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Lista de exercício 1 - Resolução:

4.1 Motor trifásico: (Y), $V_L = 220$, $I_L = 5\,A$, $\phi = 30°$, ABC

$\dot{Z}_A = \dot{Z}_B = \dot{Z}_C$, $V_L = V_F\sqrt{3}\angle 30°$, $\dot{V}_{AN}$ referência

$\dot{V}_{AN} = 127\angle 0°$ V ; $\dot{V}_{AB} = 220\angle 30°$; $\hat{I}_A = \frac{127\angle 0°}{\dot{Z}_A} \Rightarrow \dot{Z}_A = \frac{127\angle 0°}{\hat{I}_A} = \frac{127\angle 0°}{5\angle -30} = 25.4\angle 30°\ \Omega$

$\dot{V}_{BN} = 127\angle -120°$ V ; $\dot{V}_{BC} = 220\angle -90$; $\hat{I}_B = \frac{127\angle -120°}{25.4\angle 30} = 5\angle -150°$ A

$\dot{V}_{CN} = 127\angle 120°$ V ; $\dot{V}_{CA} = 220\angle 150°$; $\hat{I}_C = \frac{127\angle 120°}{25.4\angle 30} = 5\angle 90$ A

4.2 Usando os dados do exercício 4.1, temos:

$\dot{S} = \sqrt{3}V_L I_L \angle\phi$

$\dot{S} = 1905.26\angle 30$

$P = \sqrt{3} \times 220 \times 5 \times \cos(30°) = 1650$ W

$|S| = 1905.26$ VA

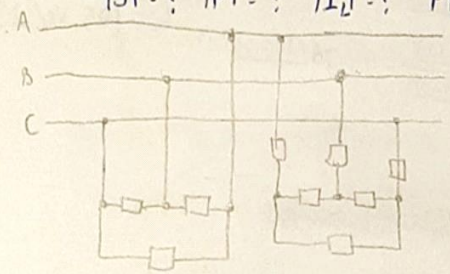
$FP = \frac{P}{S} = \frac{1650}{1905.26} = 0.866$

$Q = \sqrt{3} \times 220 \times 5 \times \text{sen}(30) = 952.63$ VAr

4.5 Motor trifásico: 10KVA, $FP_m = 0.6$, $V_L = 220$, (Δ)

Carga: (Δ), $\dot{Z} = 16$ [illegible], $\dot{Z}' = -12j\ \Omega$

$|S| = ?$ $|P| = ?$ $|I_L| = ?$ $FP_c = ?$



Motor:

$P_m = 10K \times 0.6 = 6$ kW

$Q_m = 10K \times 0.8 = 8$ KVAr

Carga:

$\hat{I}_F = \frac{220\angle 0°}{16 - 12j} = 11\angle 36.87°$ A

$\hat{I}_L = I_F\sqrt{3}\angle -30 = 11\sqrt{3}\angle 6.87°$ A

$P_c = 19.05^2 \times 16 = 5.8$ KW

$Q_c = 19.05^2 \times (-12) = -4.36$ KVAr

Total

$P = P_m + P_c = 11.8$ KW

$Q = Q_m + Q_c = 3.64$ KVAr

$|S| = \sqrt{P^2 + Q^2} = 12.35$ KVA

$\dot{S} = 12.4\angle 17.16°$ KVA $\Rightarrow FP = 0.96$

$I_L = \frac{S}{\sqrt{3}V_L} = \frac{12.35}{\sqrt{3} \times 220} = 32.41$ A

4.6 $V_L = 230$ V, $I_L = 10$, $FP_F = 0.8$ adiantado, $V_{L_c} = ?$, $\dot{Z}_L = 1 + j5\ \Omega$

Fonte

$P_F = 230 \times 10 \times \sqrt{3} \times 0.8 = 3186.97$ W

$Q_F = 230 \times 10 \times \sqrt{3} \times 0.6 = 2390.23$ VAr

$S_F = 230 \times 10 \times \sqrt{3} = 3983.72$ VA

$\dot{S}_F = 3983.72\angle -36.87°$ VA

LINHA

$\dot{S}_A = \dot{I}\dot{Z} \times \dot{I}^* = 509.7\angle 78.69°$

$\dot{S}_L = 3\dot{S}_A = 1529.71\angle 78.69°$

Carga

$\dot{S}_C = \dot{S}_F - \dot{S}_L = 4844.44\angle -53.42°$

$|V_{AB}| = \frac{|S_C|}{\sqrt{3}I_L} = 279.69$ V