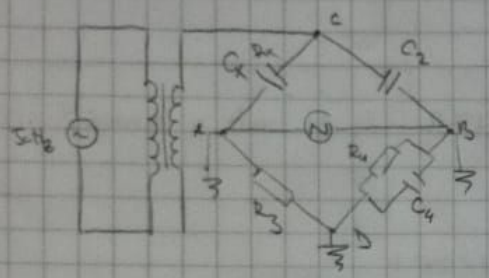
# Dodatni zadaci 2!

(14) Scheringovim mostom mjeri se kut gubitaka kondenzatora

$C_2 = 108\,pF$ ravnoteža pri $R_3 = 6,52\,k\Omega$ napajanje mosta: $V = 115\,kV = U_{eff} \approx U_{AC}$
$R_4 = 4\,k\Omega$ $C_4 = 22,5\,nF$ $f = 50\,Hz$

Koliku će dielektrična snaga trošiti u ispitivanom dielektriku tijekom mjerenja?




$$P_x = \frac{U_x^2}{R_x} = \frac{U_x^2}{\frac{1}{\omega C_x \operatorname{tg}\delta}} = U_x^2 \cdot \omega C_x \cdot \operatorname{tg}\delta = U_x^2 \cdot 100\pi \cdot 6,626\times10^{-11} \cdot 0,02827 = \underline{7,78\,W}$$

$$C_x = C_2 \frac{R_4}{R_3} = 108\times10^{-12} \cdot \frac{4k}{6,52k} = 6,626\times10^{-11}$$

$$\operatorname{tg}\delta = \omega R_4 C_4 = 2\pi \cdot 50 \cdot 4k \cdot 22,5\times10^{-9} = 0,02827$$

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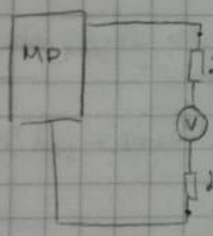
(15) Na izlaz mjernog pretvornika snage s naponskim izlazom 0–5 V priključen je analogni VM s $R_V = 10k\Omega$. Uslijed toga će pogreška nastati pri izlaznom naponu pretvornika $U_i = 3,5\,V$ ako, u slijed lošeg kontakta, otpor spojnice priključnog kabela i VM naraste za $2k\Omega$

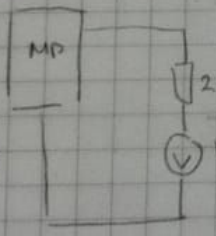



$$I_1 = \frac{U_i}{R_V} = \frac{3,5\,V}{10k} = 3,5\times10^{-3}\,A \rightarrow U_1 = I_1 \cdot R_V = 3,5\,V$$

$$I_2 = \frac{U_i}{R_V + 2\cdot R_S} = \frac{3,5\,V}{10k + 2\cdot 2k} = 33,65\times10^{-5}\,A \rightarrow U_2 = U_i \cdot \frac{R_V + R_S}{R_V + 2R_S} = 3,43269$$

$$p = \frac{U_2 - U_i}{U_i} = \frac{3,43269 - 3,5}{3,5} = -1,92\%$$

KONTAKTNI OTPOR SE SAMO NA ULAZU?




$$U_2 = U_i \cdot \frac{R_V}{R_V + R_S} = 3,5\,V \cdot \frac{10k}{102k} = 3,4314\,V$$ pazi na decimale

$$p = \frac{U_2 - U_i}{U_i} = \frac{3,4314 - 3,5}{3,5} = -1,96\%$$

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(16) SLIČAN KAO (6) U PRIMJERU 2!

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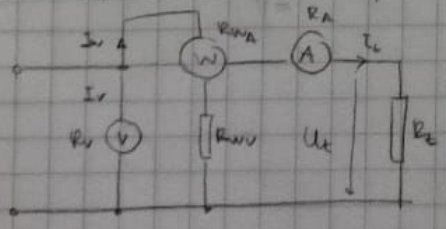
(17) Snaga trošila? $P = 122\,W$, VM $\Rightarrow 224\,V$, AM $\Rightarrow 0,53\,A$, $R_{WV} = 65k\Omega$, $R_{WA} = 0,9\,\Omega$, $R_V = 10ck\,\Omega$, $R_A = 0,6\,\Omega$




$$P_L = P_W - P_A - P(R_{WA}) = P_W - \frac{I_A^2}{R_A} - \frac{I_A^2}{R_{WA}} = 122 - \frac{0,53^2}{0,6} - \frac{0,53^2}{0,9} = \underline{121,58\,W}$$

$P_L$ – izmjerena snaga; $P_A$ – snaga na AM; $P(R_{WA})$ – snaga na otporu strujne grane WM

(18) Snaga gubitaka na dalekovodu: $W_1 = 55W$, $u_{rx}(W_1) = 0,6\%$ → ulaz

$W_2 = 52W$, $u_{rx}(W_2) = 0,9\%$ → ulaz

SLIČNO KAO (3) IZ PRIMJERA MI I (2) IZ PRIMJERA ZI

$$p(P_1) = \frac{u_{rx}(P_1)\cdot P_1}{100} = \frac{0,6\cdot 55}{100} = 0,33W$$

$$p(P_2) = \frac{u_{rx}(P_2)\cdot P_2}{100} = \frac{0,9\cdot 52}{100} = 0,468W$$

$$P(P_3) = \sqrt{P(P_1)^2 + P(P_2)^2} = \sqrt{0,33^2 + 0,468^2} = 0,573W$$

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(19) Wheatstoneov most $Z_1 = 80\angle 25°\,\Omega$, $Z_2 = 78\angle 15°\,\Omega$, $Z_3 = 46\angle 13°\,\Omega$ $Z_4$ da bude u ravnoteži?

$$Z_1 \cdot Z_4 = Z_2 \cdot Z_3$$

$$Z_4 = \frac{Z_2 \cdot Z_3}{Z_1} = \frac{80\angle 25° \cdot 78\angle 15°}{46\angle 13°} = 135,65\angle 27° \approx 136\angle 27°$$

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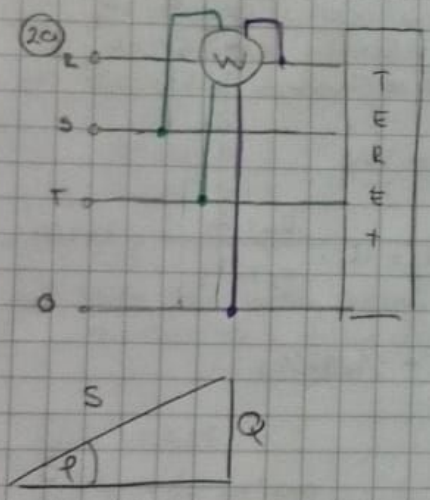
(20)



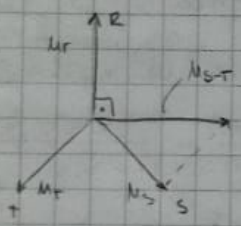

WM je strujnom granom u R fazi, 1° naponska grana je u R i 0

2° naponska grana je u S i T

$P_1 = 1000W$

$P_2 = 1300W$

$S_S = ?$ – prividna snaga jedne faze




Fazni ($U_R$) i međufazni tj. linijski ($U_{S-T}$) su pod 90°

↓

kutevi snaga su pod 90°

$$i_R \cdot U_R \cdot \cos(\varphi) = 1000W$$

$$i_R \cdot U_{S-T} \cdot \sin(\varphi) = 1300W$$

$$i_R \cdot \sqrt{3} \cdot U_R \cdot \sin(\varphi) = 1300W$$

$$\frac{i_R \cdot \sqrt{3} \cdot U_R \cdot \sin(\varphi)}{i_R \cdot U_R \cdot \cos(\varphi)} = \frac{1300}{1000}$$

$$tg(\varphi) = \frac{1,3}{\sqrt{3}} = 0,750$$




$$S = \frac{P}{\cos\varphi} = \frac{1000W}{\cos(\operatorname{arctg}(0,75))}$$

$$S = 1250\,VA$$

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(21) KAO (12) U PRIMJERU MI

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(22) KAO (17) U DODATNIM ZAD. ZA MI