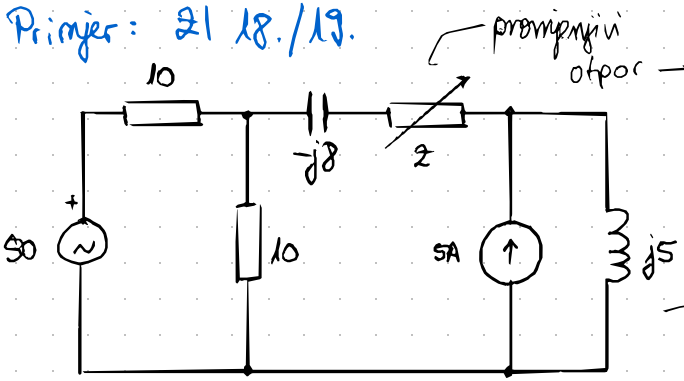
12. THEVENIN

Primjer: ZI 18./19.

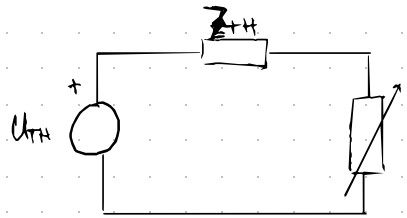


→ $P_{max} = ?$

na njemu se razvija max snaga

napravimo novu, Theveninovu shemu

- jedan naponski izvor
- Theveninov otpor
- i taj promjenjivi Z



Maksimalna snaga se razvija:

$R = R_i$ (unutarnji)

$Z = Z_i^*$ (2 izvora kompleksno konjugirana)

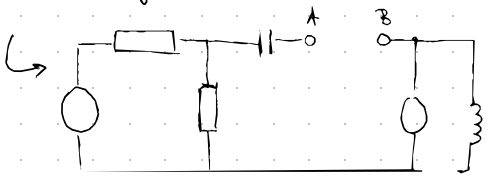
$R = |Z_i|$ (bez imaginarnog dijela)

1) izbaciti Z i doći do U_{TH} i Z_{TH}
2) izračunati U_{TH} i Z_{TH}
3) nadomjesna shema

$U_{TH} = U_{AB}$, trebamo Z_{TH}

↓

lakše za naći nego U_{TH}



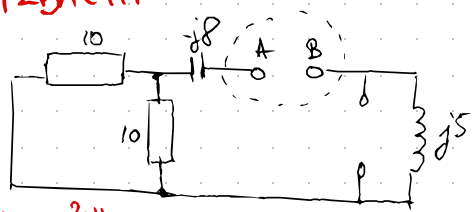
Z_{TH} ▶ isključimo izvore

(naponski: A, B → kratki spoj; strujni → A, B)

$Z_{TH} = Z_{AB}$

crtamo novu shemu bez izvora

1) IZBACITI IZVORE

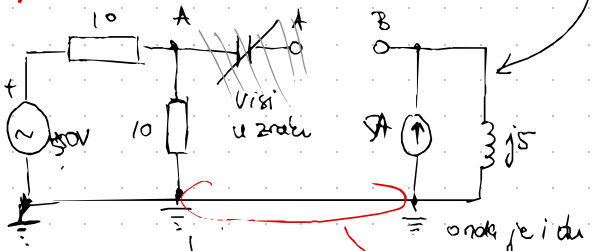


dobijemo Z_{TH}

$Z_{AB} = 5 - j8 + j5 = 5 - j3$

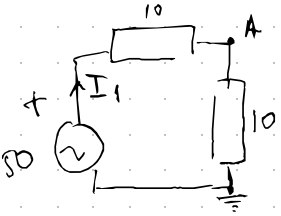
U_{TH} ▶ preko metoda – Hillman
MPČ | superpoz.

2) DOBIJEMO U_{TH}



$U_{TH} = \varphi_A - \varphi_B$

dvije grane nema utjecaja među sobom jer ne može struja ići istim putem natrag

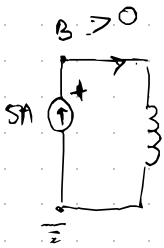


$\varphi_A = \varphi_0 + I_1 \cdot 10$

$\varphi_A = I_1 \cdot 10$

$I_1 = \frac{U}{R_{uk}} = \frac{50}{20} = 2{,}5$

$\varphi_A = 25V$

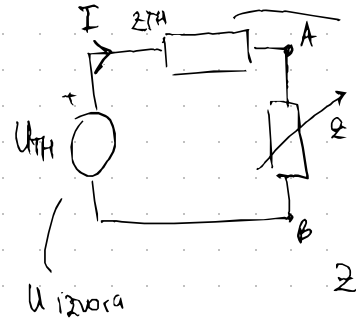


$\varphi_B = j5 \cdot 5A$

$\varphi_B = 25j$

$U_{AB} = 25 - 25j$

3) NADOMJESNA SHEMA



možemo smatrati unutarnjim otporom izvora

$Z = Z_i^*$ (konjugiran) → samo promijenimo predznak imaginarnom dijelu

$Z = \underline{\underline{Z_i^* = 5 + 3j}}$

$I = \frac{U_{TH}}{Z_{TH} + Z} = \frac{25 - 25j}{5 + 3j + 5 - 3j} = \frac{25(1-j)}{10} = \frac{5}{2} - \frac{5}{2}j$ A

$P = I^2 \cdot Re\{Z\} = I^2 \cdot 5 \Rightarrow \boxed{62{,}5\,W}$