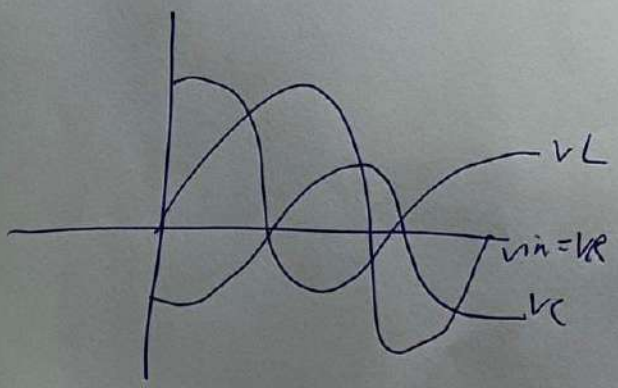


$V = A \sin \omega t$

$V = B \sin(\omega t + \phi)$

$\phi = \tan^{-1} \frac{X_L - X_C}{R}$

$\phi = \tan^{-1} \frac{\left(\omega L - \frac{1}{\omega C}\right)}{R}$

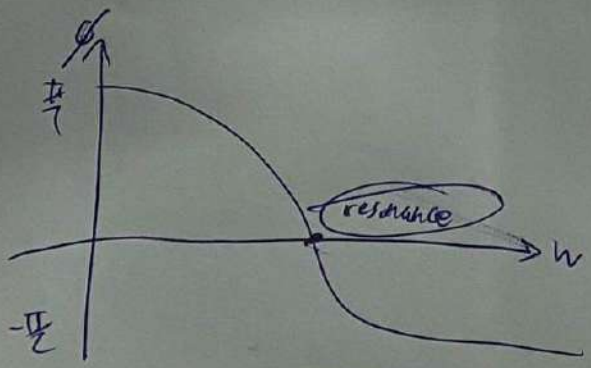


$V_{in} = V_R = i$

V_L leads V_R $\frac{\pi}{2}$

V_C lags V_R $-\frac{\pi}{2}$

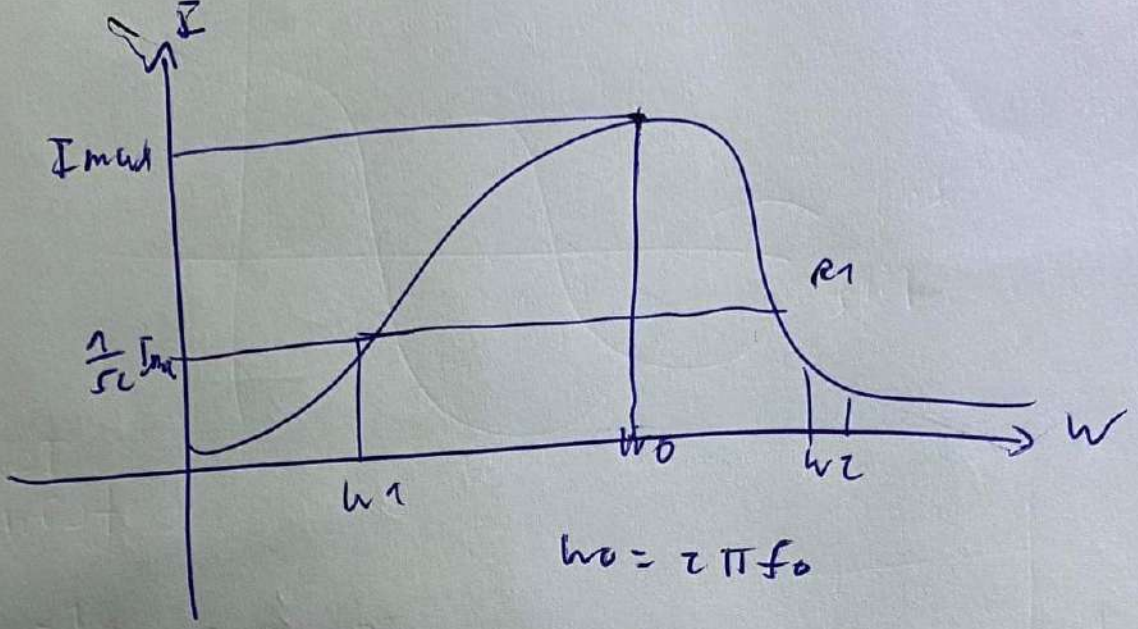
$= \pi = \left| -\frac{\pi}{2} + \frac{\pi}{2} \right|$



$R + \sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$

ex 7

$w = 2\pi f$



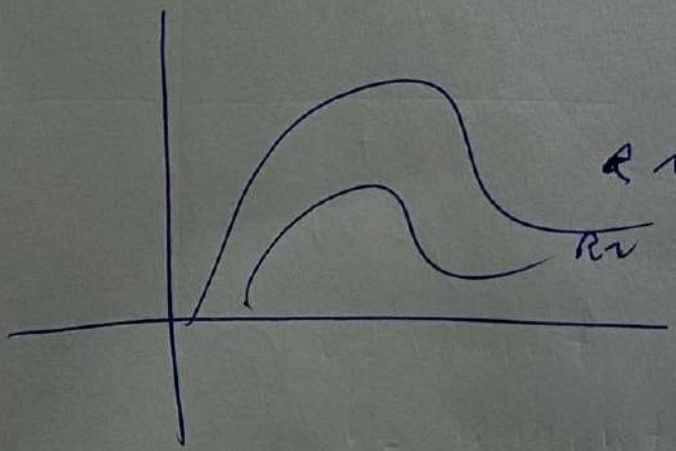
$w_0 = 2\pi f_0$

$\Delta w = w_2 - w_1$ = bandwidth

$\frac{w_0}{[\Delta w]}$ = quality factor

$Qf = \frac{wL}{R} = w_0 \frac{L}{R} = \frac{1}{\sqrt{LC}} \frac{L}{R}$

$= \frac{1}{R} \sqrt{\frac{L}{C}}$



$R_1 > R_2$

$V = IR$

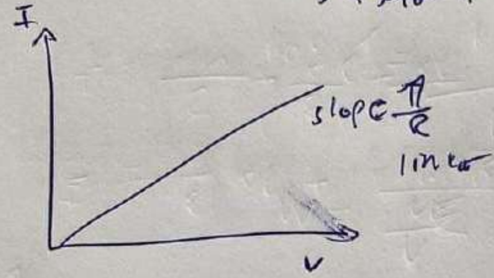
exp-1

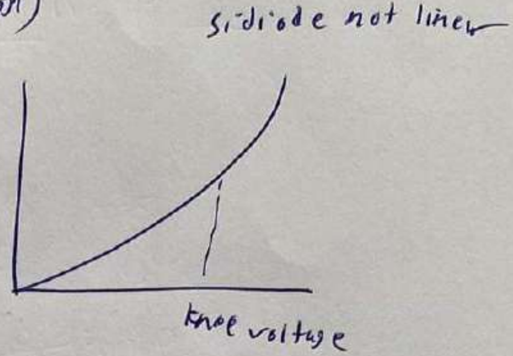
$I = I_0 \left(e^{V/k} - 1\right)$

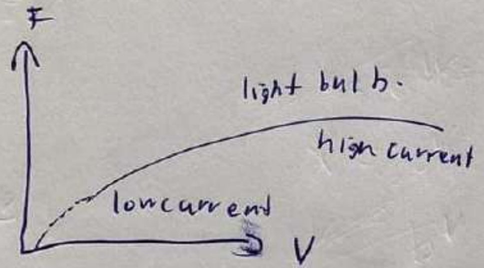
$R = R_0\left(1 + \alpha(T - T_0)\right)$

(| | | |)

5 1 x10 ∓ 5% (gold)







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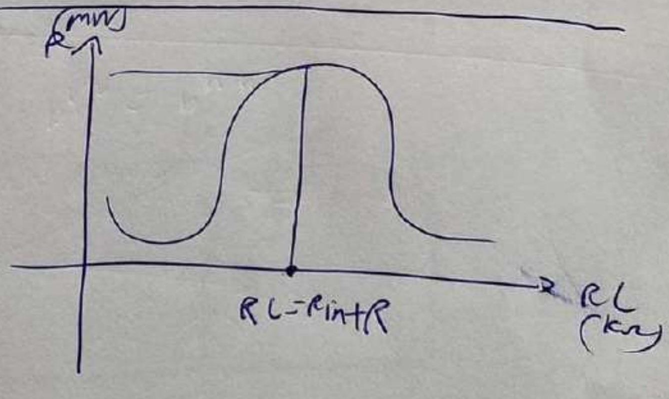
exp 2

$I = \frac{\varepsilon}{r_{in} + R_L}$

$V = I R_L$

$= \frac{\varepsilon}{(r_{in} + R_L)} R_L$



$R_L \geq r_{in}$

$V_{RL} = \varepsilon$

$P = I^2 R$

$= \left(\frac{\varepsilon}{r_{in} + R_L}\right)^2 R$

$\frac{dP}{dR_L} = 0 \quad R_L = r_{in}$