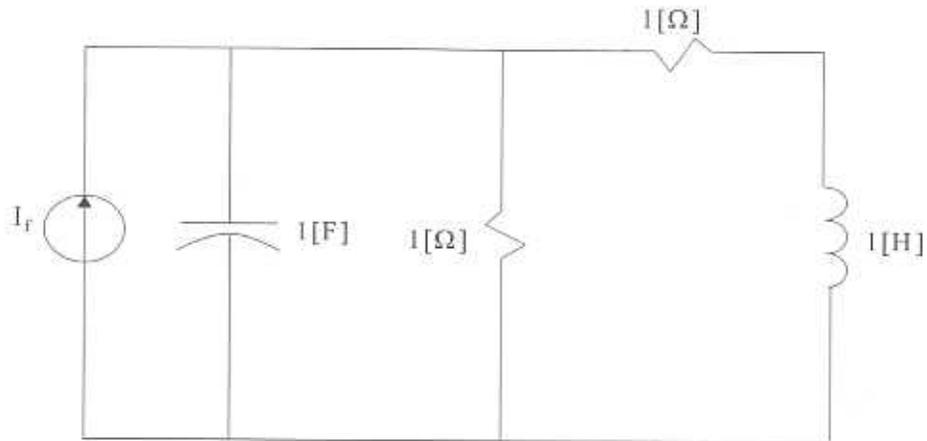
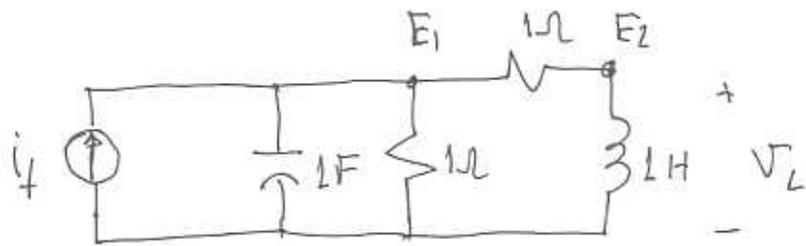


3.- Para la red lineal e invariante de la figura, determine:

- La función de red  $H(s) = \frac{V_L(s)}{I_f(s)}$
- La respuesta al impulso para  $v_L(t)$
- La respuesta en RPS para  $v_L(t)$  cuando  $i_f(t) = 10\cos(t)$  [A]



P3)



a)  $H(s) = \frac{V_L(s)}{I_f(s)}$  for nodes

$$\begin{bmatrix} s+2 & -1 \\ -1 & \frac{1}{s}+1 \end{bmatrix} \begin{bmatrix} E_1 \\ E_2 \end{bmatrix} = \begin{bmatrix} I_f \\ 0 \end{bmatrix} \quad E_2 = V_L$$

$$\Delta = (s+2)\left(\frac{1}{s}+1\right) - 1 = \cancel{1} + s + \frac{2}{s} + 2 - \cancel{1} = s + 2 + \frac{2}{s}$$

$$\Delta_2 = I_f \Rightarrow E_2 = \frac{I_f}{s + 2 + \frac{2}{s}} = \frac{s I_f}{s^2 + 2s + 2}$$

$$\Rightarrow H(s) = \frac{E_2}{I_f} = \frac{s}{s^2 + 2s + 2} //$$

b)  $h(t) = \mathcal{L}^{-1}[H(s)]$

$$\Rightarrow H(s) = \frac{s}{s^2 + 2s + 2} = \frac{A}{s + 1 - j} + \frac{B}{s + 1 + j} \quad \text{pero } B = A^*$$

$$A = \frac{-1 + j}{-1 + j + 1 + j} = \frac{-1 + j}{2j} = 0,5 + 0,5j = \frac{1}{\sqrt{2}} \angle 45^\circ$$

$$B = 0,5 - 0,5j \Rightarrow h(t) = \sqrt{2} e^{-0,5t} \cos(0,5t + 45^\circ) //$$

c) RPS  $\Rightarrow s = j\omega \Rightarrow s = j \quad T_f(t) = 10 \cos(t)$

$$H(j\omega) = \frac{j}{(j)^2 + 2j + 2} = \frac{j}{1 + 2j} = 0,4 + 0,2j = 0,447 \angle 26,6^\circ$$

$$\Rightarrow \overset{\circ}{V}_L = 0,447 \angle 26,6^\circ \times 10 \angle 0 = 4,47 \angle 26,6^\circ$$

$$V_L(t) = 4,47 \cos(t + 26,6^\circ) \quad \text{en RPS.}$$