Homework 3

Due Monday, February 7

**Reading:** Chapter 10

**Problems:** Complete all parts of the following problems from the text, unless specific problem parts are indicated. Note that answers may not be given for all parts of the problems below. You must show your work to receive credit for each problem. You should draw appropriately labeled circuit schematics or block diagrams as part of your solution for any problem where quantities used in your solution are defined by you in the circuit or diagram!

* 10.15 (a) 15.81 V(rms); (b) 62.5 W
* 10.27 (a) (1.875 + j0.625)Ω; (b) 0.9487 lagging
* 10.28 (a) 254.57∠2.07° V(rms) (b) 160 W, 1280 var; (c) 30.16 kW, 11.28 kvar

(d) 99.47%

* 10.30 11.95 μF
* 10.32 (a) -640 kvar; (b) deliver; (c) 0.447 leading;

(d) |IL | = 833.33 A(rms); (e) ) |IL | = 833.33 A(rms)

* 10.33 (a) 34,722.22 W; (b) 2552.028 V(rms)
* 10.34 (a) |VS| = 133.48 V(rms); (b) 256 W; (c) 1788.59 μF

(d) |VS| = 126.83 V(rms); (e) 184.96 W

* 10.44 (a) (20 + j20) Ω; (b) 20 W; (c) 20 + j5 Ω
* 10.46 (a) 62.5 W (b) 16.67%

By the end of this assignment you should

* Understand the concepts of instantaneous power, average power, reactive power, and power factor, and how they are interrelated.
* Understand the concept of rms value, be able to calculate the rms value of a periodic waveform, and know how to use rms values to calculate power in AC circuits.
* Understand how to use the concept of complex power to perform power balance calculations in ACSS circuits.
* Be able to calculate AC power in circuits with linear or ideal transformers.
* Know the condition for maximum power transfer to a load impedance in AC circuits and be able to calculate the load impedance required for maximum power transfer.

Rules and regulations:

* Assignments should be completed on single sides of standard-sized letter paper without ragged edges. Assignments should be stapled in the upper left corner, and your name and section number must appear in the upper right corner of each page. Your solutions should be large and legible. Failure to follow these instructions will result in a grade of zero(0) for this assignment.
* While you may consult with anyone in figuring out how to solve these problems, the solutions you write and turn in must be yours alone. Copying another person’s solution, either in whole or in part, will result in a grade of zero(0) for both students. Copying from any other source will result in a grade of zero(0).