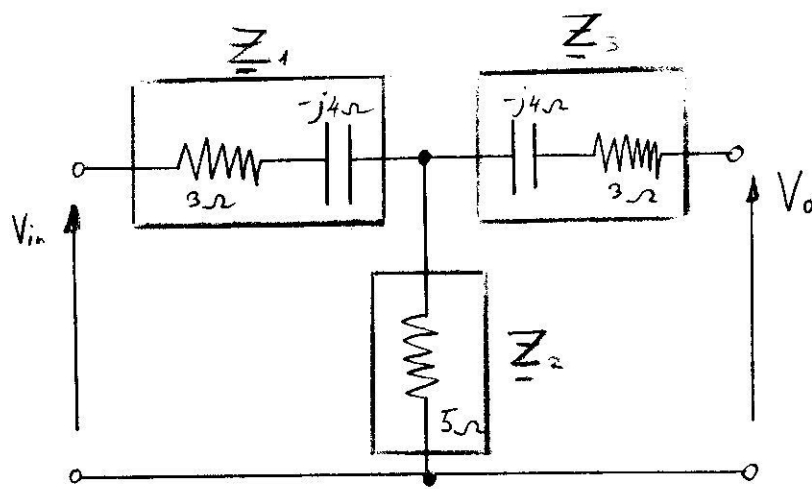


5



1, 8, 302

$$\textcircled{1} \quad \underline{Z}_{11} = \underline{Z}_1 + \underline{Z}_2 = 3 - j4 + 5 = (8 - j4) \Omega$$

$$\underline{Z}_{12} = \underline{Z}_{21} = \underline{Z}_2 = 5 \Omega$$

$$\underline{Z}_{22} = \underline{Z}_2 + \underline{Z}_3 = 5 + 3 - j4 = (8 - j4) \Omega$$

by 1/3

$$\textcircled{2} \quad |\underline{Z}| = \underline{Z}_{11} \cdot \underline{Z}_{22} - \underline{Z}_{12} \cdot \underline{Z}_{21} = (8 - j4)^2 - 5^2 = 68 \angle -70.23^\circ$$

$$A = \frac{\underline{Z}_{11}}{\underline{Z}_{21}} = \frac{8 - j4}{5} = 1.788 \angle -26.56^\circ$$

$$B = \frac{|\underline{Z}|}{\underline{Z}_{21}} = \frac{68 \angle -70.23^\circ}{5} = 13.60 \angle -70.23^\circ$$

$$C = \frac{1}{\underline{Z}_{21}} = \frac{1}{5} = 0.2$$

$$D = \frac{\underline{Z}_{22}}{\underline{Z}_{21}} = \frac{8 - j4}{5} = 1.788 \angle -26.56^\circ$$

$$\textcircled{3} \quad \underline{Z}_{sc} = \underline{Z}_1 + (\underline{Z}_2 \parallel \underline{Z}_3) = (3 - j4) + \left(\frac{1}{5} + \frac{1}{3 - j4} \right)^{-1} = 7.603 \angle -43.66^\circ \Omega$$

$$\textcircled{4} \quad \underline{Z}_0 = \sqrt{\frac{B}{C}} = \sqrt{\frac{13.6 \angle -70.23^\circ}{0.2}} = 8.246 \angle -35.1^\circ \Omega$$

⑥

$$R_0 = 50 \Omega$$

$$f_c = \frac{10^6}{\pi} \text{ Hz} \Rightarrow$$

$$\textcircled{E} \quad R_0 = \sqrt{\frac{L}{C}}$$

$$50 = \sqrt{\frac{L}{C}}$$

$$L = 50^2 C$$

$$f_c = \frac{1}{\pi \sqrt{LC}}$$

$$\frac{10^6}{\pi} = \frac{1}{\pi \sqrt{LC}}$$

$$L = 10^{-12} \cdot \frac{1}{C}$$

$\Downarrow$

$$50^2 C = 10^{-12} \cdot \frac{1}{C}$$

$$50^2 C^2 = 10^{-12}$$

$$C = 0.4 \cdot 10^{-15} \text{ F}$$

$\Downarrow$

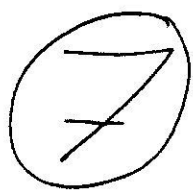
$$\frac{L}{2} = \frac{50^2 C}{2} = \frac{50^2 \cdot 0.4 \cdot 10^{-15}}{2} = 500 \cdot 10^{-15} \text{ H}$$

$$\textcircled{2} \quad f_1 = \frac{10^5}{\pi} \text{ Hz} < f_c \Rightarrow \int_{f_1}^{f_c} \frac{\partial \gamma}{\partial f} df \Rightarrow \alpha_1 = 0 \text{ neper}$$

$$f_2 = \frac{10^7}{\pi} \text{ Hz} > f_c \Rightarrow \alpha_2 = 2 \cdot \cosh^{-1} \left(\frac{f_2}{f_c} \right) \approx 6 \text{ neper}$$

$\Downarrow$

$$N_1 [\text{dB}] = 20 \log e^{\alpha_1} = 0 \text{ dB}, \quad N_2 [\text{dB}] = 20 \log e^{\alpha_2} = 52.115 \text{ dB}$$

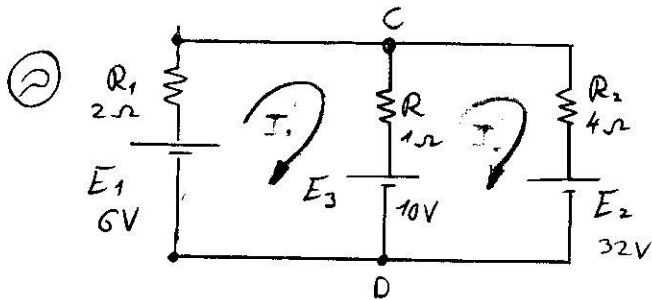


$$① U_{AB} = \frac{\frac{E_1}{R_1} + \frac{E_2}{R_2}}{\frac{1}{R_1} + \frac{1}{R} + \frac{1}{R_2}} = \frac{\frac{6}{2} + \frac{32}{4}}{\frac{1}{2} + \frac{1}{1} + \frac{1}{4}} = \frac{11}{1.75} = 6.285V$$

$$= 6.285V$$

$$\Downarrow$$

$$I_{R_{[A \rightarrow B]}} = \frac{U_{AB}}{R} = \frac{6.285}{1} = 6.285A_{,,}$$



$$\begin{cases} R_{11} I_1' - R_{12} I_2' = E_1' \\ -R_{21} I_1' + R_{22} I_2' = E_2' \end{cases}$$



$$I_1' = -3A$$

$$3I_1' - 1 \cdot I_2' = 6 - 10$$

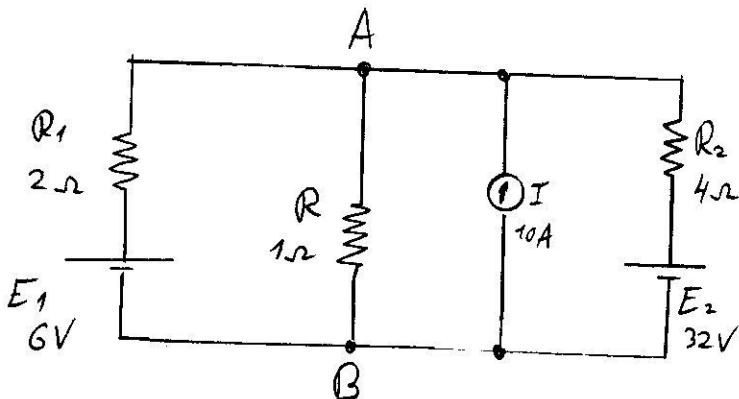
$$I_2' = -5A$$

$$-1 \cdot I_1' + 5 \cdot I_2' = 10 - 32$$



$$I_{R_2} = 0 - I_2' = 0 - (-5) = 5A_{,,}$$

③



$$U_{AB} = \frac{\frac{E_1}{R_1} + I + \frac{E_2}{R_2}}{\frac{1}{R_1} + \frac{1}{R} + \frac{1}{R_2}} = \frac{11 + 10}{1.75} = 12V$$

$$I_R = \frac{U_{AB}}{R} = \frac{12}{1} = 12A_{,,}$$

[A → B]

! 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

! 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

$$\begin{aligned}
 \textcircled{8} \quad \textcircled{k} \quad \underline{Z} &= R_1 + [(R_2 + jX_L) \parallel R_3] = \\
 &= 5 + [(5 + j20) \parallel 20] = \\
 &= 5 + [(5 + j20)^{-1} + 20^{-1}]^{-1} = \\
 &= \underbrace{(15.244 + j7.804) \Omega}_{X + jY} = \underbrace{17.126 \angle 27.11^\circ \Omega}_{|Z| \angle \alpha} //
 \end{aligned}$$

$$\textcircled{2} \quad \underline{I}_T = \frac{\underline{U}}{\underline{Z}} = \frac{100 \angle 45^\circ}{17.126 \angle 27.11^\circ} = 5.84 \angle 17.88^\circ \text{ A}$$

$$\underline{U}_{R_1} = \underline{I}_T \cdot R_1 = 5.84 \angle 17.88^\circ \cdot 5 = 29.195 \angle 17.88^\circ \text{ V}$$

⇓

$$\underline{U}_{AB} = \underline{U} - \underline{U}_{R_1} = 100 \angle 45^\circ - 29.195 \angle 17.88^\circ = 75.2 \angle 55.2^\circ \text{ V}$$

$$\begin{aligned}
 \textcircled{d} \quad \underline{S}_T &= \underline{I}_T^* \cdot \underline{U} = 5.84 \angle -17.88^\circ \cdot 100 \angle 45^\circ = \\
 &= \underline{(519.751 + j 266.112) \text{ VA}} = 583.915 \angle 27.11^\circ \text{ VA} \\
 &\quad P_T [\text{W}]
 \end{aligned}$$