

Name:

Date:

Lab Section:

ECE 431 Electric Machinery Spring 2020

Pre-lab assignment #1

Due at the beginning of your lab session – no late Pre-lab assignments accepted.

1. Read Experiment #1. In your own words, what are the objectives of the experiment?

1 pt
Become familiar with 3Ø AC measurements.
i). One wattmeter method
ii). Two wattmeters method

2. A type of wattmeter called an electrodynamicometer has *independent* voltage and current ports. It displays the product $|V||I|\cos(\angle V - \angle I)$ regardless of connection (magnitudes represent RMS values). This meter is used as shown in Fig. 1.3 of the lab manual.

a) If the load in Fig. 1.3 is resistive, the voltages are all balanced three-phase line voltages equal to 230 V line-to-line RMS, and the line currents are 3 A RMS, what will this meter read when connected as shown (use a phasor diagram for voltages and currents)?

3 pt
 $\angle V_{BC} = -90^\circ, \angle I_a = 0^\circ$
 $|V_{BC}||I_a|\cos(\angle V_{BC} - \angle I_a) = 0 \text{ W}$

b) If the load instead has power factor of 0.75 lagging, but voltage is still 230 V and current is still 3 A what will the meter reading be?

3 pt
 $0.75 \text{ lag} \Rightarrow \angle I_a = -\cos^{-1}(0.75) = -41.41^\circ$
 $|V_{BC}||I_a|\cos(\angle V_{BC} - \angle I_a)$
 $= 1230 \times 1.3 \times \cos(-90^\circ + 41.41^\circ)$
 $= 456.4 \text{ W}$

c) Can the meter ever read negative values (if so, explain how)?

3 pt
Yes, If the load is capacitive