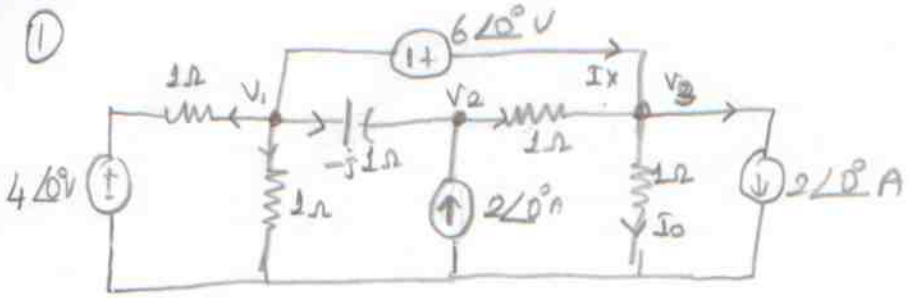
①



Düğüm gerilimleri yöntemi ile bulunur.

① $V_3 - V_1 = 6V$ // $\quad V_1 = V_3 - 6$ $\quad V_1 - 4 + V_1$

② $-(V_2 - V_3) + V_3 + 2 - I_x = 0 \quad I_x = 2V_3 - V_2 + 2$

③ $\frac{V_1 - V_2}{-j} + 2 - (V_2 - V_3) = 0 \Rightarrow V_1 j - j V_2 + 2 - V_2 + V_3 = 0 \quad V_3 j - 6j - (j+1)V_2 + 2 + V_3 = 0$

$(1+j)V_3 - (1+j)V_2 = -2 + 6j$

④ $\frac{V_1 - 4}{1} + V_1 + \frac{V_1 - V_2}{-j} + I_x = 0 \Rightarrow 2V_1 - 4 + V_1 j - j V_2 + I_x = 0$

$(2+j)V_1 - j V_2 - 4 = -I_x$

$-(2+j)(V_3 - 6) + j V_2 + 4 = 2V_3 - V_2 + 2$

$-2V_3 + 12 - jV_3 + j6 + jV_2 + 4 = 2V_3 - V_2 + 2$

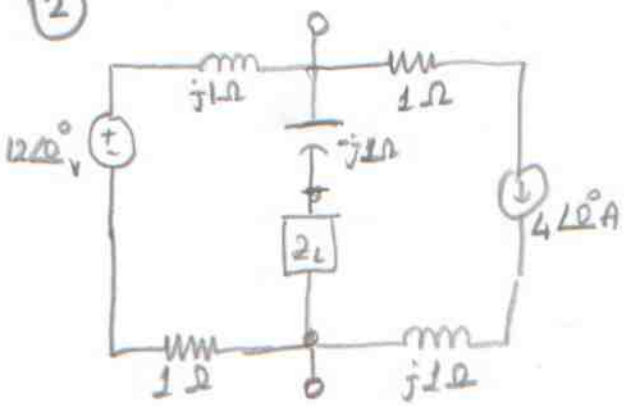
$-4V_3 - jV_3 + jV_2 + V_2 = -14 - j6$

$V_3(-4-j) + V_2(1+j) = -14 - j6$

$V_3(1+j) - V_2(1+j) = -2 + 6j$

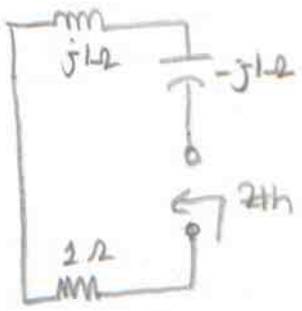
$-3V_3 = -16 \quad V_3 = \frac{16}{3}\angle 0° \quad I_o = \frac{16}{3}\angle 0° \text{ A}$ //

(2)



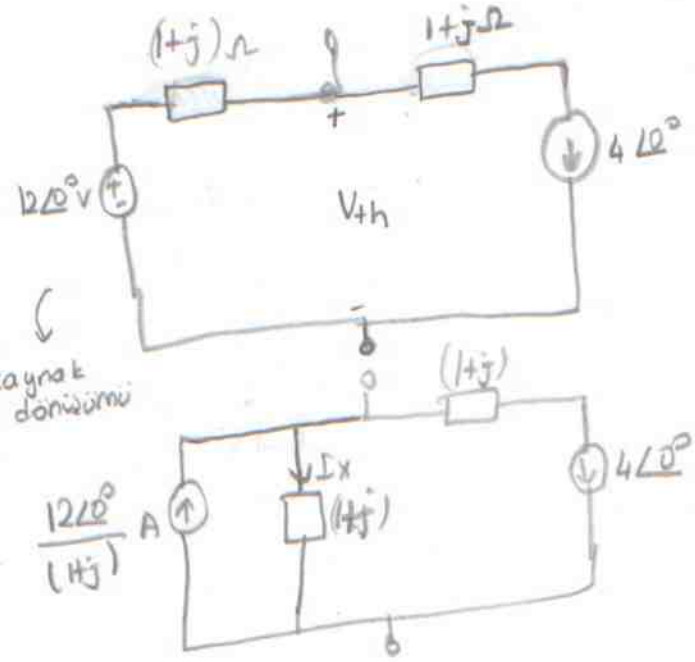
maksimum ortalama güç transferi için geerkli Z_L'yi ve transfer edilen maksimum ortalama gücü bulunuz.

Z_{TH} =>



$Z_{th} = 1\,\Omega$

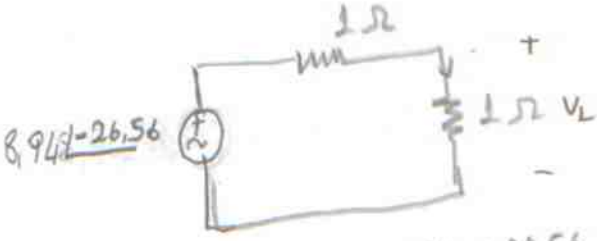
$V_{th} = ?$



$\frac{12\angle 0^\circ}{(1+j)} = I_x + 4 \qquad I_x = \frac{12 - 4 - 4j}{(1+j)}$

$I_x = \frac{8 - 4j}{(1+j)}$

$V_{th} = 8 - 4j = I_x (1+j) = 8 - j4\ V$



$P = \frac{1}{2}\left(\frac{8,94}{2}\right)^2 \cdot 1$

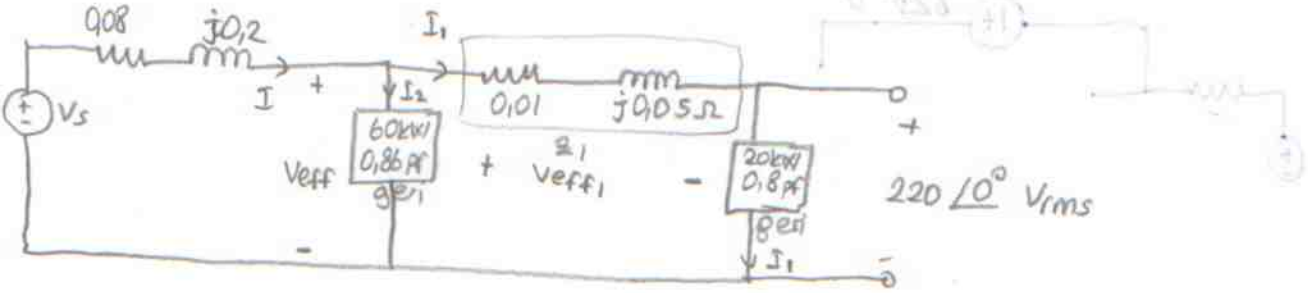
$V_L = \frac{8,94\angle -26,56}{2}$

$P = \frac{1}{2}(4,47)^2 = 19,98\ W$

$V_L = 4,47\angle -26,56\ V$

$I_L = 4,47\angle 26,56\ A$

(3)



$P = 20\ kW$ $\quad \theta_1 = \cos^{-1} 0{,}8 = 36{,}87°$

$V = 220 \angle 0°\ V$ rms

$P = V . I_1 . \cos\theta_1$

$20.10^3 = 220 . I_1\ 0{,}8$

$I_1 = 113{,}63 \angle -36{,}87°$ A rms

$V_{eff} = V_{eff_1} + 220 \angle 0°$

$V_{eff} = 4{,}315 + j\,3{,}86 + 220 = 224{,}32 + j\,3{,}86\ V = 224{,}35 \angle 0{,}98°\ V$

$\theta_2 = \cos^{-1} 0{,}86 = 30{,}68°$

$60.10^3 = 224{,}35 . I_2 . 0{,}86$

$I_2 = 310{,}98 \angle -29{,}7°$ Arms

$I = I_2 + I_1 = (310{,}98 \angle -29{,}7° + (113{,}63 \angle -36{,}87°) = 423{,}95 \angle -31{,}61°$ A rms

$V_S = (0{,}08 + j\,0{,}2)(361{,}027 - j\,222{,}24) + 224{,}32 + j\,3{,}86$

$V_S = 28{,}88 + 44{,}44 + j\,72{,}2 - j\,17{,}77 + 224{,}32 + j\,3{,}86$

$V_S = 297{,}64 + j\,58{,}81 = 303{,}4 \angle 11{,}17°$ V rms

$\theta = \theta_V - \theta_i = 11{,}17° - (-31{,}61°) = 42{,}78°$

$PF = \cos\theta = 0{,}93$ //

(4)-

$I = wCV = 2\pi.60.200.10^{-6}.240$

$I = 18,1\angle 90°$ A //

$Q_c = 18,1.240 = 4344$ VAr

$Q_{eski} = (\tan 38,74°)/36.10^3$

$Q_{eski} = 28,88$ kVAr

$Q_{yeni} = Q_{eski} - Q_c$

$Q_{yeni} = 28,880 - 4344$

$Q_{yeni} = 24538$ VAr

$\tan \theta_{yeni} = \frac{24538}{36000} \Rightarrow \theta_{yeni} = 34,28°$

$pf = \cos \theta_{yeni} = 0,826$ //