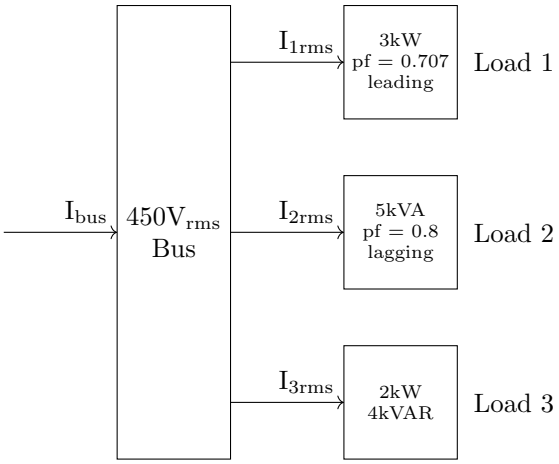
1. Analyze the following AC power system with three loads connected to a $450V_{rms}$ bus.




(a) Find the real and reactive powers for each of the 3 loads.

$P_1 =$

$Q_1 =$

$S_1 =$

$P_2 =$

$Q_2 =$

$S_2 =$

$P_3 =$

$Q_3 =$

$S_3 =$

(b) Find the total real and reactive powers supplied by the bus to the loads

$P_{\text{bus}} =$

$Q_{\text{bus}} =$

(c) Find the bus apparent power.

$S_{\text{bus}} =$

(d) Find the RMS value of the bus current.

$I_{\text{bus}} =$

2. A 3HP induction motor is powered from a $220\text{V}_{\text{rms}}$ bus. While delivering rated power, it operates at 80% efficiency and 0.85 power factor (lagging).

   (a) Find the real mechanical power out in Watts.

   $P_{\text{mech}} =$ ____

   (b) Find the real electrical power into the motor.

   $P =$ ____

   (c) Find the apparent power of the motor

   $S_{\text{motor}} =$ ____

   (d) Find the reactive power of the motor.

   $Q_{\text{motor}} =$ ____

   (e) Find the current drawn by the motor from the $220\text{V}_{\text{rms}}$ bus

   $I_{\text{motor}} =$ ____

(f) We wish to reduce this current to 13A by attaching a second item to the $220\text{V}_{\text{rms}}$ bus that has only a negative reactive power. Determine the amount of that reactive power.

$Q_{\text{device}} =$ [ ]