Tutorial-5

(Q1) Find out the L.T of each of the time domain functions.

(a) $t\cos t\,u(t)$ (b) $t\sin t\,u(t)$ (c) $e^{-t}t\cos t\,u(t)$ (d) $e^{-t}t\sin t\,u(t)$

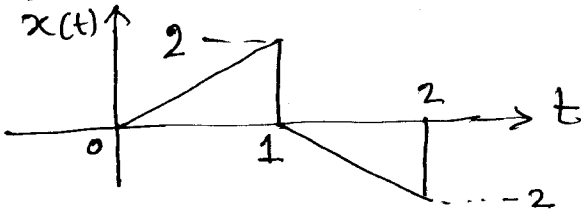
(Q2) The L.T of the time domain function $x(t)$ shown in the following figure has the form:

$$X(s) = X_1(s) + X_2(s)e^{-s} + X_3(s)\,e^{-2s}$$

where $X_1(s)$, $X_2(s)$ and $X_3(s)$ are rational functions.

Obtain $X_1(s)$, $X_2(s)$ and $X_3(s)$

Fig. for Q2 →



(Q3) Find the inverse L.T of each of the following functions.

(a) $\dfrac{s^3}{(s+2)(s+3)(s+4)}$ (b) $\dfrac{3s^2+2s+2}{(s+2)^2(s+3)}$

(c) $\dfrac{(4s^2-3s+5)}{s(s^2+2s+5)}$

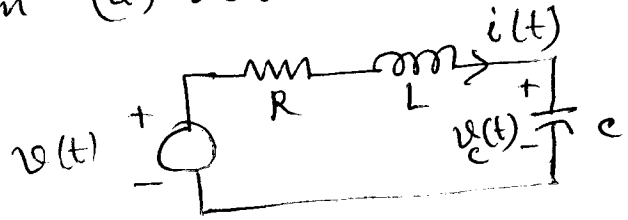
(Q4) Find the inverse L.T of the following partial-fraction expansions

(a) $$X(s) = \frac{j1}{s+1+j1} - \frac{j1}{s+1-j1} - \frac{1}{(s+1+j1)^2} - \frac{1}{(s+1-j1)^2}$$

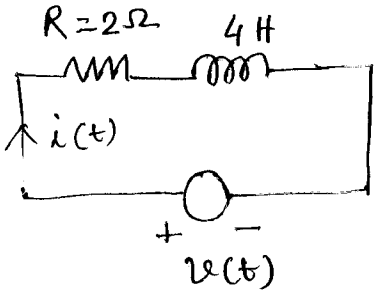
(b) $$X(s) = \frac{jb}{(s-j)^2} - \frac{jb}{(s+j)^2}$$

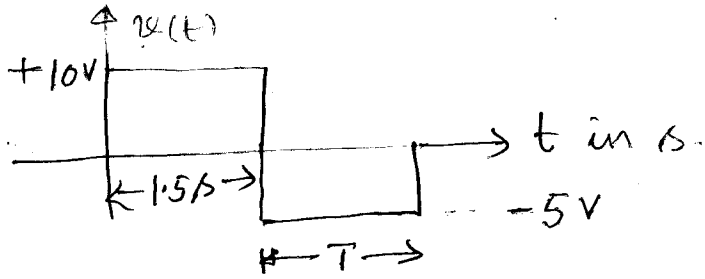
(Q5) For the R-L-C network with $R = 1\,\Omega$, $C = 1\,F$ & $L = \frac{1}{2}\,H$, Calculate $v_c(t)$ and $i(t)$ assuming all initial conditions relaxed.

when (a) $v(t) = u(t)$ volts (b) $v(t) = t\,u(t)$ volts.



(Q6)





Use L.T to find out $i(t)$ for the following cases and sketch it, ~~for the Q6~~

(a) $T = 4\,s$ & $i(0^-) = 0$

(b) $T = 1\,s$ & $i(0^-) = 0$

(c) $T = 2\,s$ & $i(0^-) = 1\,A$

(Q7) Repeat problem Q6 when $R = 0$.

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