

## HW 4

1.

A single phase, 60 Hz, source supplies a 90 KVA , 0.8 power factor **lagging** load through a transmission line with impedance  $0.02 + j0.05$  ohm.

A. If the Load voltage needs to be 277 V find the voltage and complex power needed at the source.

Ans: Magnitude of source voltage= 292 V

B. Determine the value in Farads and the VAR rating of a 277 V capacitor which, when connected in parallel with the load, will correct the power facto to 0.98 lagging. ANS 39.4 KVAR

C. With the capacitor added, if the Load voltage needs to be 277 V find the voltage and complex power needed at the source. Compare your answers for source voltage, source current, and line loss with those without the capacitor(Problem 1), and comment.

2.24 The lighting load(incandescent bulbs) has a PF=1; For the third load, synchronous motor, the problem gives 10 HP as going out of the motor ( supplied by the motor to whatever the motor is turning). We need to know what is being supplied to the motor by the source. Recall HW 2, efficiency = output real power/ input real power. Ans:Real Power from source 27.78 kW

2.26 part b only. Draw a circuit diagram please Ans: 682.4 V

**2.31**

To calculate complex power entering a line such as the line from Node 1 at the left to Node 2 on the right, in Fig. 2.26, p. 76, start with calculating the current  $I_{12} = (V_1 - V_2)/jX$  then  $S_{12} = V_1 I_{12}^*$  . For part (b) assume voltage magnitudes are fixed but  $\delta_1$  and  $\delta_2$  can change.

**Due 9/8/08**

Part Answer  $P_{12} = [ |V_1| |V_2| \sin (\delta_1 - \delta_2) ] / X$

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