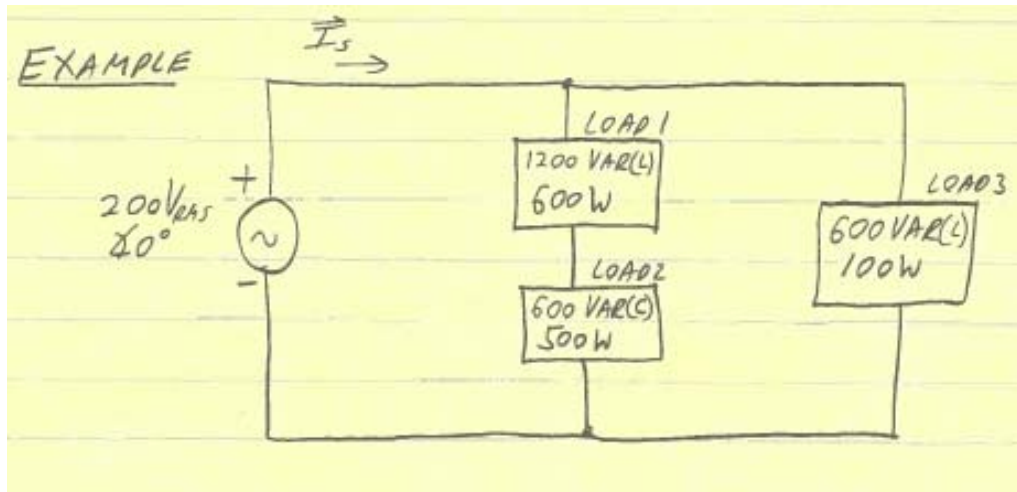


In Class Problem

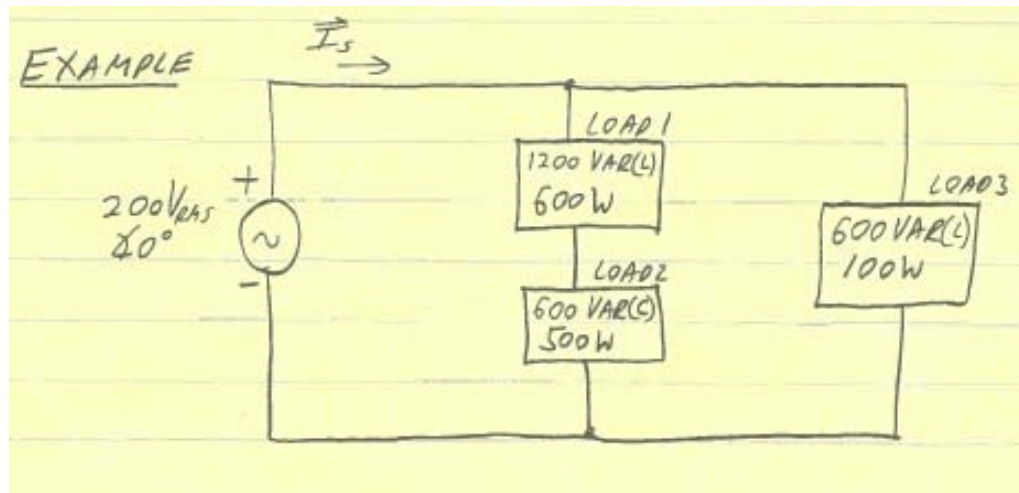


- (A) Find P_T (W), Q_T (VARs), S_T (VA)
- (B) Draw the power triangle
- (C) Determine F_p
- (D) Find I_s

Approach:

- 1) FIND P , Q FOR EACH CIRCUIT BRANCH
 - 2) $P_T = P_1 + P_2 + \dots$
 - 3) $Q_T = Q_{OT} - Q_{LT}$
OR
 $Q_{LT} - Q_{CT}$
 - 4) $S_T = \sqrt{P_T^2 + Q_T^2}$
 - 5) $F_p = P_T / S_T$, OR $F_p = \cos(\theta_z) = \cos(\theta_s)$
- OR ADD
" \vec{S} " IN EACH BRANCH
TO FIND \vec{S}_T
(VECTOR FORM)

In Class Problem



(A) Find: P_T (W), Q_T (VARs), S_T (VA)

FIND P_T, Q_T, S_T

$$\vec{S}_1 = 600 + j1200 \quad \leftarrow \text{INDUCTIVE}$$

$$\vec{S}_2 = 500 - j600 \quad \leftarrow \text{CAPACITIVE}$$

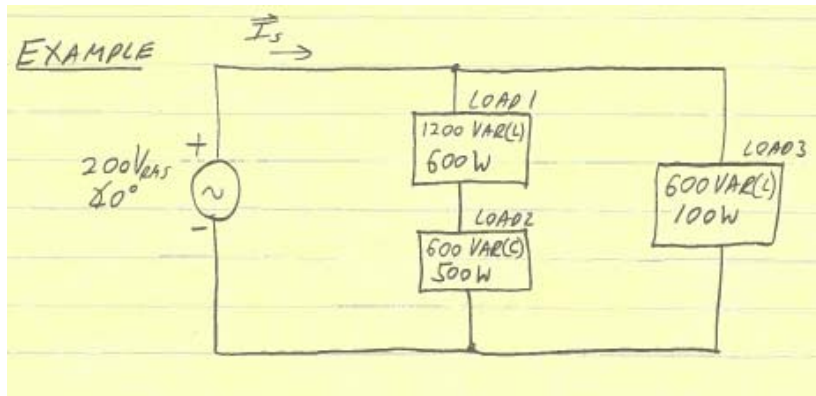
$$\vec{S}_3 = 100 + j600 \quad \leftarrow \text{INDUCTIVE}$$

$$\therefore \vec{S}_T = 1200 + j1200 \quad \leftarrow \text{INDUCTIVE}$$

$$\boxed{P_T = 1200\text{W}} \quad \boxed{Q_T = 1200\text{VARs}}$$

$$1697\text{VA} \angle 45^\circ$$

In Class Problem



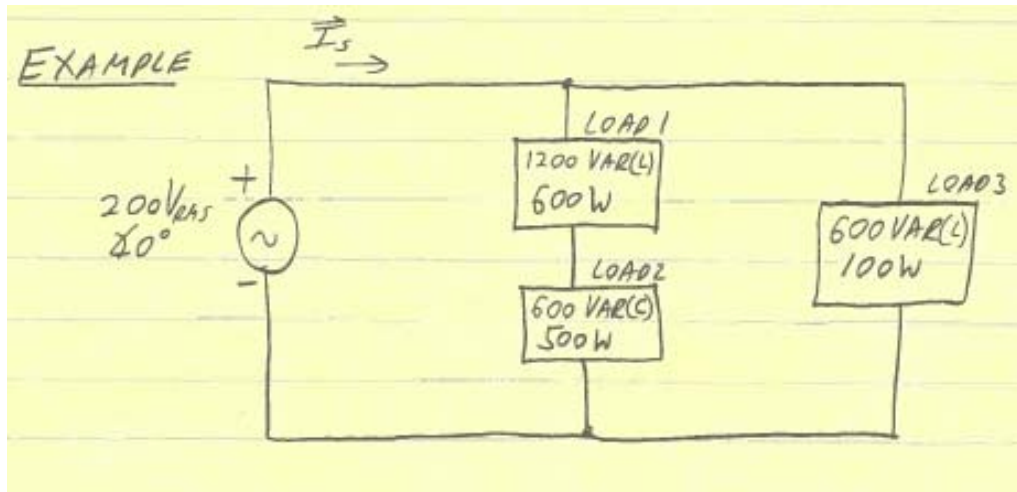
(B) Draw the power triangle

RECALL: $\vec{S} = \vec{P} + \vec{Q}$

HERE: $\vec{P} = 1200W \angle 0^\circ$
 $\vec{Q} = 1200VAR \angle 90^\circ$ (INDUCTIVE)



In Class Problem



(C) Determine F_p

$$F_p = \cos(\theta_z) = \cos(\theta_s)$$

$$\cos(45^\circ) = \boxed{0.707}$$

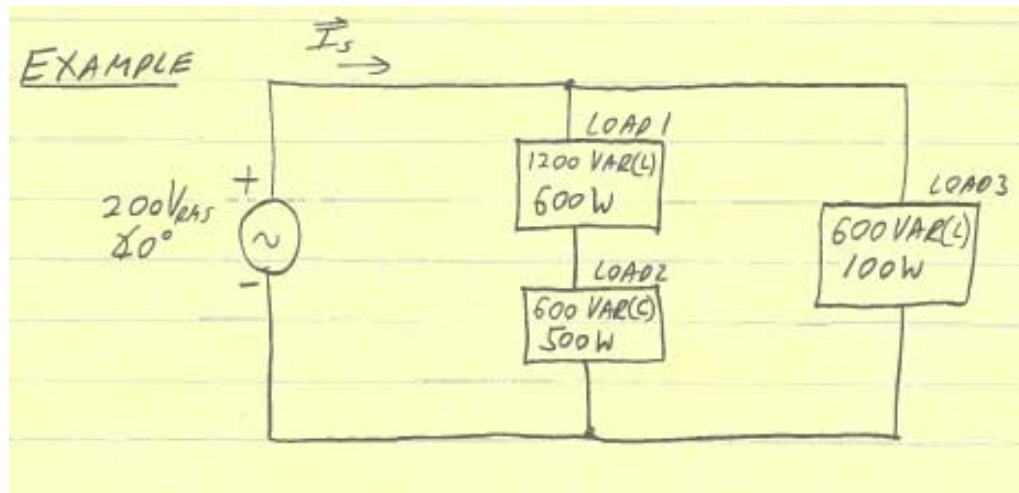
LAGGING (INDUCTIVE)

Or

$$F_p = \frac{P_T}{S_T} = \frac{1200}{1697} = \boxed{0.707}$$

LAGGING SINCE
INDUCTIVE

In Class Problem



(D) Find \vec{I}_s

$$\vec{S} = \vec{V} \vec{I}^*$$

See the posted PDF "S equals VI Conjugate Derivation"

$$\vec{I}_s^* = \frac{\vec{S}}{\vec{V}} = \frac{1697 \text{ VA} \angle 45^\circ}{200 \text{ V}_{RMS} \angle 0^\circ} = \underline{8.485 \text{ A}_{RMS} \angle 45^\circ}$$

$$\boxed{\vec{I}_s = 8.49 \text{ A}_{RMS} \angle 45^\circ}$$