Athirah Fanzi

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1 a)
$$KVL = Ri + \frac{1}{C} \int i dt = Vs$$

$$RI(s) + \frac{1}{C} \left[\frac{I(s)}{s} + \frac{CV_0}{s} \right] = \frac{Vs}{s}$$

$$I(s) \left[R + \frac{1}{Cs} \right] = \frac{Vs - V_0}{s}$$

$$I(s) = \frac{Vs - V_0}{s} \cdot \left[\frac{1}{s} \right] = \frac{Vs - V_0}{s} \cdot \left[\frac{1}{s} \cdot \left[\frac{1}{s} \right] = \frac{Vs - V_0}{s} \cdot \left[\frac{1}{s} \cdot \left[\frac{1}{s} \right] = \frac{Vs - V_0}{s} \cdot \left[\frac{$$

$$V_{c}(t) = \frac{1}{c} \int_{0}^{t} i dt$$

= $\frac{V_{s} - V_{0}}{\kappa c} \int_{0}^{t} e^{-\tau/\kappa c} dt$
= $(V_{s} - V_{0}) (1 - e^{-\tau/\kappa c}),$

b)
$$kVl = R_i + \frac{1}{C} \int idt = Vs$$

$$RI(s) + \frac{1}{C} \left[\frac{I(s)}{s} + \frac{C(-V_0)}{s} \right] = \frac{Vs}{s}$$

$$I(s) \left[R + \frac{1}{Cs} \right] = \frac{Vs + V_0}{s}$$

$$I(s) = \frac{Vs + V_0}{R} \cdot \frac{1}{s + \frac{1}{C}} / RC$$

$$i(t) = \frac{Vs + V_0}{R} \cdot \frac{1}{s + \frac{1}{C}} / RC$$

$$V(t) = \frac{1}{C} \int_0^t i dt$$

$$= \frac{V \cdot t \cdot V_0}{RC} \int_0^t e^{-\frac{t}{RC}} dt$$

$$= (V \cdot t \cdot V_0) \left(1 - e^{-\frac{t}{RC}}\right)$$

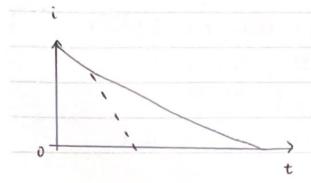


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Vc (F) = Vs (Fully Charged)



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2.
$$L \frac{di}{dt} + \frac{1}{c} \int i dt = Vs$$

Applying Laplace Transform =
$$L [SI(s) - i(e)] + \frac{1}{c} [\frac{I(s)}{s} + \frac{((-Vo))}{s}]$$

$$= \frac{Vs}{s} ; i(o) = 0$$

$$I(s) [sL + \frac{i}{sC}] = \frac{Vs + Vo}{s}$$

$$i(t) = (Vs + Vo) [\frac{c}{L} sin w_o t]$$

$$V_{c}(t) = \frac{1}{c} \left(V_{s}(-V_{o}) \right) \int_{-L}^{c} \int_{0}^{t} \sin w_{o}t dt - V_{o}$$

$$= \left(V_{s}+V_{o} \right) \left(1 - \cos w_{o}t \right) - V_{o}$$

$$to = \frac{H}{W_0} ; W_0 = \frac{1}{\sqrt{LC}}$$

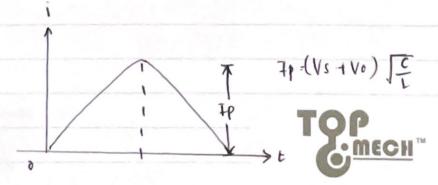
$$= H \sqrt{LC}$$

$$= H \sqrt{0.2 \times 10^{-3} (10 \times 10^{-6})}$$

$$= 140.496 H I$$

$$= 140.496 H I$$

$$Vc = 2[Vs - (-Vo)] + (-Vo)$$
 $Vo = -VL - Vc + Vs$
= $2(230 + 50) - 50$ = $0 - 570 + 230$
= $510 V$ = $-280 V$



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