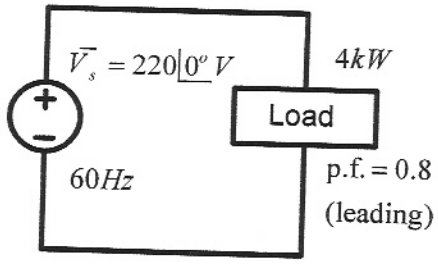
EE 201(04) Quiz 5

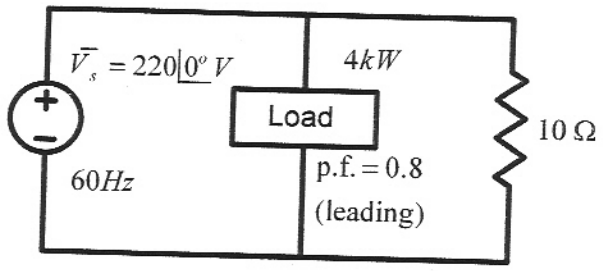
Name:

I.D. Number: KEY

The load shown in circuit (a) absorbs $4kW$ of average power when connected to the $220V$ sinusoidal source. The load has a leading power factor of 0.8.
a) Calculate the complex power absorbed by the load shown in circuit (a).
b) As seen in circuit b), a 10Ω resistance is connected in parallel to the load. Calculate the complex power absorbed by the *combined* load of circuit b).



(a)



(b)

a) $S = \dfrac{P}{P.f.} = \dfrac{4000}{0.8} = 5000 \text{ VA}$

$\theta = -\cos^{-1} 0.8 = -36.87^\circ$

$\therefore \bar{S} = S\angle\theta = 5000\angle -36.87^\circ \text{ VA}$

b) $P_{10\Omega} = \bar{S}_{10\Omega} = \dfrac{1}{2}\dfrac{V^2}{R} = 0.5\dfrac{(220)^2}{10}$

$= 2420 \text{ W}.$

$\therefore \bar{S}_t = \bar{S} + \bar{S}_{10\Omega} = 5000\angle -36.87^\circ + 2420$

$= (4000 - j3000) + 2420$

$= 6420 - j3000 = 7086.35\angle -25.05^\circ$

VA