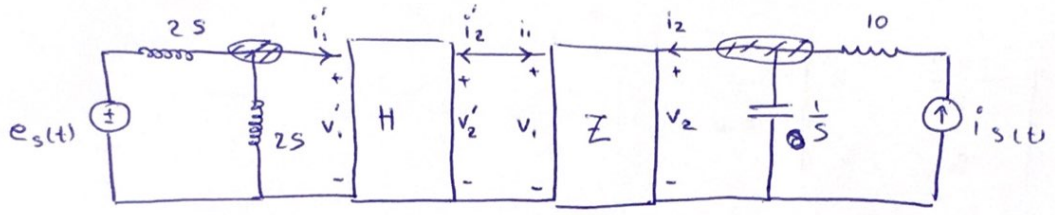
یا لطیف

رضا دینه‌پور
۹۸۱۴۳۰۳
امتحان پایانترم مدار ۲

#3



$$H = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}, \quad Z = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \Rightarrow \begin{cases} V_1 = I_1 + I_2 \\ V_2 = I_1 + I_2 \end{cases}$$

$$\begin{cases} V_1' = I_1 + V_2' \\ I_2' = -I_1 + V_2' \end{cases} \Rightarrow V_1 = V_2', \quad i_1 = -i_2'$$

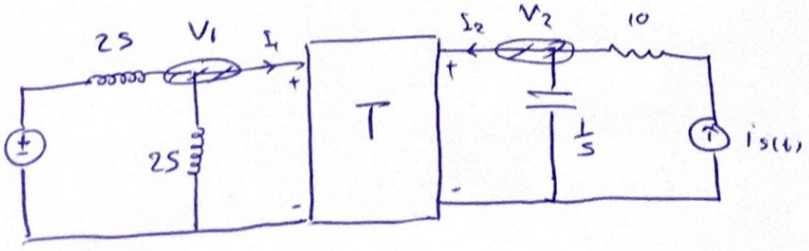
$$\Rightarrow I_1 + I_2 = I_2' + I_1' \xrightarrow{I_1 = -I_2'} -I_2' + I_2 = I_2' + I_1 \Rightarrow \boxed{-2I_2' = I_1 - I_2}$$

$$H \to T: \quad T_1 = \begin{bmatrix} \frac{-\det(H)}{h_{21}} & \frac{h_{11}}{h_{21}} \\ \frac{-h_{22}}{h_{21}} & \frac{-1}{h_{21}} \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$$

$$Z \to T: \quad T_2 = \begin{bmatrix} \frac{Z_{11}}{Z_{21}} & \frac{\det(Z)}{Z_{21}} \\ \frac{1}{Z_{21}} & \frac{Z_{22}}{Z_{21}} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$$

$$\Rightarrow T = T_1 T_2 = \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix}$$

$\Rightarrow$



$$\Rightarrow \begin{cases} V_1 = V_2 \\ I_1 = 2V_2 \end{cases}$$

KCL in V_1 : $+I_1 + \frac{V_1}{2S} + \frac{V_1 - E_S}{2S} = 0 \xrightarrow{I = 2V_1} V_1\left(2 + \frac{1}{2S} + \frac{1}{2S}\right) = \frac{E_S}{2S}$

$V_1\left(\frac{2S+1}{S}\right) = \frac{E_S}{2S}$

KCL in V_2 : $I_2 + SV_2 - i_S = 0 \xrightarrow{V_1 = V_2} I_2 + SV_1 = i_S \Rightarrow SV_1 = i_S$

$\Rightarrow \det \begin{vmatrix} \frac{2S+1}{S} & 0 \\ S & 0 \end{vmatrix} = 0$