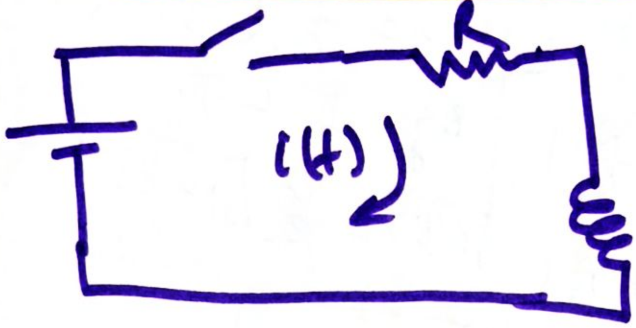
then

$$I(s) = \frac{V}{R}\left[u_a(t)\, e^{-\frac{1}{RC}(t-a)} - u_b(t)\, e^{-\frac{1}{RC}(t-b)}\right]$$

Analysis of R-L circuit using L. T.



Switch is closed at $t=0$.

at $t \geq 0$.

$$V - Ri - L\frac{di}{dt} = 0.$$

$$V\,u(t) = Ri - L\frac{di}{dt}$$

After Apply L.T.

$$\frac{V}{s} = R\,I(s) + L\frac{di}{dt}$$

$$\mathcal{L}\,\frac{d}{dt} i(t) = sI(s) - i(0^-)$$

As no current passing through inductor before so $i(0^-) = 0$.

$$\frac{V}{s} = R\,I(s) + L(s)\,I(s)$$

$$\frac{V}{s} = R\,I(s) + L(s)\,I(s)$$

$$= (R + Ls)\; I(s)$$

$$I_s = \frac{V}{s(R+Ls)}$$

$$I(s) = \frac{V}{\cancel{s} \, Ls\left(\frac{R}{L}+s\right)}$$

$$= \frac{V}{L}\left[\frac{1}{s\left(s+\frac{R}{L}\right)}\right]$$

$$\frac{V/L}{s\left(s+\frac{R}{L}\right)} = \frac{A}{s} + \frac{B}{\left(s+\frac{R}{L}\right)}$$

$$\frac{V}{L} = A\left(s+\frac{R}{L}\right) + Bs.$$

By using Partial fraction

$$\frac{V/L}{s\left(s+\frac{R}{L}\right)} = \frac{A}{s} + \frac{B}{\left(s+\frac{R}{L}\right)}$$

$$\frac{V}{L} = A\left(s+\frac{R}{L}\right) + Bs$$

$$= As + A\frac{R}{L} + Bs.$$

$$\frac{V}{L} = (A+B)s. + \frac{AR}{L}.$$

Here there is no s on LHS.

so $(A+B)s = 0.$

$A+B=0.$ —(1)

& $\frac{V}{L} = \frac{AR}{L}$

so $A = \frac{V}{R}$

so $B = -\frac{V}{R}.$

so

$$\frac{V/L}{s\left(s+\frac{R}{L}\right)} = \left[\frac{V/R}{s} - \frac{V/R}{s+(R/L)}\right]$$

or $I(s) = \frac{V/L}{s\left(s+\frac{R}{L}\right)} = \left[\frac{V/R}{s} - \frac{V/R}{s+R/L}\right]$

$$I(s) = \frac{V}{R}\left(\frac{1}{s} - \frac{1}{s+\frac{R}{L}}\right)$$

By I.L.T.

$$\boxed{i(t) = \frac{V}{R}\left[1-e^{-R/L\,t}\right]}$$