به نام خدا

مدرس : غفارپور

$$f(t) \longrightarrow F(s) = \int_{\boxed{0^-}}^{\infty} f(t)\, e^{-st}\, dt$$

$$u(t) \longrightarrow \int_{0}^{\infty} 1 \times e^{-st}\, dt = \frac{1}{s}$$

$$e^{-at} u(t) \longrightarrow \int_{0}^{\infty} e^{-at} e^{-st}\, dt = \frac{1}{s+a}$$

$$\int_{0^-}^{\infty} \delta(t)\, e^{-st}\, dt$$

$$\int_{0^-}^{\infty} \delta(t)\, dt = 1$$

$$kf(t) \longleftrightarrow kF(s)$$

$$f(t) = \int_0^\infty e^{st} \times F(s)\, ds$$

$$e^{-at} u(t) \rightarrow \frac{1}{s+a}$$

$$f(t) \underline{\pm}\, g(t) \longrightarrow F(s) \underline{\pm}\, G(s)$$

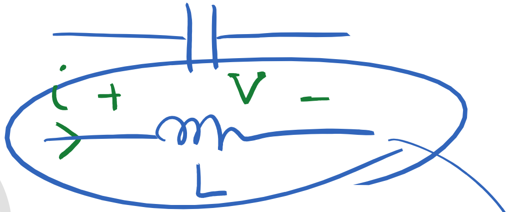
$$۳u(t) + ۴\delta(t) \longrightarrow \frac{۳}{s} + ۴$$

$$\boxed{\frac{۱}{s+۲}} + \frac{۴}{s} \longrightarrow ۴u(t) + e^{-۲t}u(t)$$

$$f(t) \longrightarrow F(s)$$

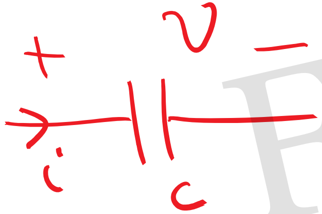
$$f'(t) \longrightarrow sF(s) - f(0^-)$$

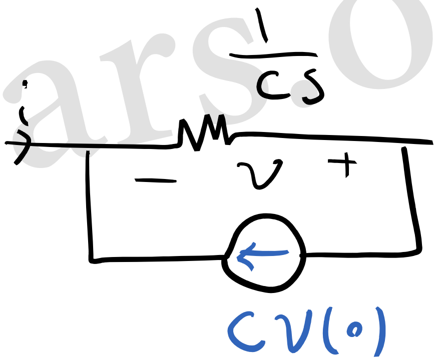
$$f''(t) \longrightarrow s^2F(s) - sf(0) - f'(0)$$



$$v = Li' \Longrightarrow V = L(\underbrace{sI}_{V} - i(0)) = \underbrace{Ls}\,i - \underbrace{Li(0)}$$

$i = cv'$





$$f(t-a) \longrightarrow e^{-as}F(s)$$

$$e^{at}f(t) \longrightarrow F(s-a)$$

$$f(t)\cdot g(t) \longrightarrow F(s) * G(s)$$

$$f(0) = \lim_{s\to\infty} sF(s)$$

$$f(\infty) = \lim_{s\to 0} sF(s)$$

$$\delta \longrightarrow 1$$

$$\delta' \longrightarrow s$$

$$u(t) \longrightarrow \frac{1}{s}$$

$$t\,u(t) = r(t) \longrightarrow \frac{1}{s^2}$$

$$e^{-at}\,u(t) \longrightarrow \frac{1}{s+a}$$

$$\sin at \longrightarrow \frac{a}{s^2+a^2}$$

$$\underline{\cos at} \longrightarrow \frac{s}{s^2+a^2}$$

$$\sin ۲t \longrightarrow \boxed{\frac{۲}{s^۲+۴}}$$

$$e^{at} f(t) \longrightarrow F(\underline{s-a})$$

$$\underline{e^{-۴t}\sin ۳t} \longrightarrow \frac{۳}{(s+۴)^۲+۹} = \frac{۳}{s^۲+۸s+۲۵}$$

$$F(s) = \frac{\boxed{۴}}{s+۳} \longrightarrow ۴e^{-۳t}u(t)$$

$$e^{-at}u(t) \longrightarrow \frac{1}{s+a}$$

$$F(s)\ \frac{۲s}{\underbrace{(s+1)(s-۴)}} = \frac{A}{s+1} + \frac{B}{s-۴}$$

$$A = F(s)\,(s+1)\Big|_{s=-1} = \frac{-۲}{-۵} = \frac{۲}{۵}$$

$$\boxed{B = \frac{۸}{۵}}$$

$$\left(\frac{۲}{۵}e^{-t} + \frac{۸}{۵}e^{۴t}\right)u(t)$$

$$\frac{s}{\boxed{(s+۱)^{۲}}(s+۲)} = \frac{A}{\underset{\checkmark}{\underline{(s+۱)^{۲}}}} + \frac{B}{\underline{(s+۱)}} + \frac{C}{\underset{\checkmark}{\underline{s+۲}}}$$

$A = -۱ \;,\; C = -۲$

$$B = \left(\frac{s}{s+۲}\right)'\Bigg|_{s=-۱} = \frac{s+۲-s}{(s+۲)^{۲}}\Bigg|_{s=-۱} = ۲$$

$$\underbrace{\frac{۲s+۱}{s+۱}} = \frac{۲(s+۱)-۱}{s+۱} = \underset{\downarrow}{۲} - \underbrace{\frac{۱}{s+۱}}$$

$$۲\delta(t) - e^{-t}u(t)$$

$$\boxed{\frac{s^۲+۵s+۱۶}{s+۲}} = \frac{\boxed{(s^۲+۴s+۴)}+s+۱۲}{s+۲} = s+۲+\frac{s+۲+۱۰}{s+۲}$$

$$= \boxed{s}+\boxed{۲+۱}+\boxed{\frac{۱۰}{s+۲}}$$

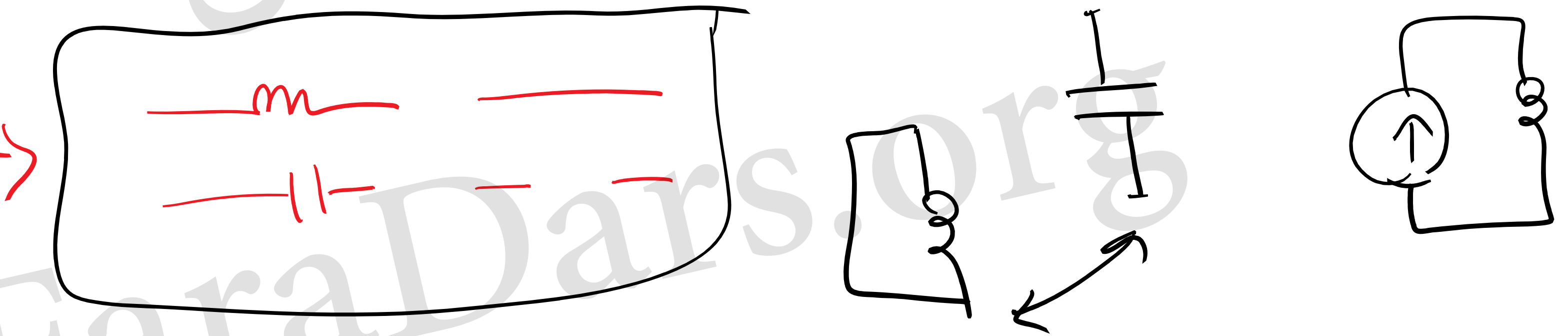
مراحل:

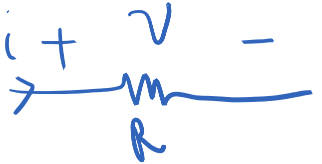
① شرایط اولیه: $t > 0$ $v_c(0^-) , i_L(0^-)$

$t = 0^-$

صفر

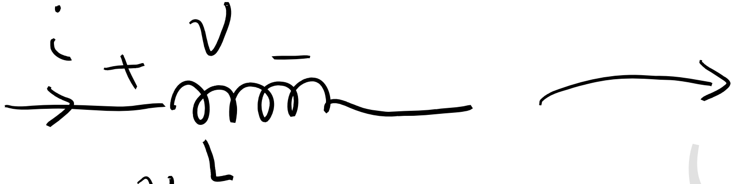
بی اثر

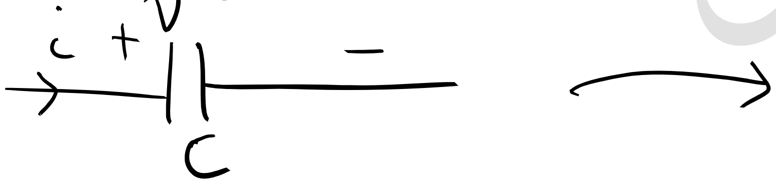


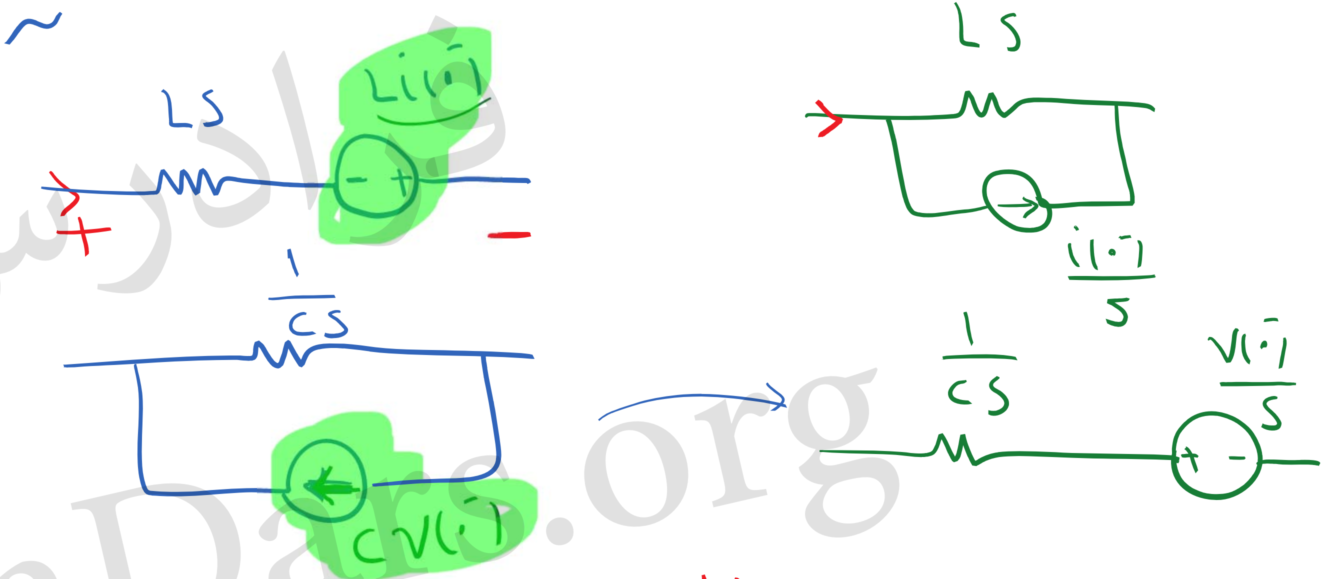


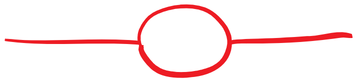
$v=Ri$

خروس





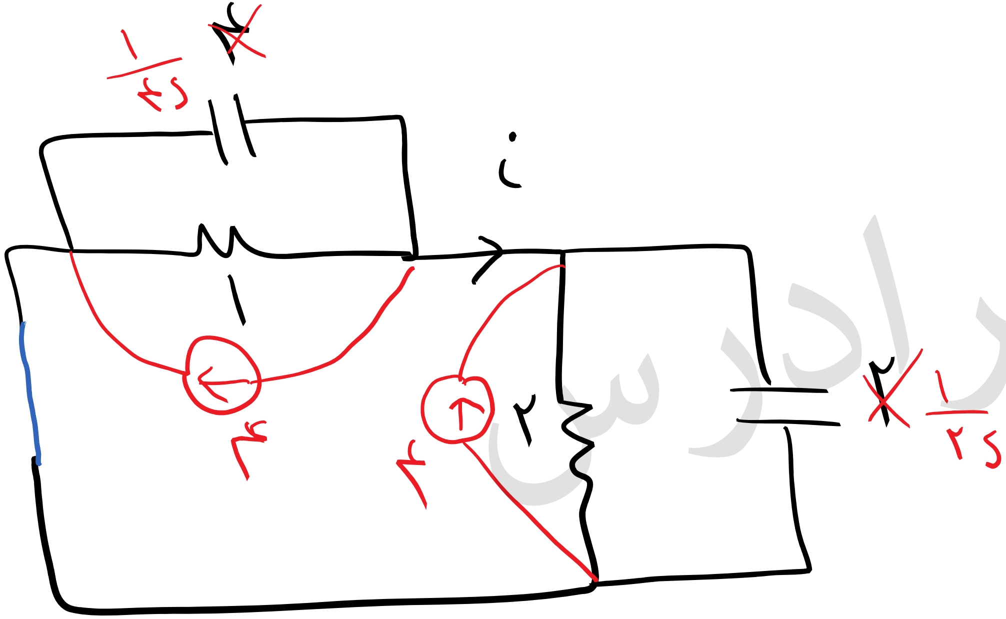


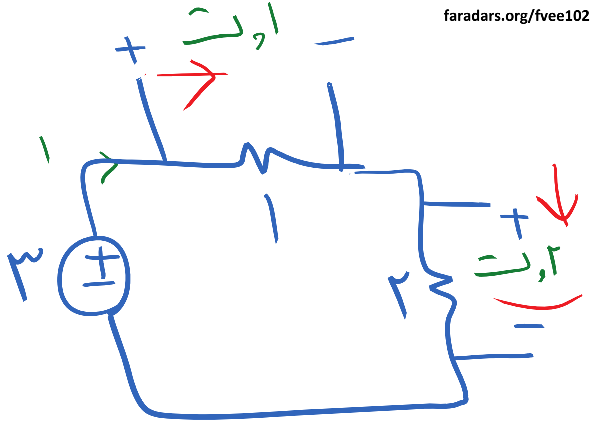


$\int_{0}^{\infty}$

$\delta = \delta u(-t) + \delta u(t)$

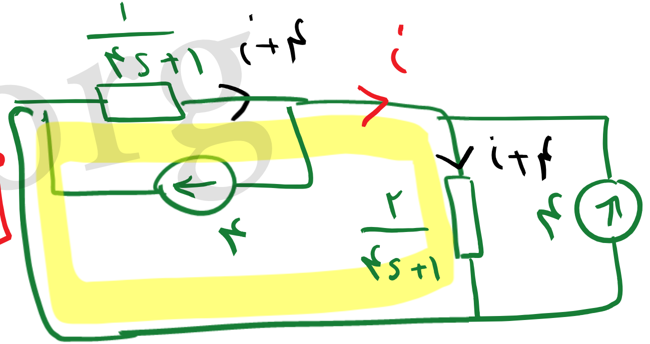
$t > ۰$

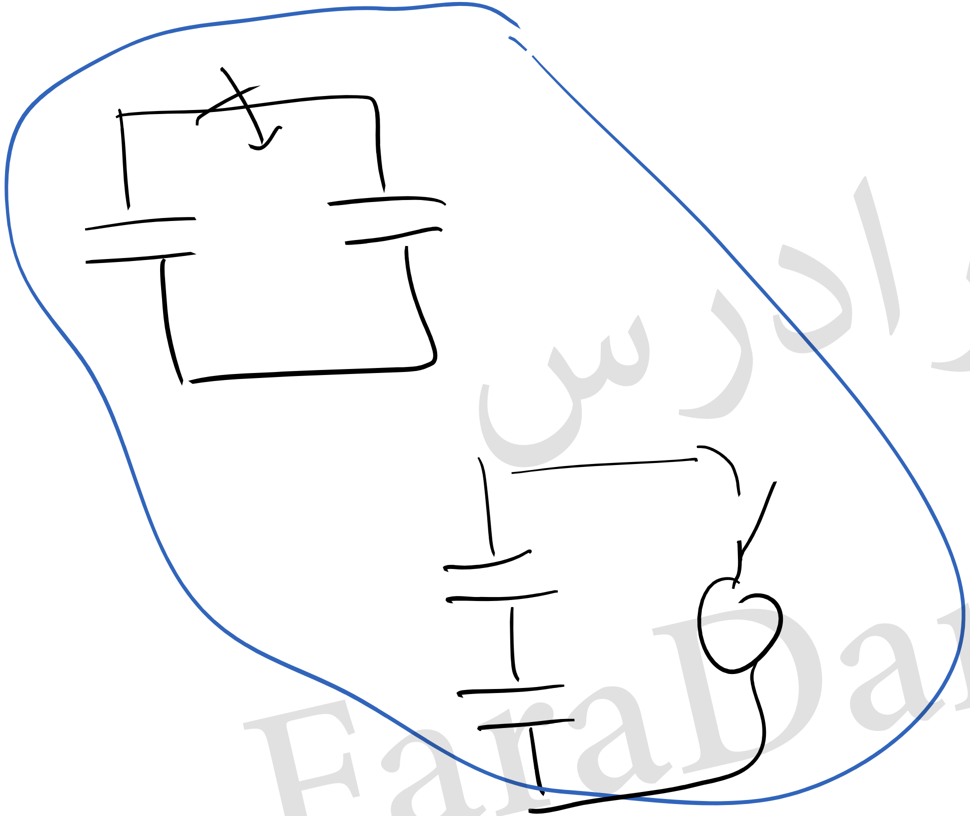




$$\frac{۳}{۴s+۱}(i+۴) = ۰ \Rightarrow i = -۴$$

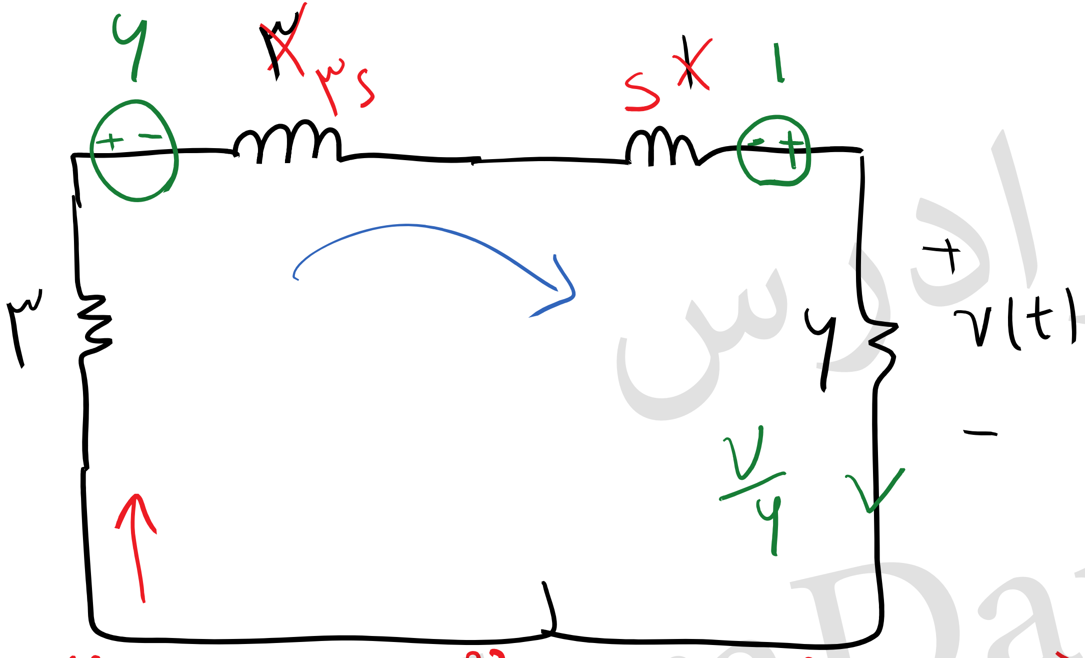
$$\boxed{i(t) = -۴\delta(t)}$$

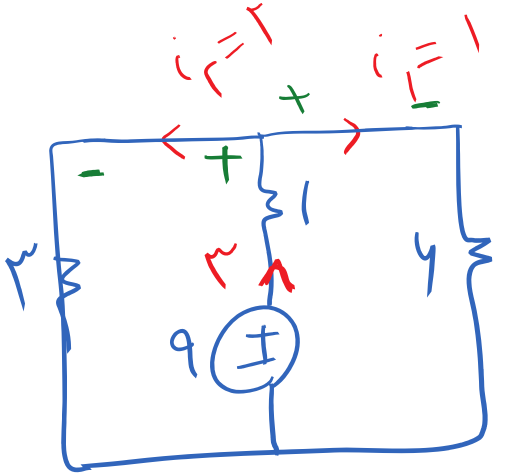




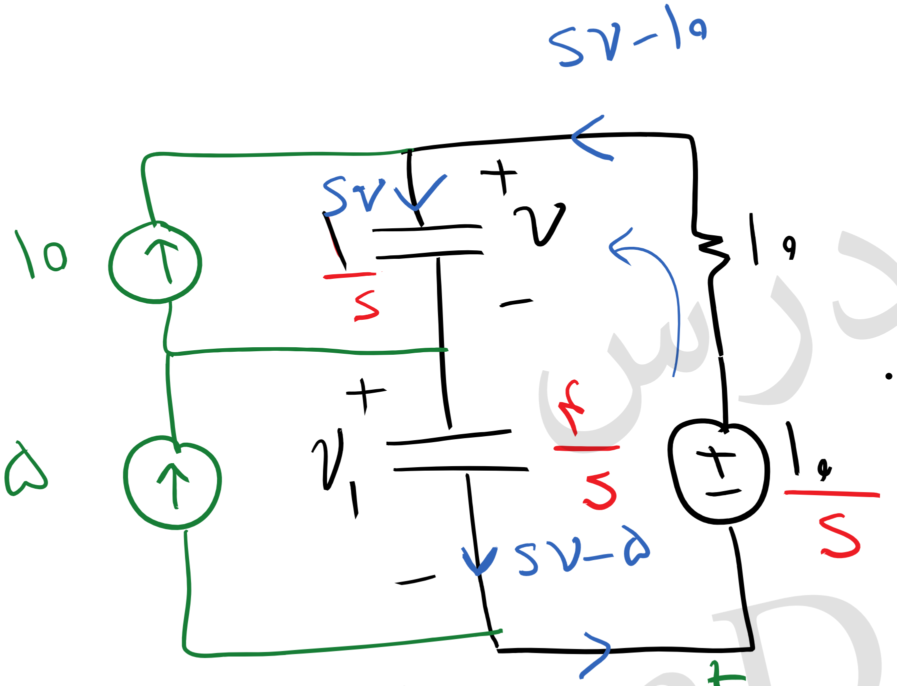
$t \geq 0$ ورودی ضربه

$t = 0^+$





$$\frac{v}{۲}+۶+۴s\,\frac{v}{۶}-۱+v=۰ \Rightarrow \boxed{v=\frac{-۷٫۵}{s+\frac{۹}{۴}}} \rightarrow -۷٫۵\,e^{-\frac{۹}{۴}t}\,u(t)$$



$$-\frac{۱۰}{s} + ۱۰(sV-۱۰) + V + \frac{۲}{s}(sV-۵) = ۰$$

$$-\frac{۳۰}{s} + ۱۰sV - ۱۰۰ + ۵V = ۰$$

$$-۳ + s^۲V - ۱۰s + \frac{s}{۲}V = ۰$$

$$s(s+\frac{۱}{۲})V = ۱۰s + ۳$$

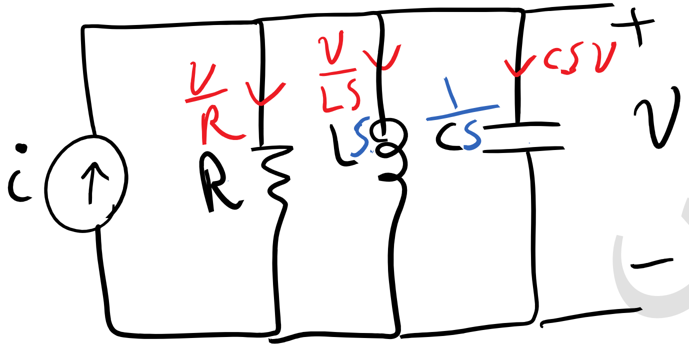
$$V = \frac{۱۰s+۳}{s(s+\frac{۱}{۲})} = \frac{۶}{s} + \frac{۴}{s+\frac{۱}{۲}}$$

$۴e^{-\frac{t}{۲}}u(t)$

$۶u(t)$

$v = i x$

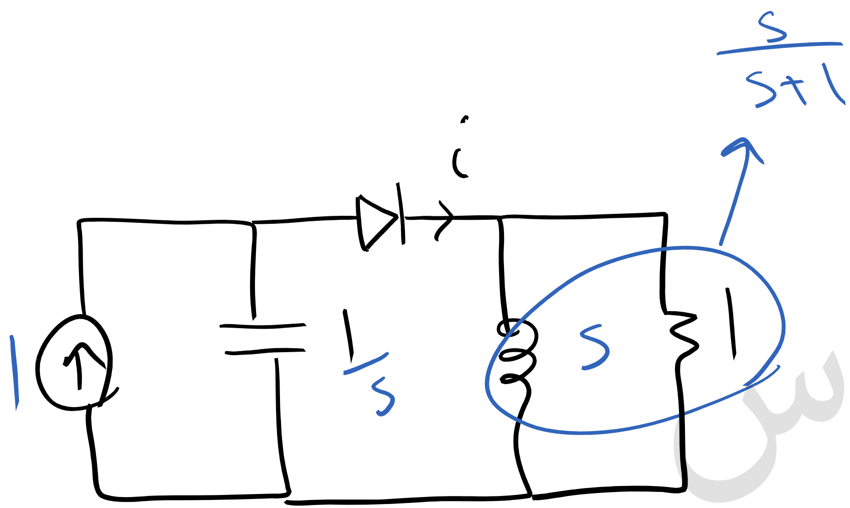
$i = v\left(\frac{1}{R} + \frac{1}{LS} + CS\right)$



$\frac{S}{C} i = v\left(\frac{S}{RC} + \frac{1}{LC} + S^2\right)$

$v\left(S^2 + \frac{S}{RC} + \frac{1}{LC}\right) = \frac{1}{C} S i$

$$\boxed{v'' + \frac{1}{RC} v' + \frac{1}{LC} v = \frac{i'}{C}}$$



$$i=\frac{\frac{1}{s}}{\frac{1}{s}+\frac{s}{s+1}}=\frac{s+1}{s^۲+s+1}=\frac{}{\underbrace{s^۲+s+\frac{1}{۴}}+\frac{۳}{۴}}$$

$$=\frac{(s+\frac{1}{۲})+\frac{1}{۲}}{(s+\frac{1}{۲})^۲+\frac{۳}{۴}}=\underbrace{\frac{s+\frac{1}{۲}}{(s+\frac{1}{۲})^۲+\frac{۳}{۴}}}+\frac{\frac{1}{۲}}{(s+\frac{1}{۲})^۲+\frac{۳}{۴}}$$

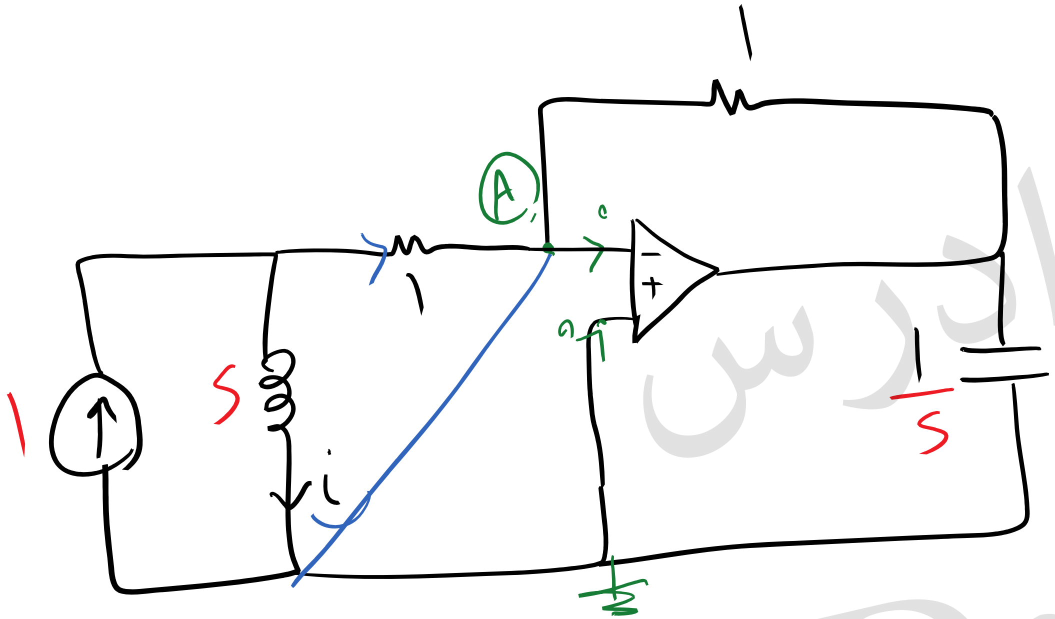
$$e^{-\frac{t}{۲}}\cos\frac{\sqrt{۳}}{۲}t+\frac{e^{-\frac{t}{۲}}}{\sqrt{۳}}\sin\frac{\sqrt{۳}}{۲}t$$

$$e^{-bt}f(t)\longrightarrow F(s+b)$$

$$e^{-b}\cos at\longrightarrow\frac{s+b}{(s+b)^۲+a^۲}$$

$$\cos\frac{\sqrt{۳}}{۲}t+\frac{1}{\sqrt{۳}}\sin\frac{\sqrt{۳}}{۲}t=۰\Rightarrow tg\,\underbrace{\frac{\sqrt{۳}}{۲}t}_{\alpha=\frac{۲\pi}{۳}}=-\sqrt{۳}\longrightarrow\boxed{t=\frac{۴\pi}{۳\sqrt{۳}}}$$

پاسخ حالت صفر :



$$i = \frac{1}{1+s}$$

$$i(t) = e^{-t}\,u(t)$$

$$f(t) \times g(t) \longrightarrow F(s) * G(s)$$

ضربه ← در t

معادله دیفرانسیل

این اسلاید ها بر مبنای نکات مطرح شده در فرادرس

«آموزش مدارهای الکتریکی ۲»

تهیه شده است.

برای کسب اطلاعات بیشتر در مورد این آموزش به لینک زیر مراجعه نمایید

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