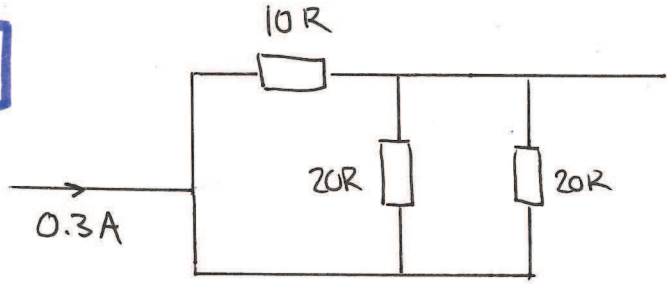
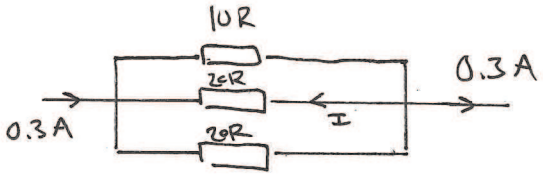
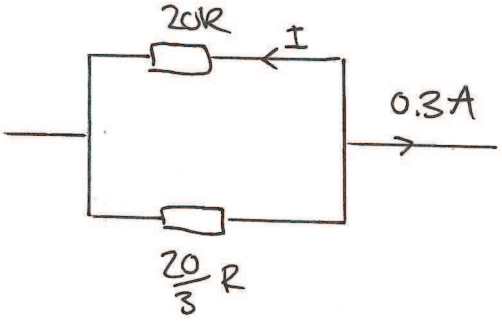
Tors LV 2

7





$$\frac{10R \cdot 20R}{10R+20R} = \frac{20}{3}R$$

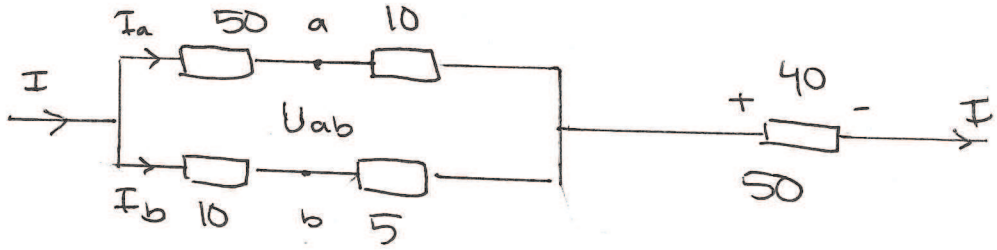


strömdelning

$$I_a = -I = 0.3 \frac{\frac{20}{3}R}{\frac{20}{3}R + 20R} = 0.075\ A$$

$$I = -0.075\ A$$

10



1. Bestäm $I = \frac{40}{50} = 0.8\ A$

2. strömdelning

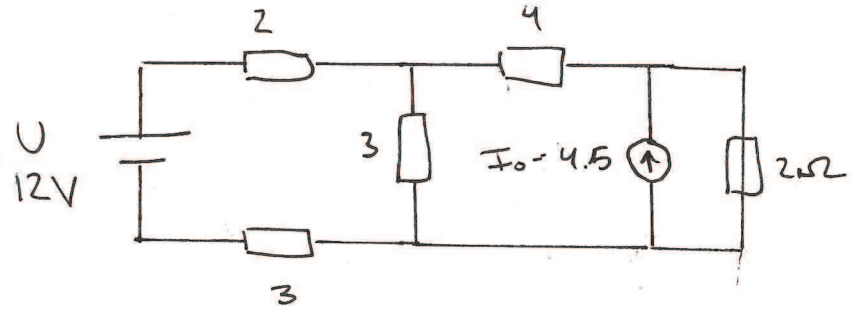
$$I_a = I \cdot \frac{10+5}{(10+5)+(50+10)} = 0.16\ A$$

$$I_b = I - I_a = 0.8 - 0.16 = 0.64\ A$$

3. Spänningsfall över 50 Ω resp 10 Ω

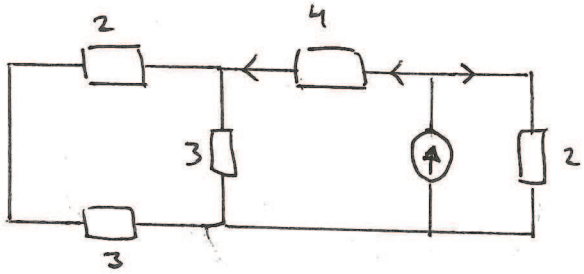
$$\left.\begin{aligned} U_1 &= 50 \cdot 0.16 = 8\,V \\ U_2 &= 10 \cdot 0.64 = 6.4\,V \end{aligned}\right\} U_{ab} = 8 - 6.4 = 1.6\,V$$

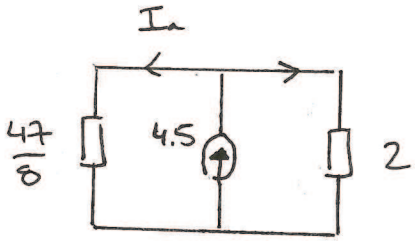
15 SPP



(1) Kortslut U, bryt I_0 (2)

1.

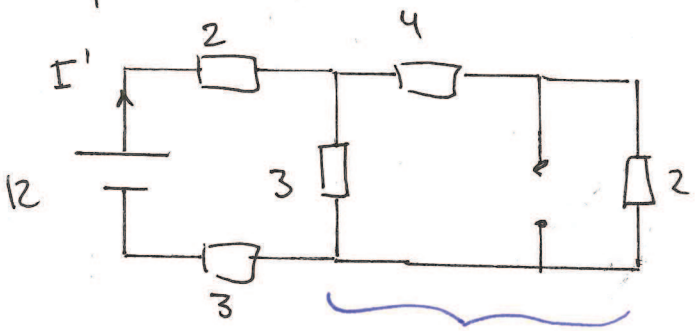


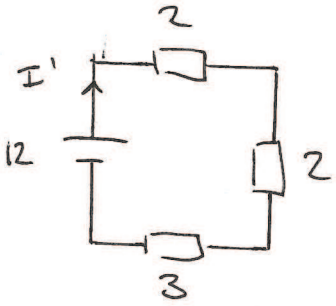


$$I_a = \frac{2}{2+\frac{47}{8}} I_0 = 1.143\,A$$

Nästa strömdelning: $I'' = I_a \frac{3}{3+3+2} = 1.143 \cdot \frac{3}{8} = 0.429\,A$

2. Bryt I_0



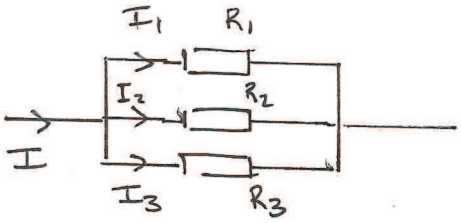


$$\frac{6 \cdot 3}{3+6} = 2\,\Omega$$

$$I' = \frac{12}{7}\,A$$

Svar: $I = I' - I'' = \frac{12}{7} - 0.429 = 1.29\,A$

[1]



(a) K1 : $I = I_1 + I_2 + I_3$ (1)

K2 : $R_2 I_2 - R_1 I_1 = 0$ (2)

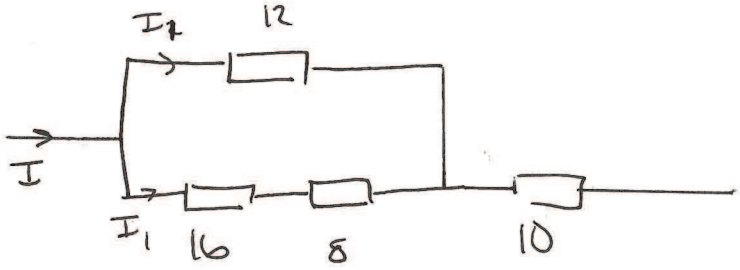
$R_3 I_3 - R_2 I_2 = 0$ (3)

$$I = I_2\left(\frac{R_2}{R_1} + 1 + \frac{R_2}{R_3}\right) = \frac{R_2R_3 + R_1R_3 + R_1R_2}{R_1R_3} I_2$$

$$I_1 = \frac{R_2}{R_1} I_2$$

$$I_3 = \frac{R_2}{R_3} I_2$$

(b)



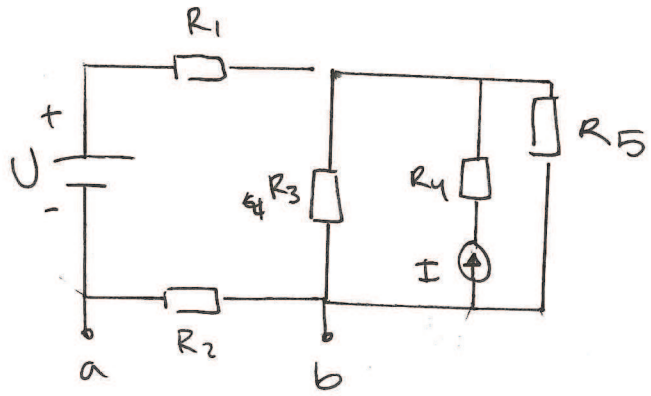
$I_2 = 4A$

$I = I_1 + I_2$

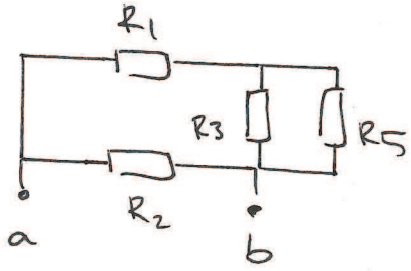
$U = (16+8)\, I_2 = 96\ V$

$U = 12 \cdot I_1 = 96V \longrightarrow I_1 = \frac{96}{12} = 8\ A$

$I = 8 + 4 = 12A$



1.



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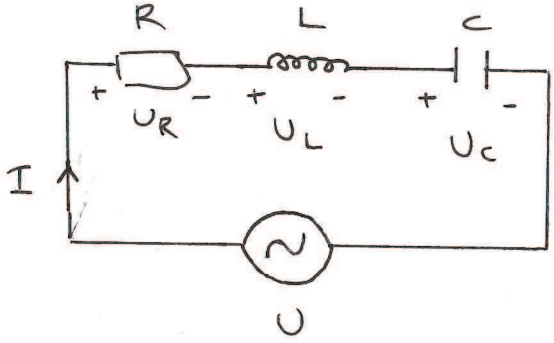
4



Resonans: $U_L = U_C$

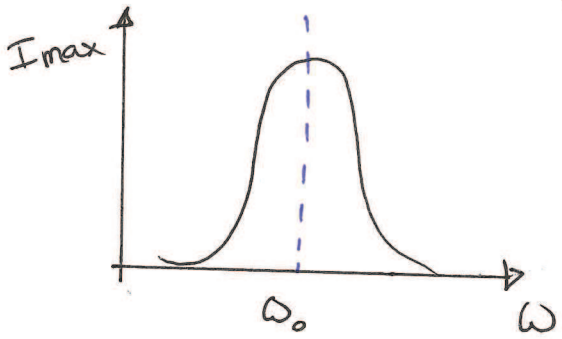
$\omega L \cancel{I} = \frac{1}{\omega C} \cancel{I}$

$\omega L = \frac{1}{\omega C}$

$U = U_R = RI$

(c) Vid resonans: $I = I_{max}$

$\overline{Z} = \overline{Z}_{min} = R$



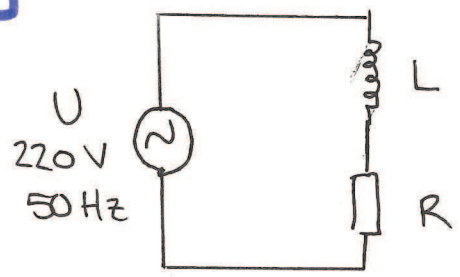
$\omega_0 < \omega$

ωL minskar

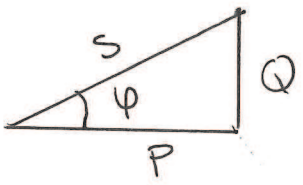
$\frac{1}{\omega C}$ ökar

30

(1)



$S = \sqrt{P^2 + Q^2}$



$P = 4$ kW

$Q = 3$ kVAr

$S = U \cdot I = \sqrt{P^2 + Q^2}$

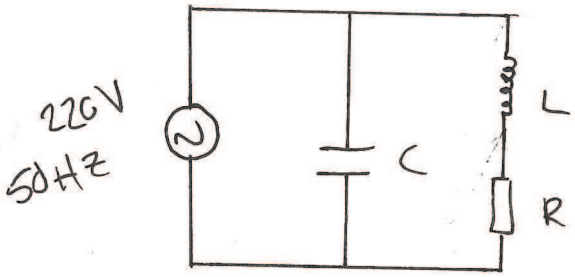
$I = \dfrac{\sqrt{P^2 + Q^2}}{220} = 22.7\ A$

$P = RI^2 \longrightarrow R = \dfrac{P}{I^2} = \dfrac{4000}{515} = 7.8\ \Omega$

{Obs! Håll koll på skillnaden: $u(t)$, U, $\hat{U}$, $\bar{U}$}

(2) Parallell C kopplas in Sökt: C

Villkor: $\cos\varphi = 1$



Utan C:

$I = 22.7\ A,\ R = 7.8\ \Omega,\ U = 220\ V$

$\omega = 100\ \pi$

$\bar{Z} = R + j\omega L$

$\bar{Z} = \dfrac{\bar{U}}{\bar{I}}$ $I = \dfrac{U}{|\bar{Z}|} = \dfrac{220}{\sqrt{R^2 + (\omega L)^2}} = 22.7\ A$

~~82.7~~ =

$$220 = 22.7\sqrt{(7.8)^2 + (\omega L)^2}$$

$$(\omega L)^2 = \frac{4840 - 31350}{515.3} = 33.1$$

$$L = \frac{\sqrt{33.1}}{100\pi} = 0.018\ H$$

$$\overline{Z} = R + j\omega L = 7.8 + j \cdot 100\pi \cdot 0.18 = 7.8 + 5.65j$$

~~arctan 5.65~~ arctan ~~5.65~~ 5.65 / 7.8 = ~~35.9° ≈ 36°~~

$$\arctan \frac{5.65}{7.8} = 35.9° \cong 36°$$

$$I_c = I_L \sin\varphi = 22.7 \sin 36 = 13.3\ A$$

$$U = I_c \frac{1}{\omega C} \longrightarrow C = \frac{I_c}{\omega U}$$

$$C = \frac{13.3}{100\pi \cdot 220} = 193\ \mu F$$

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