ID# KEY

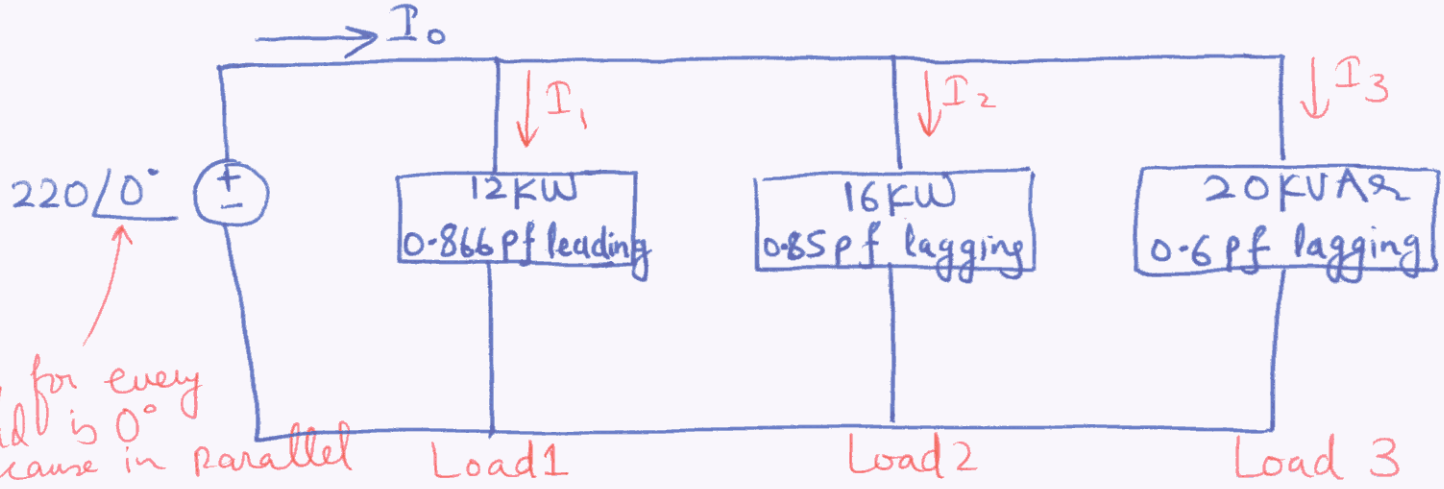
Name _____

# Quiz
## EE 201-06 (032)

(a) Find $I_o$

(b) Power factor of source (indicate if leading or lagging).

(c) What should be connected in parallel to make the source power factor to unity. (Dont find the value, just name the component and write the reason for your selection).




$\theta_V$ for every load is $0^\circ$ because in parallel

**For Load 1**

$P = VI\cos\theta \Rightarrow I_1 = \frac{12{,}000}{220 \times 0.866}$

$\Rightarrow |I_1| = 63\,A$

Also $\theta_V - \theta_I = -\cos^{-1}(0.866)$

$\Rightarrow \theta_I = 30^\circ$

$\therefore I_1 = |I_1|\angle 30^\circ = 63\angle 30^\circ$

**For Load 2**

$P = VI\cos\theta \Rightarrow I_2 = \frac{16{,}000}{220 \times 0.85}$

$\Rightarrow |I_2| = 85.56\,A$

Also $\theta_V - \theta_I = +\cos^{-1}(0.85) \Rightarrow \theta_I = -31.7$

$I_2 = |I_2|\angle -31.7^\circ = 85.56\angle -31.7^\circ$

**For Load 3**

$Q = VI\sin\theta \Rightarrow I_3 = \frac{20{,}000}{220 \times \sin(\cos^{-1}0.6)}$

$|I_3| = 113.63\,A$

Also $\theta_V - \theta_I = +\cos^{-1}(0.6) \Rightarrow \theta_I = -53.13$

$I_3 = |I_3|\angle -53.13 = 113.63\angle -53.13^\circ$

$I_o = I_1 + I_2 + I_3$

$= 63\angle 30^\circ + 85.56\angle -31.7^\circ + 113.63\angle -53$

$= 54.56 + j31.5 + 72.7 - j45 + 68.12 - j91$

$= 195.38 - j104.5$

$= 221.57\angle -28.14^\circ$

(b) $p.f. = \cos(\theta_V - \theta_I)$

$= \cos(0 - (-28.14))$

$p.f. = 0.882$ lagging.

because $\theta_I$ is lagging $\theta_V$

$\theta_V - \theta_I = +ve$

(c) Therefore we will connect a capacitor in parallel.