پاسخ تمرین سری پنجم

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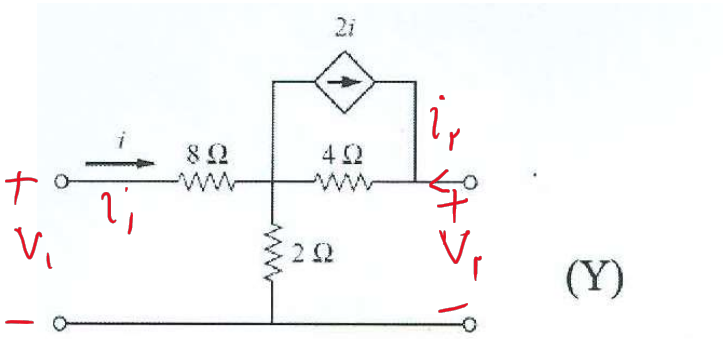
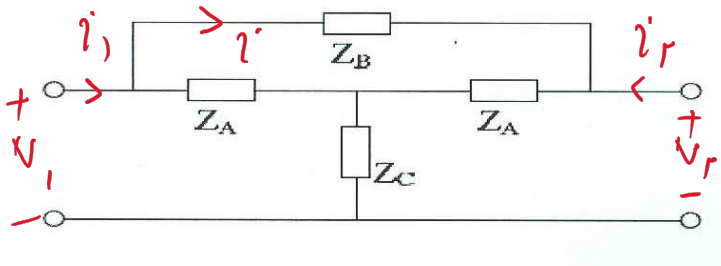


(Y)

$$\begin{cases} V_1 = 8I_1 + 2(I_1 + I_2) \\ V_2 = 4(I_2 + 2I_1) + 2(I_1 + I_2) \end{cases} \rightarrow \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 10 & 2 \\ 10 & 6 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} \rightarrow \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 10 & 2 \\ 10 & 6 \end{bmatrix}^{-1} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \frac{1}{40} \begin{bmatrix} 6 & -2 \\ -10 & 10 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix}$$



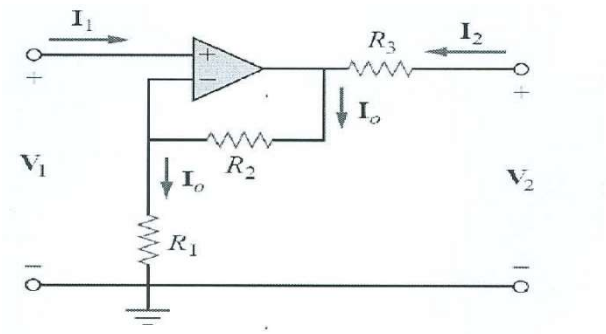
(Z)

$$\begin{cases} V_1 = Z_A(I_1 - I) + Z_C(I_1 - I + I_2 + I) \\ V_2 = Z_A(I_2 + I) + Z_C(I_1 - I + I_2 + I) \end{cases} \rightarrow \begin{cases} V_1 = Z_A(I_1 - I) + Z_C(I_1 + I_2) \\ V_2 = Z_A(I_2 + I) + Z_C(I_1 + I_2) \end{cases} \boxed{1}$$

$$Z_B I = Z_A(I_1 - I) - Z_A(I_2 + I) \rightarrow (Z_B + 2Z_A)I = Z_A(I_1 - I_2) \rightarrow I = \frac{Z_A(I_1 - I_2)}{Z_B + 2Z_A} \boxed{2}$$

$$\boxed{1} \xrightarrow{\boxed{2}} \begin{cases} V_1 = (Z_A + Z_C)I_1 - Z_A \dfrac{Z_A(I_1 - I_2)}{Z_B + 2Z_A} + Z_C I_2 \\ V_2 = Z_C I_1 + (Z_A + Z_C)I_2 + Z_A \dfrac{Z_A(I_1 - I_2)}{Z_B + 2Z_A} \end{cases} \rightarrow Z = \begin{bmatrix} Z_A + Z_C - \dfrac{Z_A^2}{Z_B + 2Z_A} & Z_C + \dfrac{Z_A^2}{Z_B + 2Z_A} \\ Z_C + \dfrac{Z_A^2}{Z_B + 2Z_A} & Z_A + Z_C - \dfrac{Z_A^2}{Z_B + 2Z_A} \end{bmatrix}$$

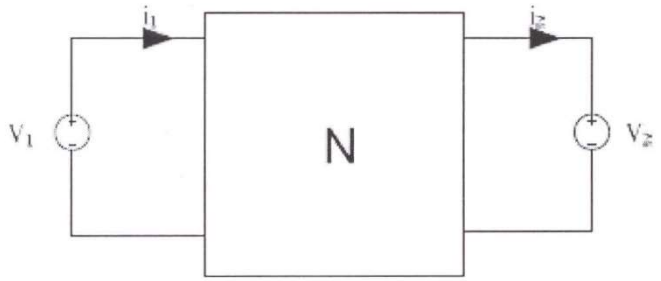
۲-



$$R_۳I_۲ + (R_۱ + R_۲)I_o = V_۲ \ , \ R_۱I_o = V_۱ \rightarrow R_۳I_۲ + (R_۱ + R_۲)\frac{V_۱}{R_۱} = V_۲ \rightarrow I_۲ = -\frac{R_۱ + R_۲}{R_۱R_۳}V_۱ + \frac{۱}{R_۳}V_۲ \rightarrow$$

$$\begin{bmatrix} I_۱ \\ I_۲ \end{bmatrix} = \begin{bmatrix} ۰ & ۰ \\ -\frac{R_۱ + R_۲}{R_۱R_۳} & \frac{۱}{R_۳} \end{bmatrix} \begin{bmatrix} V_۱ \\ V_۲ \end{bmatrix} \rightarrow Y = \begin{bmatrix} ۰ & ۰ \\ -\frac{R_۱ + R_۲}{R_۱R_۳} & \frac{۱}{R_۳} \end{bmatrix} \rightarrow |Y| = ۰$$

۳- شبکه پسیو است. پس خاصیت هم پاسخی برقرار است.



$$V_۱(t) = ۲۰t \ , \ V_۲(t) = ۰ \ , \ i_۱(t) = ۴t \ , \ i_۲(t) = t$$

$$V_۲(t) = ۵۰t + ۱۰ \ , \ V_۱(t) = ۲۰t + ۴۰$$

$$V_\alpha \hat{J}_\alpha + V_\beta \hat{J}_\beta = \hat{V}_\alpha J_\alpha + \hat{V}_\beta J_\beta \rightarrow \frac{۲۰}{s^۲}\hat{J}_\alpha + ۰ = (\frac{۵۰}{s^۲} + \frac{۱۰}{s})(-\frac{۴}{s^۲}) + (\frac{۲۰}{s^۲} + \frac{۴۰}{s})(\frac{۱}{s^۲}) \rightarrow \hat{J}_\alpha = -\frac{۹}{s^۲} \rightarrow I_۱ = \frac{۹}{s^۲} \rightarrow$$

$$i_۱ = ۹t$$