EE 233 HW2

OCT 10th

Due Date: OCT 17th

Problems from text book (electric circuits, 10th version): **10.4, 10.13, 10.47**

Other problems are listed below

1. The three loads in the circuit seen in Fig.1 are described as follows: Load 1 is absorbing 7.5 kW and 2500 VAR; load 2 is absorbing 10 kVA at a 0.28 pf lead; load 3 is a 12.5 Ω resistor in parallel with an inductor that has reactance of 50 Ω.

a) Calculate the average power and the magnetizing reactive power delivered by each source if $\mathbf{V}_{g1} = \mathbf{V}_{g2} = 250 \angle 0^{\circ}$ V (rms).

b) Check your calculations by showing your results are consistent with the requirements

$$\sum P_{dev} = \sum P_{abs}$$

$$\sum Q_{dev} = \sum Q_{abs}$$

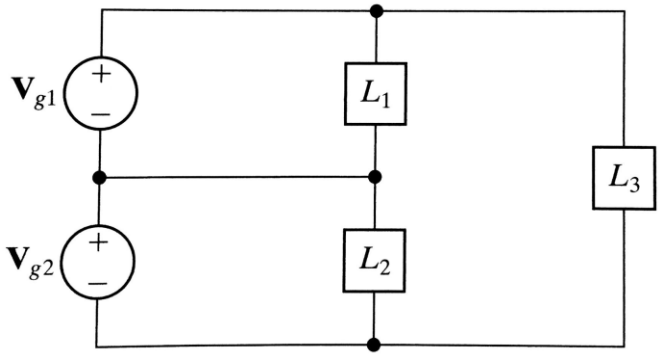

Figure 1

2. a) Find the average power dissipated in the line in Fig.2

b) Find the capacitive reactance that when connected in parallel with the load will make the load

look purely resistive

c) What is the equivalent impedance of the load in (b)

d) Find the average power dissipated in the line when the capacitive reactance is connected across the load

e) Express the power loss in (d) as a percentage of the power loss found in (a).

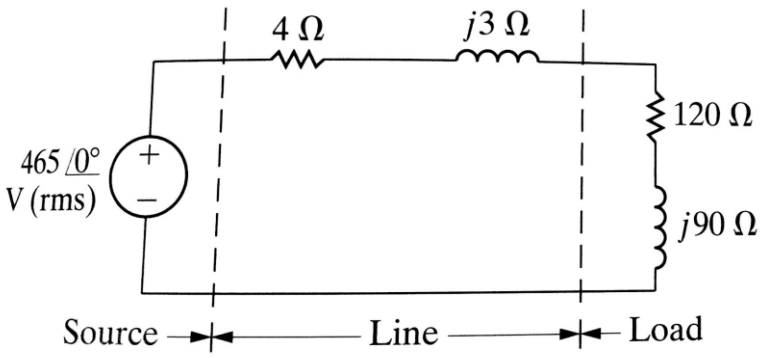

Figure 2

3. The Phasor Voltage $\mathbf{V}_{ab}$ in the circuit shown in Fig.3 is $240\angle 0^{\circ}$ V (rms) when no external load is connected to the terminals a,b. When a load having an impedance of $90 - j30\ \Omega$ is connected across a,b, the value of $\mathbf{V}_{ab}$ is $115.2 - j86.4$ V (rms).

a) Find the impedance that should be connected across a,b for maximum average power transfer.

b) Find the maximum average power transferred to the load of (a).

c) Construct the impedance of part (a) using components from Appendix H if the source frequency is 60 Hz

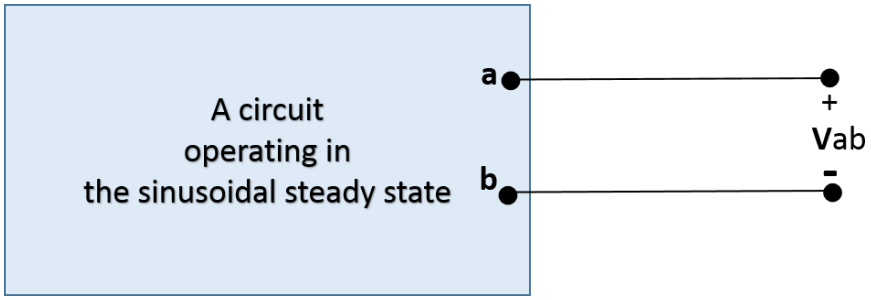

Figure 3