UNIVERSITY OF CALIFORNIA AT BERKELEY EECS Department

EECS 100, Spring 2009

Homework #4

P 3.25 (a) $C_{eq} = 3 + \left(\frac{1}{10} + \frac{1}{15}\right)^{-1} + \left(\frac{1}{12} + \frac{1}{(5+1)}\right)^{-1} = 13\mu F$

(b) $C_{eq} = \left(\frac{1}{10+8} + \frac{1}{4+5}\right)^{-1} = 6\mu F$

P.3.28

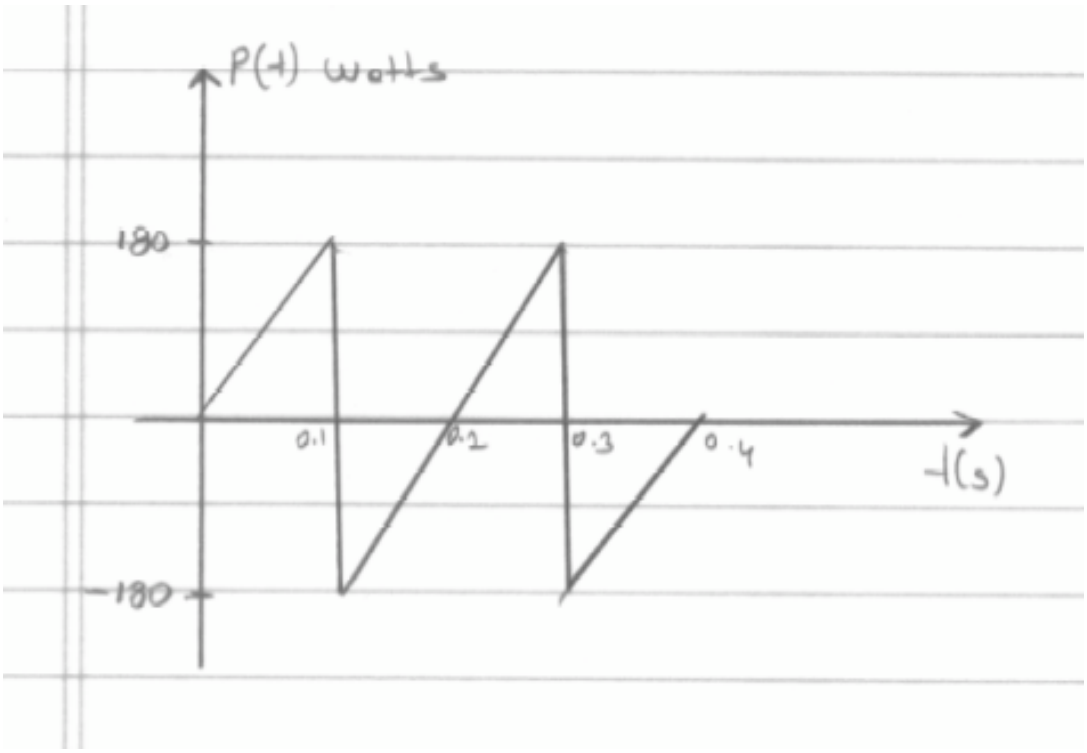
I=C(dv/dt) q=CV C_{eq}=1/C1+1/C2=6uF

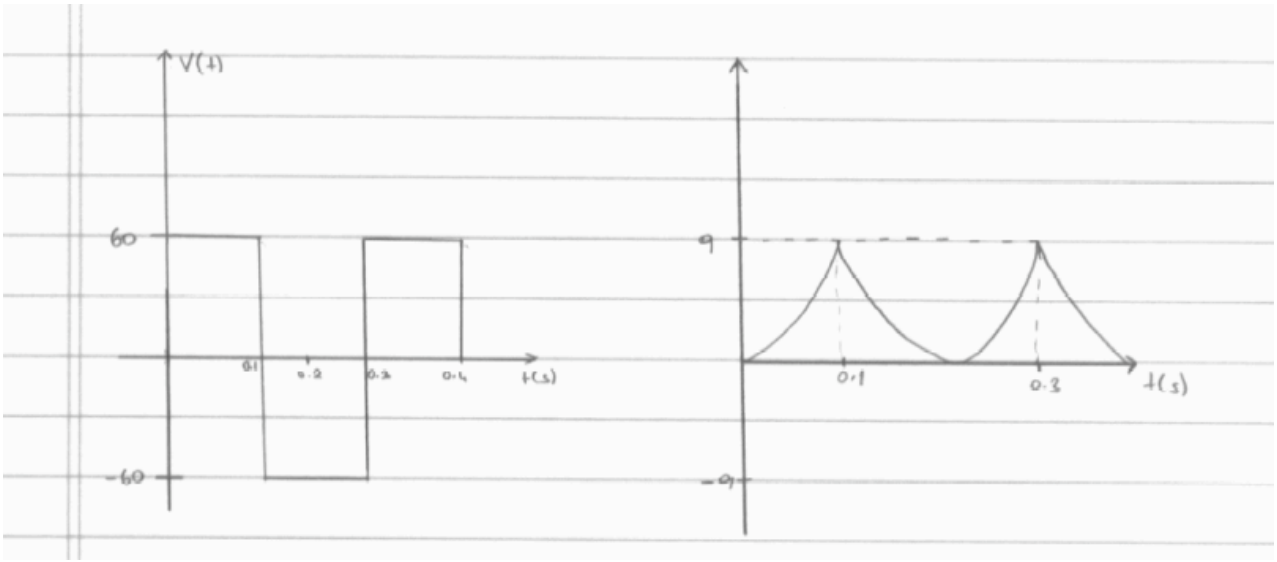
Q=CV= $C_{eq.}$ .V=60uC

V_1 =Q/ C_1 =4V V_2=Q/ C_2 =6V

P.3.45

$V_t = L(di/dt)$ $w(t)=1/2Li(t)^2$ $p(t)=i(t)v(t)$





3.62

a) L1=1H+2H=3H

L2=1/3+1/6=2H Lequ=2H+1H=3H

b) L1=1/20+1/5=4H

L2=1/18+1/9=6H L1+L2=10H

Lfinal=1/10+1/15=6

3.68

$c(t)=0.1\cos(10^5 t)$ $V_L = L(di/dt) = -100\sin(10^5 t)$

$V_R = i(t)Rs = 0.1\cos(10^5 t)$

$V_L + V_R = 0.1\cos(10^5 t) - 100\sin(10^5 t)$

***%1 accuracy Ignore Resistance.

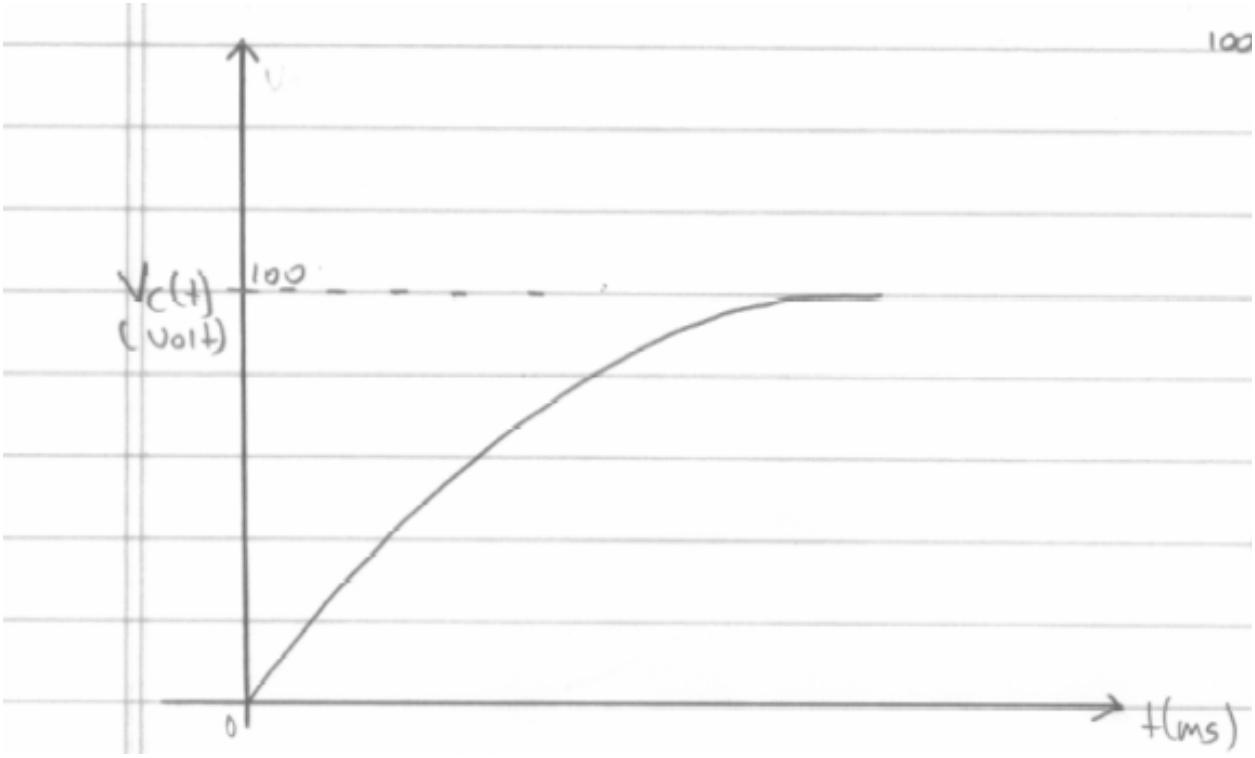
b) $i(t)=0.1\cos(10t)$ $V_R = i(t)Rs = 0.1\cos(10t)$

$V_L = L(di/dt) = -0.01\sin(10t)$

*** Resistance cannot be ignored

4.3

$Vc(t)=Vs-Vs.e^{-t/Rc}=100-100\ e^{-1000t}$ Rc=1/1000=1ms



4.7

a) $Vc(t)=Vi.e^{-t/Rc}=50\ e^{-50t}$ $Vc(t)=50\ e^{-50t}$ $t>0$

$Vc(t)=50$ $t<0$

$Vr(t)=Vc(t)$ $t>0$ $Vc(t)=0$ $t<0$

$P(t)=i(t)V(t)=V(t)^2/R=2500\ e^{-100t}$ MW

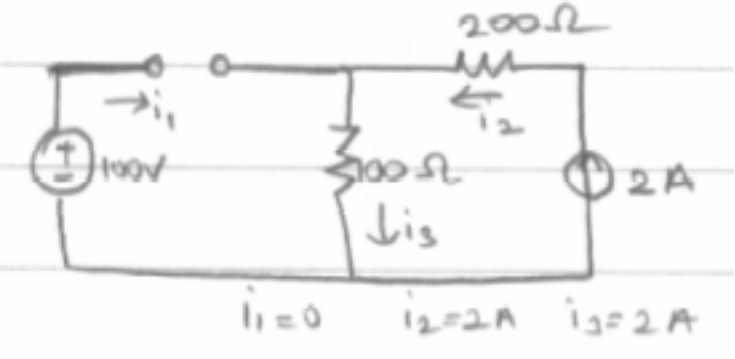
$Wr=\int P_R\,dt=25MJ$

$Wc=1/2CV^2=1/2(0.02.10^{-6}.50^2)=25MJ$

4.20

i1=0 i2=2A i3=2A

Equavlent circuit for Steady-state:



4.27

iR=2mA $V_R=L_R$ R=20V $V_c= V_R$ +15V=35V

4.33

i_L (t=0)=0

i_L (t)=K1+K2$e^{-Rt/L}$ V(t)=di(t)/dt

At t=0; $i_L(t)=K1+K2=0$

At t=∞; $i_L(t)=K1=0.1$ $K2=-K1=-0.1$

$i_L(t)=0$ t=0
$i_L(t)=0.1-0.1e^{-E6t}$ t>0

$V_t = L(di/dt)$

V(t)=0 t<0
$V(t)=100\ e^{-E6t}$ t>0