7. 2010

9.

$$g_V \cdot \frac{12}{6+12} = U_2 \cdot \frac{6}{6+6}$$

$$g_V \cdot \frac{2}{3} = U_2 \cdot \frac{1}{2} \quad / \cdot 2$$

$$U_2 = g \cdot \frac{2}{3} \cdot 2 = 12.$$

10. $u(t) = 100 \sin(500t)$ ✓

$i(t) = 2{,}5 \sin(500t)$ A

$R = 20\,\Omega$

$$P = \frac{100 \cdot 2{,}5}{2} \cdot \cos\varphi = 125 \cdot \cos 0 = 125\,W$$

$U = \frac{\cancel{\ldots}}{R}$ $U = I_R \cdot R$

$P = U \cdot I_R \quad = \frac{\cancel{I_R} \cdot I_R}{R} \Rightarrow I_R = \sqrt{P \cdot R} = \sqrt{125 \cdot 20}$

$P = I_R^2 \cdot R \qquad I_R = \sqrt{\frac{P}{R}} = \sqrt{\frac{125}{20}} = 2{,}5\,A$

8)

2. 2011

9) $U = 48V$

$C_1 = 30 \mu F$

$C_2 = 60 \mu F$

$C_{uk} = 20 \mu F$

$$C = \frac{Q}{U}$$

$$Q = C \cdot U$$

$$Q = 960 \mu C$$
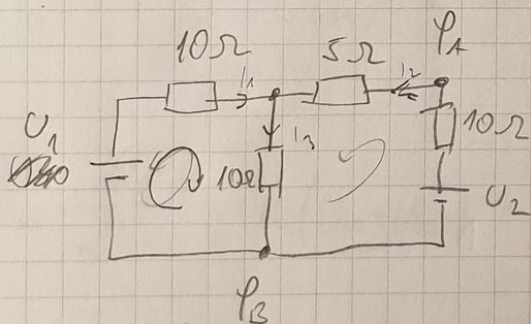
$U_1 = \frac{Q}{C_1} = 32$

$U_2 = \frac{Q}{C_2} = 16$

$B = 16V$

$A = 32$ $\cdot$ 16

$U_{AB} = 32 - 16 = 16 \ V$

10

10Ω 5Ω φ_A
10Ω
U_1
10Ω
U_2
φ_B

$U_1 = 40V$

$U_2 = R \cdot I = 10V$

$R_1 = 10\Omega$

$R_2 = 15\Omega$

$I_3 = I_1 + I_2$

$U_2 - I_2 R_2 - I_3 R_1 = 0$

$\underline{U_1 - I_1 R_1 - I_3 R_1 = 0}$

$U_2 - I_2 R_2 \boxed{(-I_1 R_1)} - I_2 R_1 = 0 \implies \boxed{I_1 = \frac{U_2}{R_1} - I_2 \frac{R_2}{R_1} - I_2}$

$U_1 - I_1 R_1 - I_1 R_1 - I_2 R_1 = 0$

$U_1 - 2R_1 \cdot I_1 - I_2 R_1 = 0$

$U_1 = (2U_2 - 2I_2 R_2 - 2I_2 R_1) - I_2 R_1 = 0$

$U_1 - 2U_2 + 2I_2 R_2 + 2I_2 R_1 - I_2 R_1 = 0$

$\varphi_A = U_2 + I_2 \cdot R_1$

$= 10V - \left(-\frac{1}{2}A\right) \cdot 10\Omega = 13V$

$I_2 (2R_2 + R_1) = 2U_2 - U_1$

$I_2 = \frac{2U_2 - U_1}{2R_2 + R_1}$

g) $\quad i(t) = I_m \sin(\omega t + \alpha_i) \qquad = 5\sqrt{2} \sin\left(100\pi t + \frac{\pi}{4}\,^\circ\right)$

$$= -5A$$

$I = 5\underline{/45^\circ}$

$f = 50 Hz$

$\omega = 2\pi f = 100\pi$

10

$$\frac{I_1}{I_2} = \frac{\dfrac{U}{2R}}{\dfrac{U}{R+X_c}} = \frac{R+X_c}{2R} = \frac{i+g}{2i} = \frac{\sqrt{2}}{2} = 0,707 \qquad E)$$

7. 2012.

⑧

OK OVOJĒ →

⑨ $\mathcal{K} = 55 \frac{Sm}{mm^2}$? $\frac{S}{m}$ mjerna jedinica za provodnik

$$55 \frac{S}{mm} = 55\,000 \frac{S}{m}$$

$S = 10\ mm^2 = 10 \cdot 10^{-6}\ m^2$

$l = 0,5\ m = 500\ mm$

$\phi = 10^{-4}\ Vs$

$\Delta t \to \phi \to 0$

$\Delta Q = ?$

$$l = \frac{dQ}{dt}$$

$$dQ = I \cdot dt$$

$$dQ = -I \cdot N \cdot \frac{d\phi}{e_{ind}}$$

$$dQ = -\frac{N}{R} \cdot d\phi$$

$$dQ = -N \cdot G \cdot d\phi$$

$$dQ = -1 \cdot 55 \cdot 10^3 \frac{S}{m} \cdot \frac{10^{-5}\ m^2}{0,5\ m} \cdot -10^{-4}\ Vs$$

$$= 110\ \mu As$$

$e_{ind} = -N \frac{d\phi}{dt}$

$dt = -N \frac{d\phi}{e_{ind}}$

$R = S \cdot \frac{l}{s}$

$G = \mathcal{K} \frac{S}{l}$

→ zbog ovog ispadu red veličine manje

$l = \frac{dQ}{dt} \Rightarrow dQ = l \cdot dt$

$e_{ind} = -N \cdot \frac{d\phi}{dt}$

$dt = -N \cdot \frac{d\phi}{e_{ind}}$

$dQ = -N \cdot I \cdot \frac{d\phi}{e_{ind}}$

$dQ = -N \cdot G \cdot d\phi$

$dQ = -N \cdot \mathcal{K} \cdot \frac{S}{l} \cdot d\phi$

$= -1 \cdot 55 \cdot \frac{10}{0,5} \cdot (-10^{-4})$

$dQ = 110\ m\ As$

10.   Struja je 0 $\rightarrow$ nema grane $\rightarrow$ 2 odvojena kruga sa

                                                    serijom otpora

$$\varphi_A = \varphi_B$$

$$9V \cdot \frac{12\,\Omega}{6\Omega + 12\,\Omega} = \frac{6\Omega}{6\Omega + 6\Omega} \cdot U_2$$

$$9V \cdot \frac{12}{18} = \frac{6}{12} U_2$$

$$6V = \frac{1}{2} U_2$$

$$U_2 = 12V$$

(11)

$$U_0 = -5V$$

9. 2012

⑨ $Z = 55\,\Omega$ ZVIJEZDA   SPOJ

  $I = 4\,A$

  1. fazu $U_f = I_f \cdot Z = 220\,V$

  voltmetar   mjeri   linijski   napon

          $U_\ell = \sqrt{3} \cdot U_f = \sqrt{3} \cdot 220V = 381\,V$ E)

---

⑩ $u(t) = 100 \sin(500t)\,V \longrightarrow U_{max}$

  $i(t) = 2{,}5 \sin(500t)\,A$ $U = \dfrac{U_{max}}{\sqrt{2}}$

                                              $I = \dfrac{I_{max}}{\sqrt{2}}$

  $P = U \cdot I \cdot \cos\varphi = \dfrac{250}{2} = 125\,w$

              $U = I_R \cdot R$

RADNA SNAGA $P = U \cdot I_R$

SAMO NA R   VALJDA ?
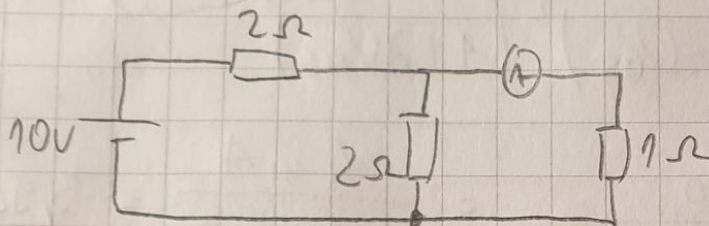
      $P = I_R^2 \cdot R$

      $I_R = \sqrt{\dfrac{P}{R}} = \sqrt{\dfrac{125}{20}} = 2{,}5\,A$

---

⑨ **9. 2013**

superposition

1)

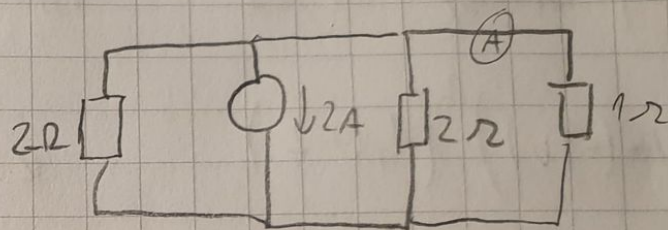

2 Ω · 10 V · 2 Ω · Ⓐ · 1 Ω

$R = \dfrac{8}{3}$

$I = \dfrac{U}{R} = \dfrac{10}{\frac{8}{3}} = \dfrac{15}{4} A$

$I_1 = I \cdot \dfrac{2}{2+1} = \dfrac{15}{4} \cdot \dfrac{2}{3} = \dfrac{5}{2} A$

3

2 Ω · 2 Ω · Ⓐ 2A · 1 Ω

$I_3 = 1 A$

2)

$I = I_1 + I_2 + I_3$

2 Ω · ↓2A · 2 Ω · Ⓐ · 1 Ω

$R = 0,5 \, \Omega$

$U = R \cdot I = 1 V$

$I_2 = \dfrac{U}{R} = -1 A$

$I = I_1 + I_2 + I_3$

$I = \dfrac{5}{2} + 1 + 1$
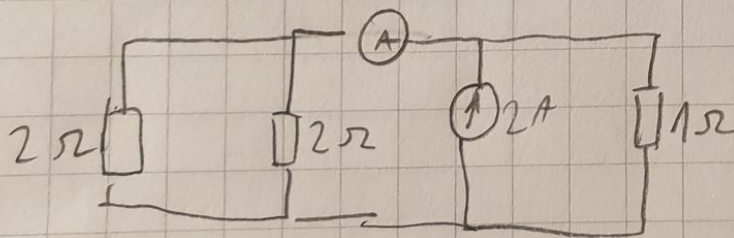
$I = 2,5 A$

(10)

$U = 220v$

$f = 50Hz$

$R = 25\,\Omega$

$L = 63\,mH$

$C = 122\,\mu F$

$X_L = jWL = 19,79\,j$

$X_C = \dfrac{1}{jWC} = -26,09j$

$25 + 19,79j - 26,09j = 25 - j\,6,3$

$P = arctg\,\dfrac{-6,3}{25} = 0,246$

FAKTOR SNAGE

→ $cos\,P = 0,969$

$= 0,97$

KAPACITIVNO

11- $\lambda = 0,005V^{-1}$

V

-7.2014

(10) $R_1 = 4\Omega$ $I_5 = 2A$

$R_2 = 11\Omega$

$R_3 = 2\Omega$ $U_5 = I_3 \cdot R_5$ U

$R_4 = 4\Omega$ $U_5 = 12V$

$R_5 = 6\Omega$

$U_5 = U_4$ $I_4 = \dfrac{U_4}{R_4} = \dfrac{12V}{4\Omega} = 3A$

$I_3 = I_4 + I_5 = 5A$

$U_3 = I_3 \cdot R_3 = 5A \cdot 2\Omega = 10V$ $I_1 = I_2 + I_3$ $U = U_1 + U_2$

$U = 28 + 22 = 50V$

$U_2 = U_3 + U_4 = 22V$ $I_1 = 7A$

$I_2 = \dfrac{U_2}{R_2} = \dfrac{22V}{11\Omega} = 2A$ $U_1 = I_1 \cdot R_1 = 28V$