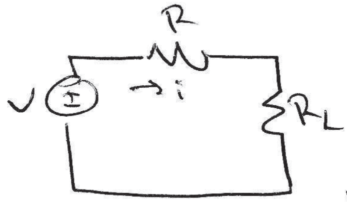
Lec 28



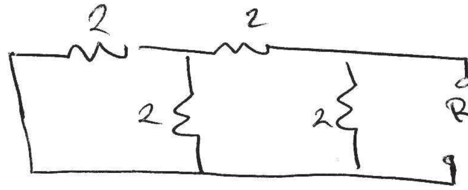
For circuit




max power delivered to load if $R = R_L$

↖ like Thevenin equiv circuit:

#106. For $R_{TH}$:

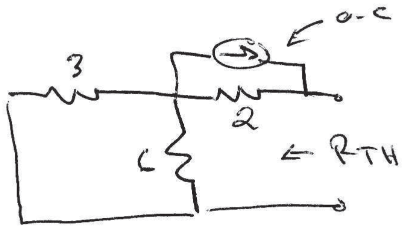



$R_{TH} = [2 \| 2 + 2] \| 2$

$= 1.2 \, k\Omega$

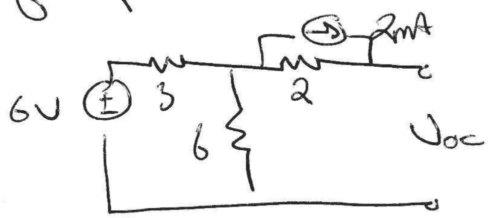
and $R_L = R_{TH}$

108. For $R_{TH}$

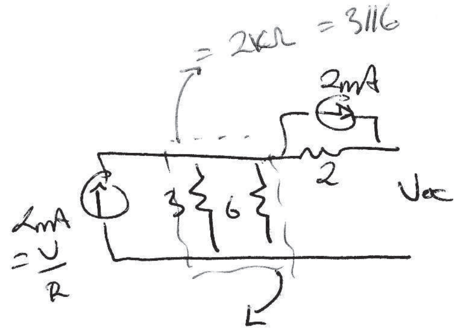


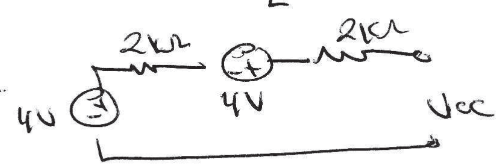

$\leftarrow R_{TH} = (3 \| 6) + 2 = 4 \, k\Omega$

To find power, need $V_{oc}$:

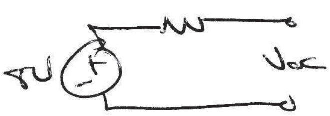



⟹



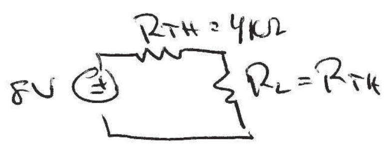




←

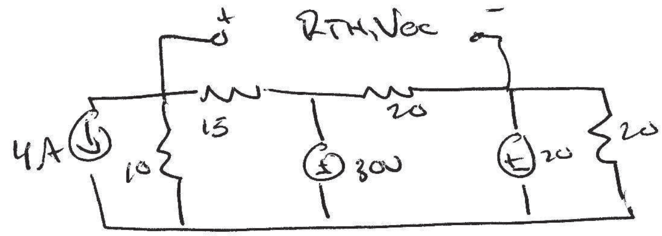


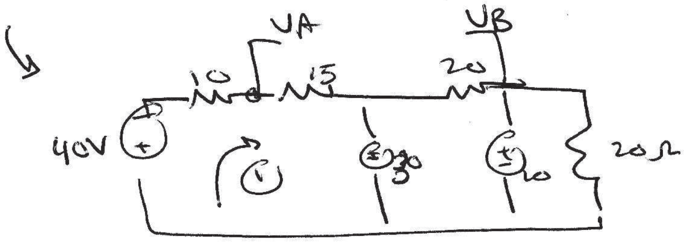

∴ $V_{oc} = 8V$ and power is $P = I^2 R$

$= \left(\frac{8}{8 \, k\Omega}\right)^2 (4 \, k\Omega) = \underline{4 \, mW}$



III.




KVL ①

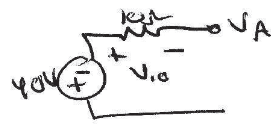
$+40 + 25i_1 + 30 = 0$

$i_1 = -2.8\ A$

$V_{10\Omega} = -28\ V$

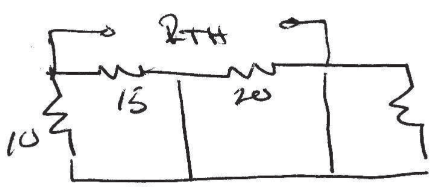
$\therefore V_A = -40 - (-28) = -12\ V$

i.e.



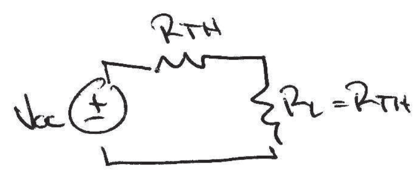

and $V_B = +20\ V$ (by inspection)

$\therefore V_{oc} = V_A - V_B = \underline{-32\ V}$




$R_{TH} = 10 \parallel 15 = 6\Omega$

∴, get

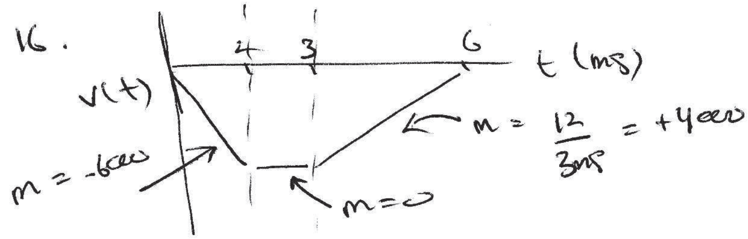



$P_L = I^2R = \left(\frac{-32}{12}\right)^2 \cdot 6 = \underline{42.7\ W}$

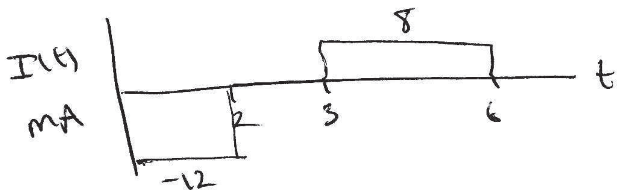
# Lec 29



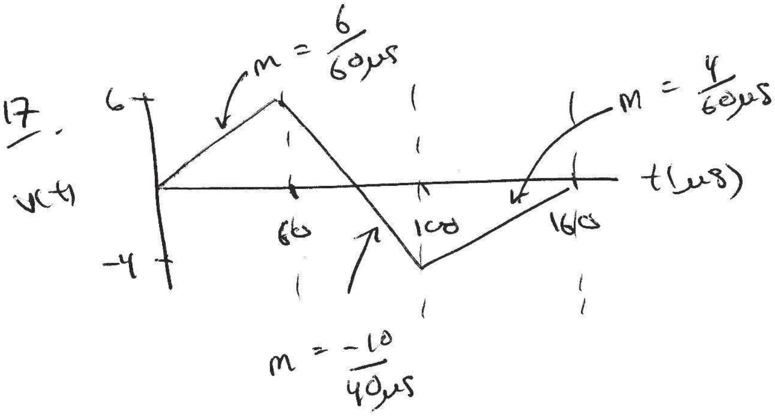
16.



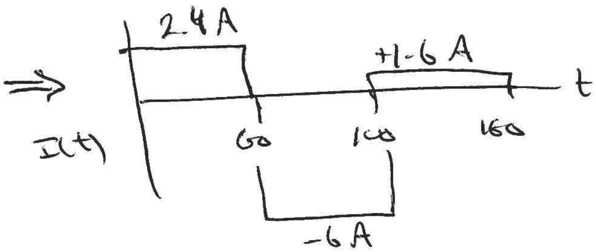

$I_c = C \cdot \frac{\partial V}{\partial t}$ , $C = 2\mu F$




17.

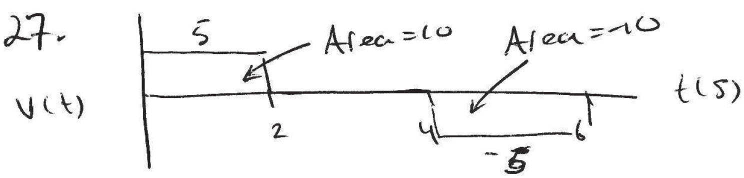



$\Rightarrow$



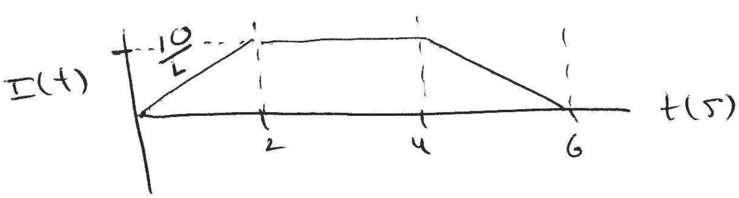

$C = 24\mu F$

27.




$V_L = L \frac{\partial i}{\partial t}$

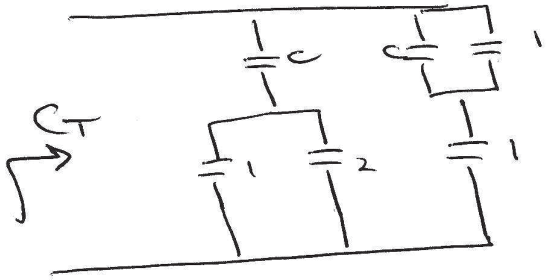
$I = \frac{1}{L} \int V(t)\, dt$




check: $m = \frac{10}{2 \cdot L}$ , $m = 0$ , $m = \frac{-10}{2L}$

$\therefore$ $V = 5$ , $V = 0$ , $V = -5$

65.



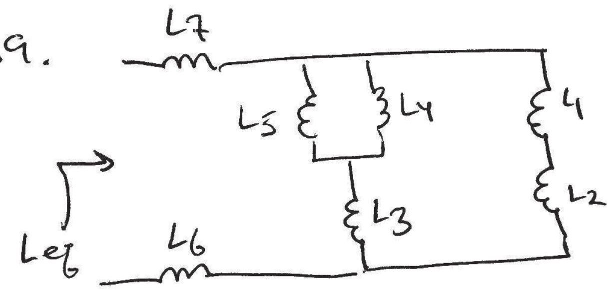

$$C_T = \left(\frac{1}{c+1} + \frac{1}{1}\right)^{-1} + \left(\frac{1}{c} + \frac{1}{3}\right)^{-1}$$

$$1 = \frac{c+1}{c+2} + \frac{3c}{c+3}$$

$$= \frac{4c^2 + 10c + 3}{c^2 + 5c + 6}$$

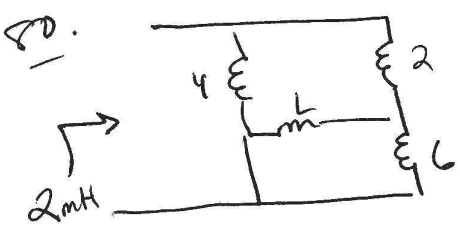
$$\therefore \quad c = 0.468\,\mu F$$

69.

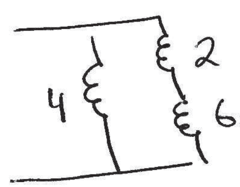



$$L_{eq} = L_7 + \left[\left(\frac{1}{L_1+L_2}\right) + \frac{1}{L_3 + \left(\frac{1}{L_5} + \frac{1}{L_4}\right)^{-1}}\right]^{-1} + L_6$$

80.




$L_{eq} \Longleftrightarrow$




$$6 \| L = \left(\frac{1}{L} + \frac{1}{6}\right)^{-1} = \left(\frac{6+6}{6L}\right)^{-1}$$

$$L_{eq} = 2mH = \left(\frac{1}{4} + \frac{1}{2 + \frac{6L}{6+L}}\right)^{-1} = \frac{48 + 32L}{36 + 12L}$$

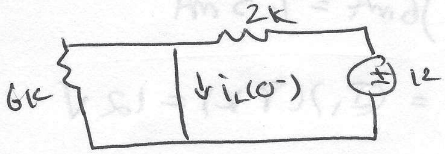
$$\underline{\underline{L = 3\,mH}}$$

Lec 30

Chap 7.

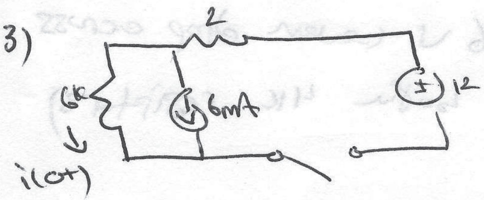
#16 1) $i(t) = K_1 + K_2 e^{-t/\tau}$

2)



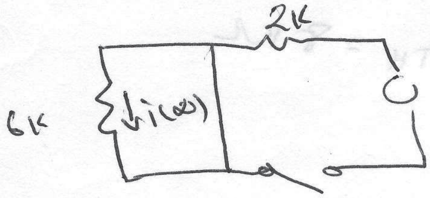

$i_L(0^-) = \frac{12}{2K} = 6mA$

3)



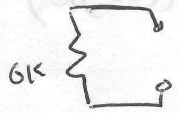

$i(0^+) = -6mA$

4)




$i(\infty) = 0$

5) $R_{TH}$




$R_{TH} = 6K\Omega$ and $\tau = \frac{L}{R_{TH}} = \frac{2H}{6K\Omega}$

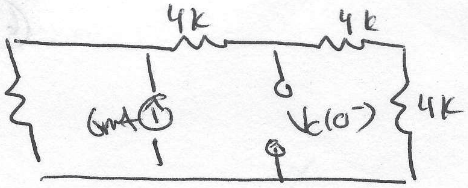
$i(0^+) = K_1 + K_2$

$i(\infty) = K_1 = 0 \rightarrow K_2 = -6\ mA$

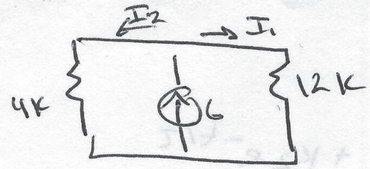
$\therefore i(t) = (-6mA)e^{-t/\tau}$

17.

2)



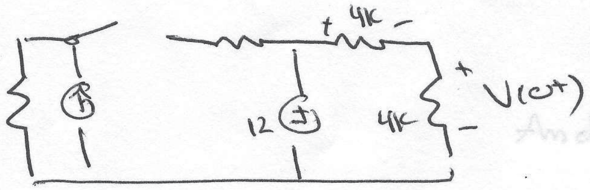

$\Rightarrow$




$I_1 = \left(\frac{4}{16}\right) 6mA = 1.5\ mA$

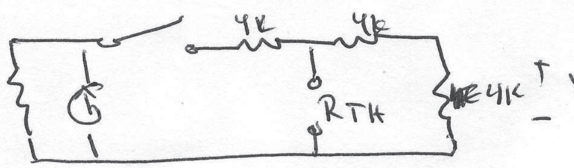
$\therefore V_c(0^-) = (I_1)(8K) = 12\ V$

3)




$V(0^+) = 6\ V$ (even drop across both 4K resistors)

4)




$V(\infty) = 0$, $R_{TH} = 8K\Omega$

$V(0^+) = K_1 + K_2$

$V(\infty) = K_1 = 0 \rightarrow K_2 = 6V$

$\tau = RC = (8K)(100\mu)$

and $V(t) = 6e^{-t/\tau}$