

Düğüm denklemlerine göre çözümü yapın.
 V_{d1} , V_{d2} , $I_2 = ?$

$$I) -I_a - I_1 + I_2 = 0$$

$$II) -I_2 - I_3 - I_b = 0$$

$$I) -I_1 + I_2 = 2$$

$$II) I_2 + I_3 = 4$$

$$I) -\left(\frac{-V_{d1}}{-5j}\right) + \frac{V_{d1} - V_{d2}}{5j} = 2$$

$$II) \frac{V_{d1} - V_{d2}}{5j} + \frac{-V_{d2}}{10j} = -4$$

$$-V_{d1} + V_{d1} - V_{d2} = 10j$$

$$2V_{d1} - 2V_{d2} - V_{d2} = -40j$$

$$\boxed{V_{d2} = -10j}$$

$$2V_{d1} - 3V_{d2} = -40j$$

$$V_{d1} = \frac{-40j + 3V_{d2}}{2}$$

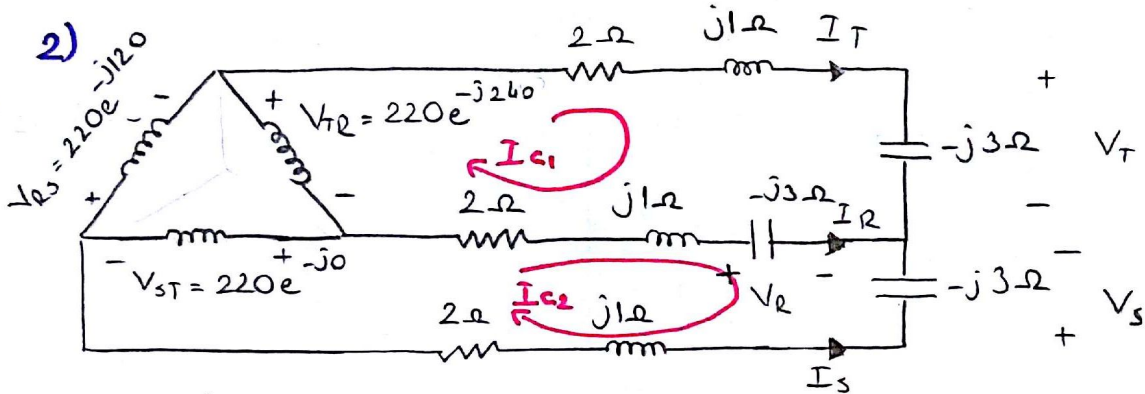
$$V_{d1} = \frac{-40j + 3(-10j)}{2}$$

$$\boxed{V_{d1} = -35j}$$

$$I_2 = \frac{V_{d1} - V_{d2}}{5j}$$

$$I_2 = \frac{-35j - (-10j)}{5j} = \frac{-25j}{5j}$$

$$\boxed{I_2 = 5A}$$



$$-220e^{-j240} + I_T(2-2j) - I_R(2-2j) = 0$$

$$-220 + I_R(2-2j) - I_S(2-2j) = 0$$

$$I_T - I_R = \frac{220e^{-j240}}{2-2j} = -75,13 + 20,13j$$

$$I_R - I_S = \frac{220}{2-2j} = 55 + 55j$$

$$I_T = I_{c1} \quad I_R = I_{c2} - I_{c1} \quad I_S = -I_{c2}$$

$$I_{c1} - (I_{c2} - I_{c1}) = -75,13 + 20,13j$$

$$(I_{c2} - I_{c1}) - (-I_{c2}) = 55 + 55j$$

$$2/ \quad 2I_{c1} - I_{c2} = -75,13 + 20,13j$$

$$-I_{c1} + 2I_{c2} = 55 + 55j$$

$$I_{c1} = -31,75 + 31,75j$$

$$I_{c2} = 11,62 + 43,67j$$

$$I_T = 44,9 e^{j135}$$

$$I_S = 44,9 e^{-j105}$$

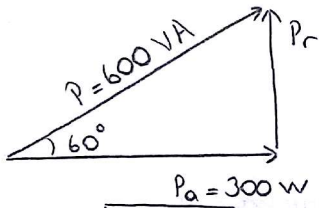
$$I_R = 44,9 e^{j15}$$

$$V_R = 134,7 e^{-j75}$$

$$V_S = 134,7 e^{j105} = 134,7 e^{-j175}$$

$$V_T = 134,7 e^{j45} = 134,7 e^{-j315}$$

3) 220V etkin gerilim değeri olan ve görünür gücü 600VA olan bir motorun aktif gücü (P_a) 300W dir. Reaktif gücünü (P_r), şebekeden çektiği akımı (I) ve akım ile gerilim arasındaki açıyı bulunuz. Bu motora tam kompanzasyon yapmak için bağlanması gereken kapasite değerini (C) ve bu durumdaki görünür gücü (P_{komp}) ve tam kompanzasyon durumunda şebekeden akım (I_{komp}) değerini bulunuz. $f=50$ Hz



$$P_r = \sqrt{P^2 - P_a^2}$$

$$= \sqrt{600^2 - 300^2}$$

$$P_r = 519,61 \text{ VAR}$$

$$P = V \cdot I$$

$$600 = 220 \cdot I$$

$$I = 2,72 \text{ A}$$

$$\theta = \arctan \frac{519,61}{300}$$

$$\theta = 60^\circ$$

$$P_r = V^2 \cdot \omega C$$

$$C = \frac{P_r}{V^2 \omega}$$

$$C = \frac{519,61}{220^2 \cdot 2\pi \cdot 50}$$

$$C = 34,17 \mu\text{F}$$

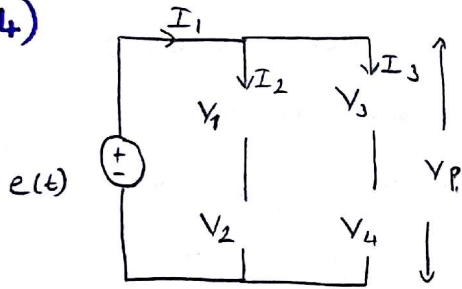
$$P_{komp} = P_a = 300 \text{ VA}$$

$$300 = V \cdot I_{komp}$$

$$I_{komp} = \frac{300}{220}$$

$$I_{komp} = 1,36 \text{ A}$$

4)



$$V_1 = V_p \cdot \cos 60 = 50 \cos 60$$

$$V_1 = 25V$$

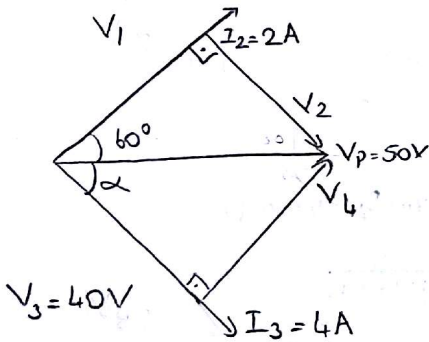
$$R_1 = \frac{V_1}{I_1} = 12,5 \Omega$$

$$V_2 = V_p \cdot \sin 60 = 43,3V$$

$$\frac{1}{\omega C_2} = \frac{V_2}{I_2} = \frac{43,3}{2} = 21,65$$

$$C_2 = \frac{1}{\omega \cdot 21,65} = 147,02 \mu F$$

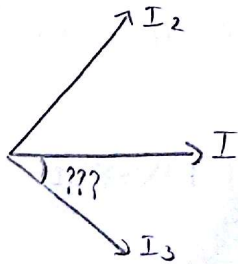
$$R_3 = \frac{V_3}{I_3} = \frac{40}{4} = 10 \Omega$$



$$V_4 = \sqrt{V_p^2 - V_3^2} = \sqrt{50^2 - 40^2} = 30V$$

$$\omega L_4 = \frac{V_4}{I_3} = \frac{30}{4} = 7,5$$

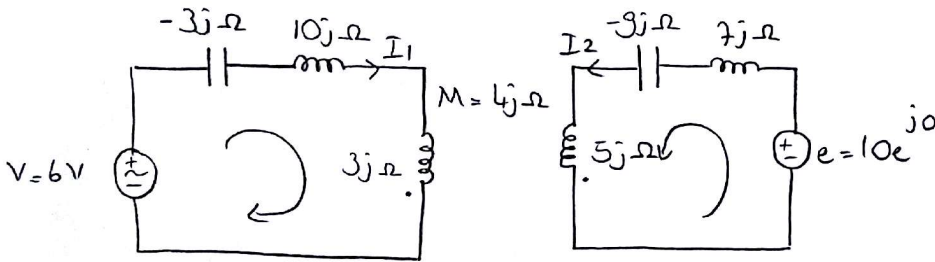
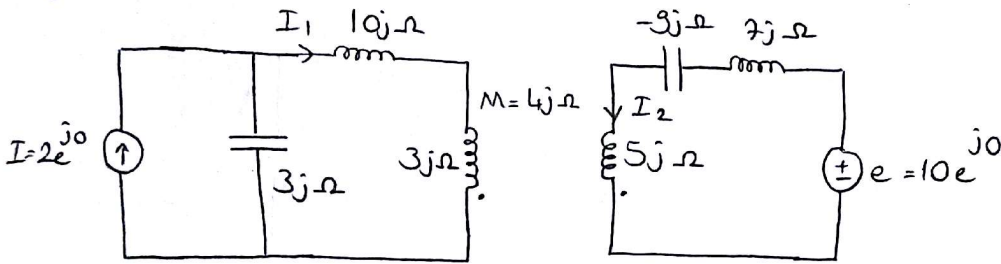
$$L_4 = 23,9 mH$$



$$I = \sqrt{I_2^2 + I_3^2 - 2I_2 \cdot I_3 \cdot \cos(180 - 36,86)}$$

$$I = 4,25A$$

5)



$$\begin{aligned} -6 + 7jI_1 + (3j \cdot I_1 + 4j \cdot I_2) &= 0 \\ -10 - 2jI_2 + (5jI_2 + 4jI_1) &= 0 \end{aligned}$$

$$\begin{aligned} 30jI_1 - 16jI_2 &= 18 - 40 \\ I_1 &= \frac{-22}{14j} = 1,57 = 1,57 \cdot e^{j90} \end{aligned}$$

$$3 / 10jI_1 + 4jI_2 = 6$$

$$-4 / 4jI_1 + 3jI_2 = 10$$

$$I_2 = \frac{6 - 10jI_1}{4j} = \frac{21,7}{4j} = -5,42j = 5,42 e^{-j90}$$