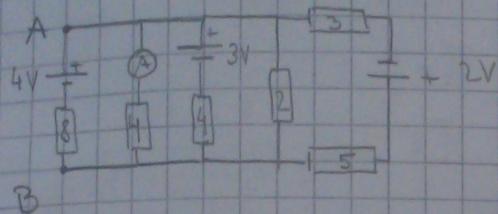


## 2. TEOREMI MREŽA

### a) MILLMANOV TEOREM

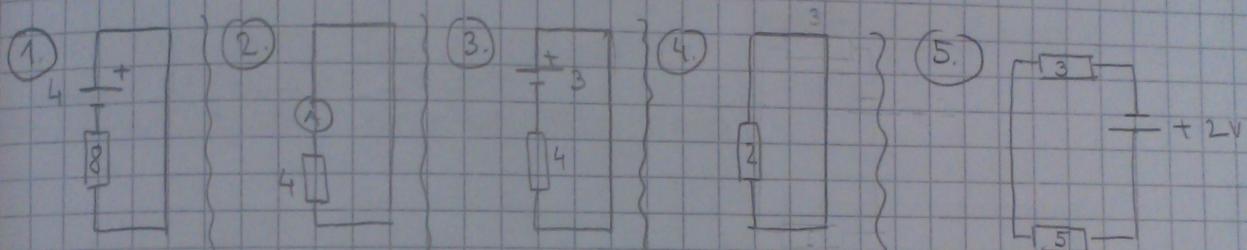
- u mreži u spaju imamo 2 čvora

Primer:



$$U_{AB} = \frac{\text{STRUJE}}{\text{ADMITANC.}} = \frac{\frac{1}{8} + 0 + \frac{3}{4} + 0 - \frac{2}{8}}{\frac{1}{8} + \frac{1}{4} + \frac{1}{4} + \frac{1}{2} + \frac{1}{8}}$$

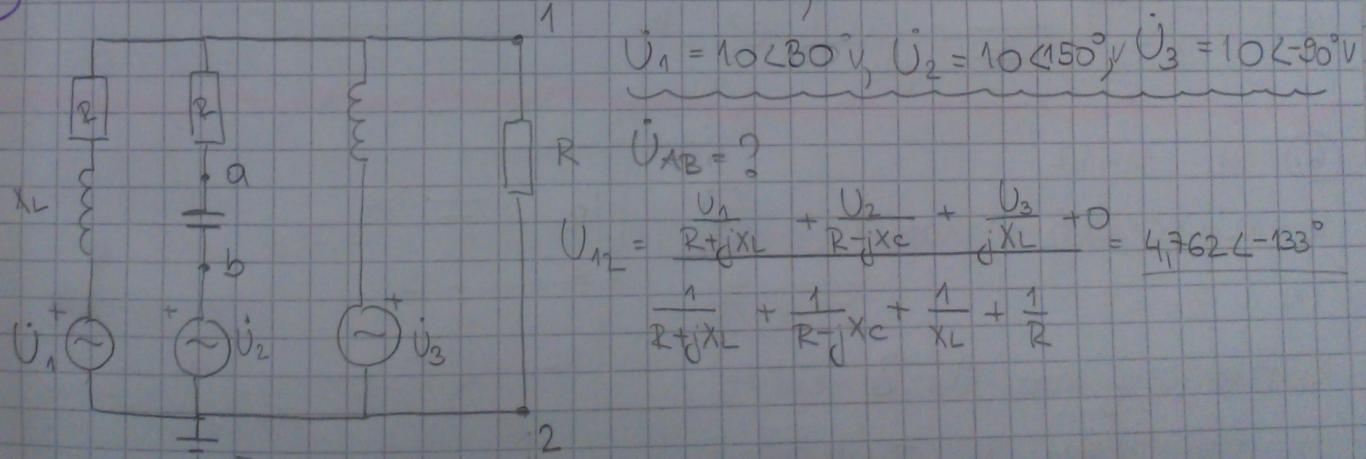
$$I_A = \frac{U_{AB}}{4} = 0,2 \text{ A}$$



$$I_1 = \frac{1}{8}, Y_1 = \frac{1}{8}; I_2 = 0, Y_2 = \frac{1}{4}; I_3 = \frac{3}{4}, Y_3 = \frac{1}{4}; I_4 = 0, Y_4 = \frac{1}{2}; I_5 = \frac{2}{8}, Y_5 = \frac{1}{8}$$

10. 2) 13.-14.

$$R = 2 \Omega, X_C = X_L = 2 \Omega$$



$$U_{AB} = ?$$

$$U_{12} = \frac{U_1}{R+jX_L} + \frac{U_2}{R-jX_C} + \frac{U_3}{jX_L} + 0 = 4,762 \angle -133^\circ$$

$$\frac{1}{R+jX_L} + \frac{1}{R-jX_C} + \frac{1}{jX_L} + \frac{1}{R}$$

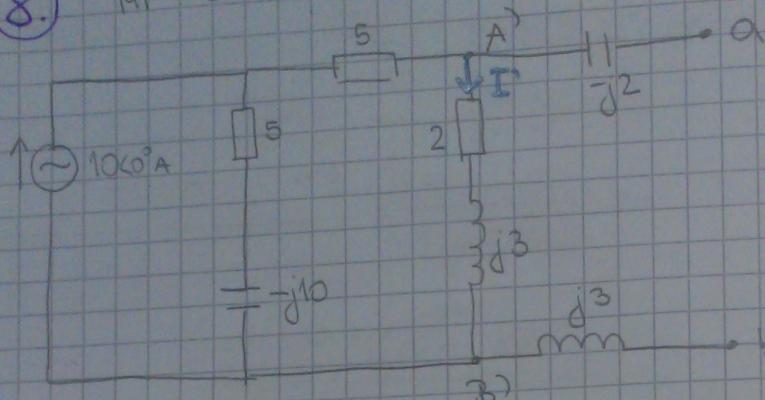
$$- u zemljištu \rightarrow P_B = 0 + U_2 = 10 \angle 150^\circ \text{ V}$$

$$I_1 = \frac{P_1 - P_B}{R-jX_C} = \frac{4,762 \angle -133^\circ - 10 \angle 150^\circ \text{ V}}{2-j2 \Omega} = 3,55 \angle -12^\circ \text{ A}$$

$$U_{AB} = I_1 \cdot jX_C = 7,1 \angle -103^\circ \text{ V}$$

## b) THEVENINOV TEOREM

8. MI 13-14.



$$U_{AB} = U_T = ?$$

$$\begin{aligned} p_A &= p_A \\ p_B &= p_B \end{aligned}$$

$$I_{ur} = 10 \text{ A}$$

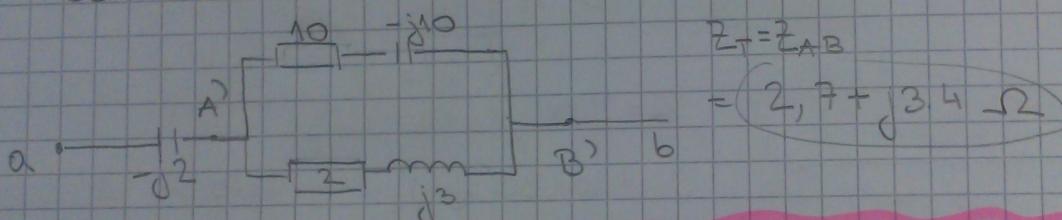
$$I = ?$$

$$I = I_{ur} - \frac{5 - j10}{5 - j10 + 2 + j3} = \#$$

$$U_{AB} = I \cdot (2 + j3) \approx 23 \angle 23^\circ \text{ V}$$

$$Z_T = ?$$

→ ODSPOLIMO STRUJNI IZVOR!



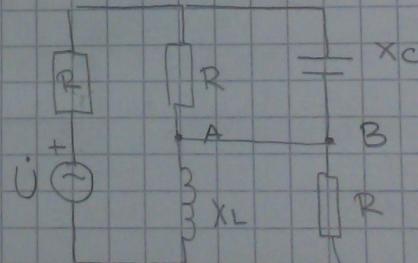
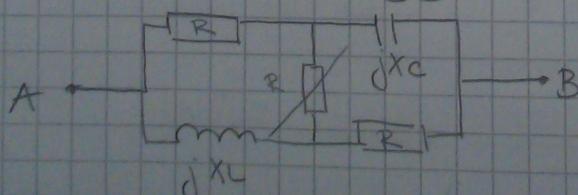
6. MI 11-12.

$$R = X_L = X_C = 10 \Omega \quad U = 100 \text{ V}$$

$$I_N \text{ i } Z_N = ?$$

- krateko spojimo A i B

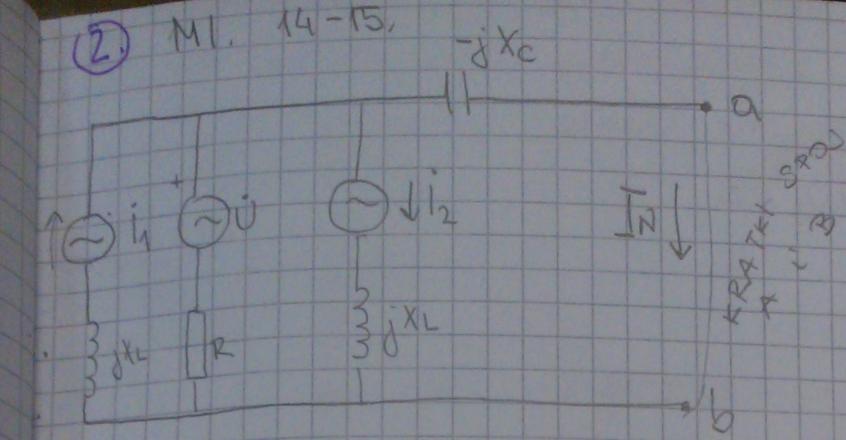
- mostom spoj u RAVNOTEZI!



$$Z_N = (R + jX_L) \parallel (R - jX_C) = 10 \Omega$$

$$I = 0 \text{ A}$$

(2) MI. 14-15.



→ MILLMANOV TEOREM

$$U_{AB} = i_1 + \frac{U}{R} - i_2 + 0$$

$$0 + \frac{1}{R} + 0 + \frac{1}{-jX_C}$$

$$= 13.9 + j5.24 V$$

$$I_N = \frac{U_{AB}}{-jX_C} = -0.524 + j1.39 A$$

$$Z_N = ?$$

→ odspojimo strujni izvor

→ mapomski krovno spojimo:



MAX SNAGA?

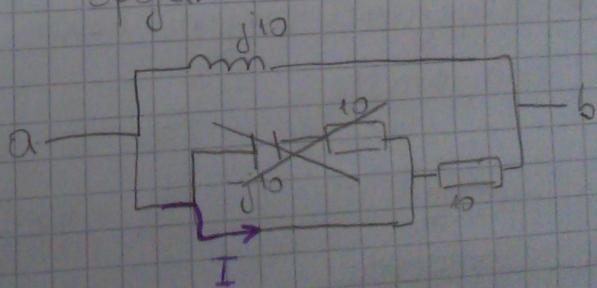
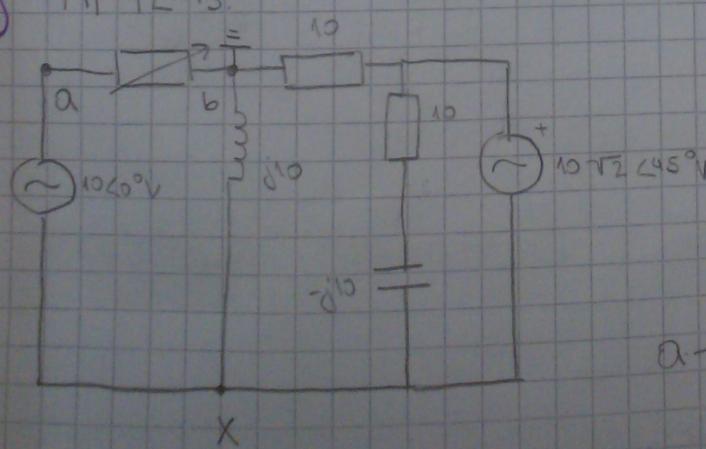
$$: Z_{\text{TRÖŠILA}} = Z^*_{\text{IZVORA}}$$

→ Ako pale imamo promijenju samo  $R$ ,  $R_y = |Z_{\text{izvora}}|$

$$P_{\text{MAX}} = ?$$

→ krovno spojimo strujne izvore, a  $R_y$  izvadimo iz

Spaja.



$$Z_{ab} = 5 + j5$$

$$R_y = |Z_{ab}| = \sqrt{50} \Omega$$

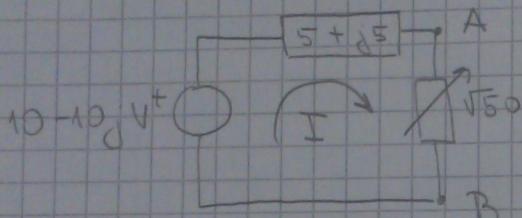
$$U_T = ?$$

- Oper ulegučimo strujne izvore  
→ uzemljimo točku B.

$$p_x = -I \cdot 10j$$

$$p_A = p_x + 10 = -I \cdot 10j + 10 = 10 - 10j \text{ V}$$

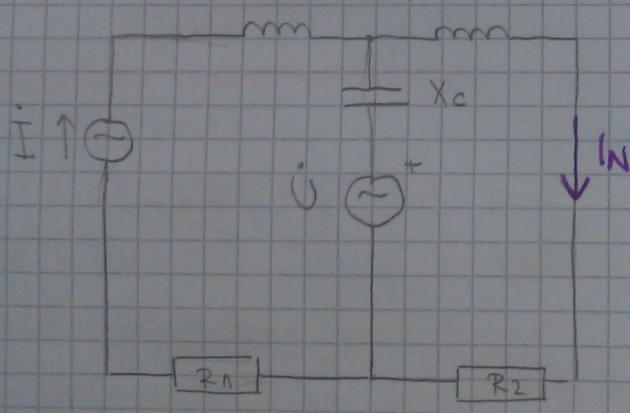
→ SHEMA S NADOMJESNIM IZVOROM



$$I = \frac{10 - 10j}{5 + j5 + 5} = 1,082 \angle -67,5^\circ$$

$$P = |I|^2 \cdot R \\ = 8,3 \text{ W}$$

16. JR 15



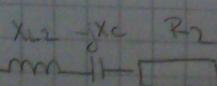
$$U_{AB} = \frac{I + \frac{U}{jX_c}}{R_2 + jX_c} = 30 - j10$$

$$= 0 + \frac{1}{jX_c} + \frac{1}{R_2 + jX_c}$$

$$I_N = \frac{U_{AB}}{R_2 + jX_L} = \frac{30 - j10}{5 + j15}$$

$$= -j2A$$

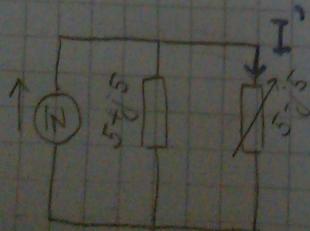
→ Odspojimo strujni izvor i kratko spojimo napomski:



$$Z_m = 5 + j5 \Omega$$

$$Z_p = Z_m^* = 5 - j5 \Omega$$

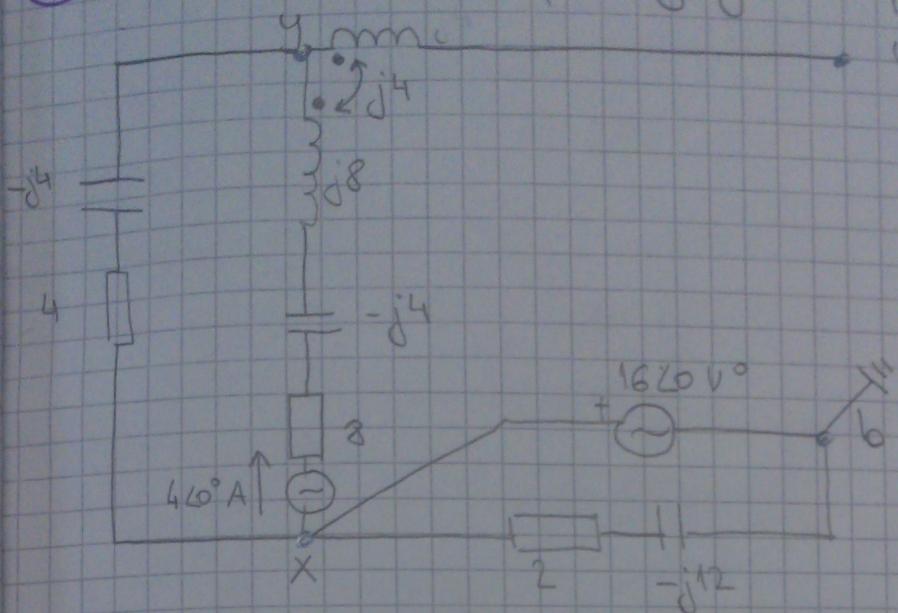
NAD. SHEMA:



$$I = I_N \cdot \frac{5 + j5}{5 + j5 + 5 - j5} = \frac{5 + j5}{10} A$$

$$P = |I|^2 \cdot R = 10 \text{ W}$$

5. → makneemo promjenju otpornik



$$\rho(x) = 16 \text{ V}$$

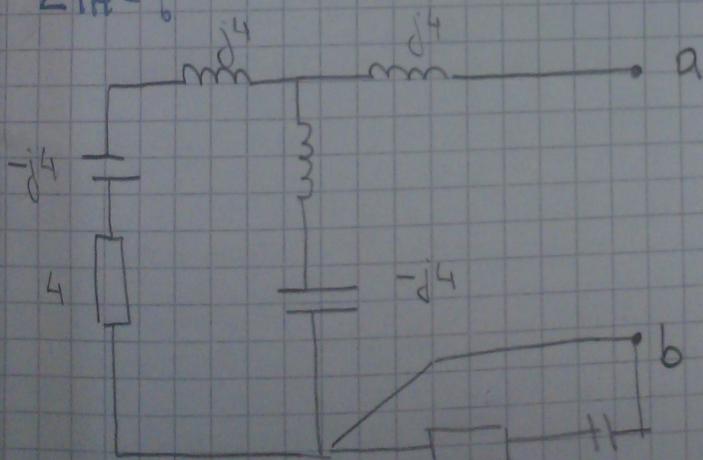
$$\rho(y) = \rho(x) + I \cdot (4 - j4)$$

$$\rho(y) = 16 + 4 \cdot (4 - j4) + I \cdot j4 = 32 \text{ V}$$

$$U_T = \rho_y - \rho_B = 32 \text{ V}$$

30-10

$$Z_{TH} = ?$$

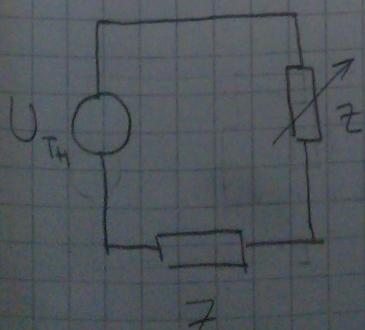


$$Z_T = j4 + j4 - j4 + 4 = 4 + j4$$

$$Z_T - Z_T^* = 4 - 4j$$

NAD. SHEMA :

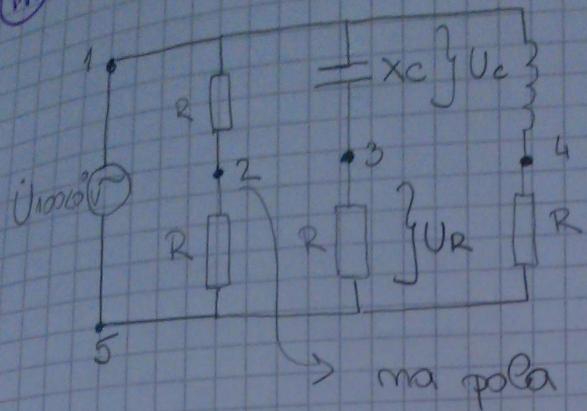
$$I = \frac{U_T}{Z} = 4 \text{ A}$$



$$P = |I|^2 \cdot R = 64 \text{ W}$$

$D = X_L = X_C$   $U_{53}$  u odnosu moj fazor  $U_{23}$ :

(16)



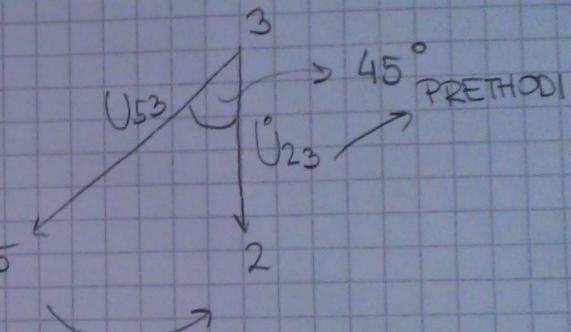
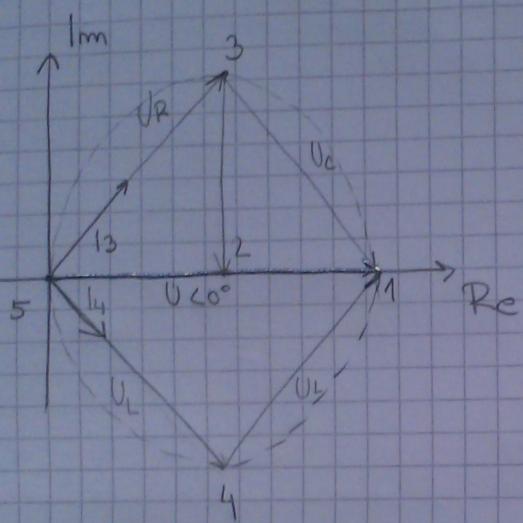
$$U_R = I_3 \cdot R$$

$$= \frac{100 \angle 0^\circ}{R - jX_C} \cdot R$$

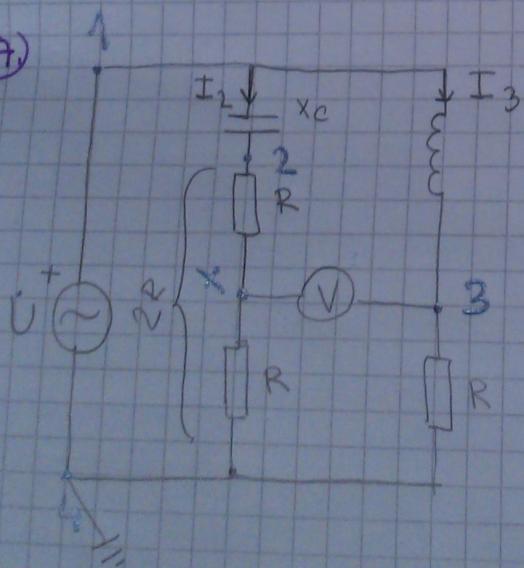
$$= \frac{100 \angle 0^\circ V}{A - jA}$$

$$= \frac{100 \angle 0^\circ}{\sqrt{2} \angle -45^\circ}$$

$$= \frac{100}{\sqrt{2}} \angle 45^\circ$$

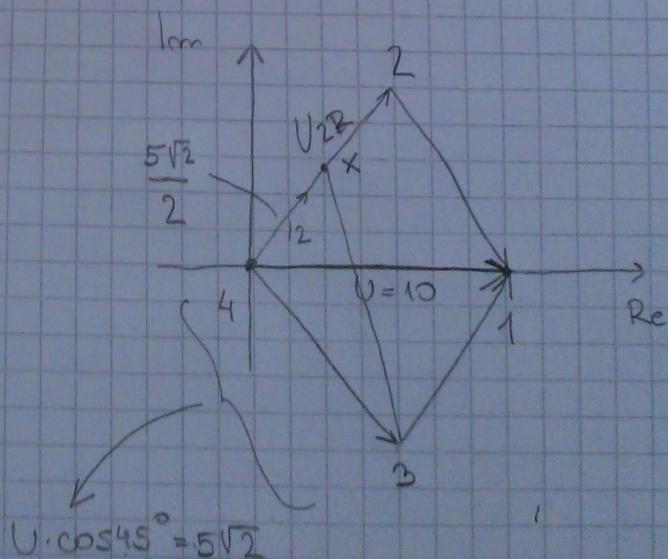


(17)



$$U = 10V$$

$$R = X_L = \frac{1}{2} X_C \quad X_C = 2R$$



$$U \cdot \cos 45^\circ = 5\sqrt{2}$$

$$U_{r\theta} = \sqrt{\left(\frac{5\sqrt{2}}{2}\right)^2 + \left(5\sqrt{2}\right)^2} = 7.9 V$$