

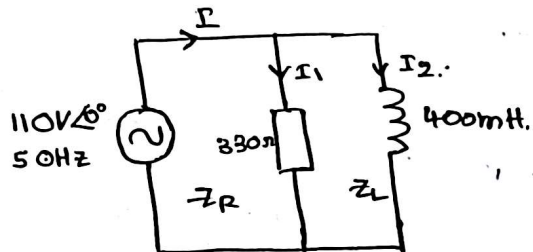
# EE256 POWER AND ENERGY

## Power Factor Improvement

Pre Lab.

E121/345

① Draw the phasor diagram for the circuit given below.



$$f = 50 \text{ Hz}$$

$$\omega = 2\pi f$$

$$\omega = 100\pi$$

$$Z_R = 330 \angle 0^\circ$$

$$Z_L = j\omega L$$

$$Z_L = 125.663 \angle 90^\circ$$

consider  $Z_R$ ,

$$V = I R$$

$$110 \angle 0^\circ = I_1 Z_R$$

$$110 \angle 0^\circ = I_1 (330 \angle 0^\circ)$$

$$\underline{I_1 = 0.333 \angle 0^\circ \text{ A}}$$

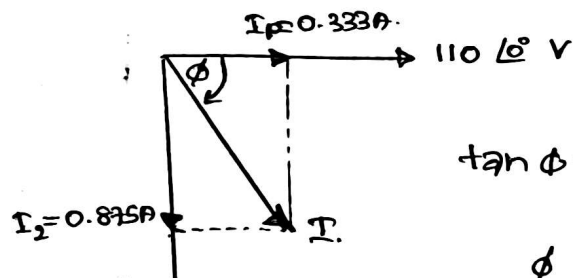
consider  $Z_L$ ,

$$V = I R$$

$$110 \angle 0^\circ = I_2 Z_L$$

$$110 \angle 0^\circ = I_2 125.663 \angle 90^\circ$$

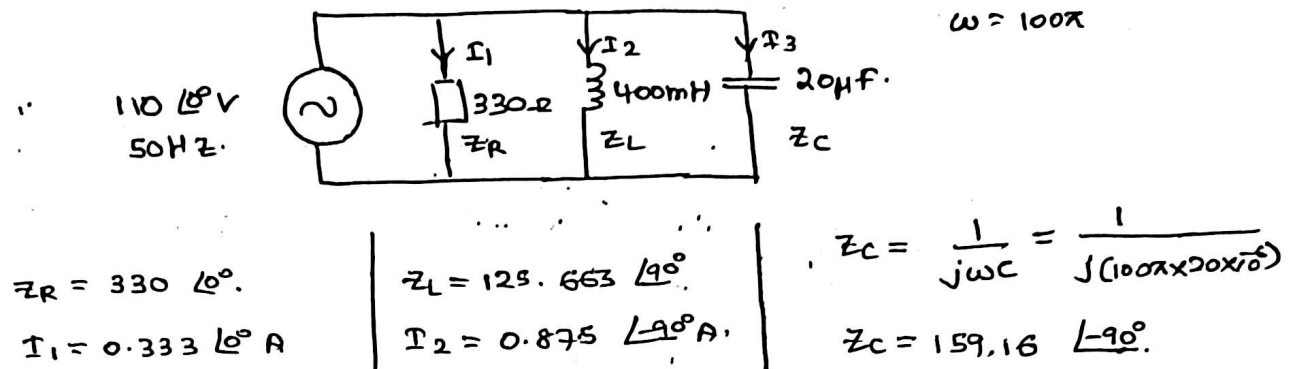
$$\underline{0.875 \angle -90^\circ \text{ A} = I_2}$$



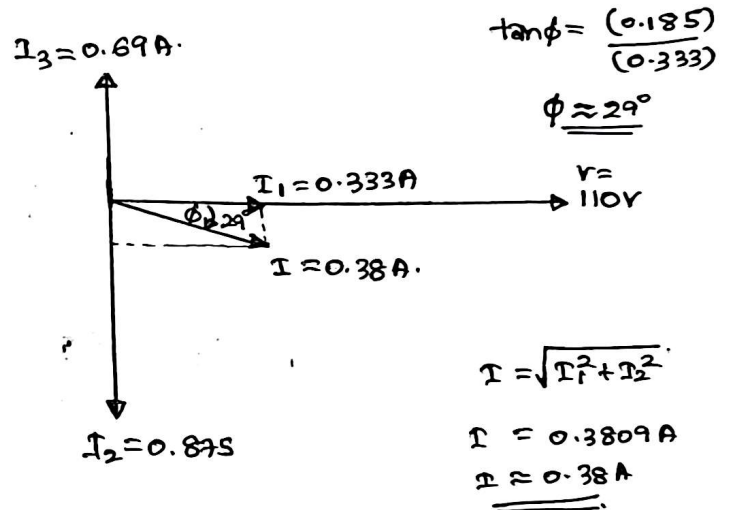
$$\tan \phi = \frac{0.875}{0.333}$$

$$\underline{\underline{\phi = 69.17^\circ}}$$

- ② A capacitor of magnitude  $20\mu\text{F}$  is connected in parallel to the same circuit. Draw the new phasor diagram.



$V = IZ$   
 $110 \angle 0^\circ = I_3 Z_C$   
 $110 \angle 0^\circ = I_3 159.16 \angle -90^\circ$   
 $I_3 = 0.69 \angle 90^\circ \text{ A}$



- ③ The circuit that you will assemble in the lab is shown in the following diagram. Can the probe's ground clip (COM) be connected as shown in the figure? Explain

The probe ground clip can be connected as in the figure because the secondary winding of the transformer provide isolation from main supply.

24/05  
Z