

## PHYSICS-2

### Elementary Physics of Energy

#### Homework 6

Due Date: May 18, 2012

This set of problems has no correspondence to those in RK, but are based on class notes and the hand out on resistances that is in the “Resources” folder. If necessary, you can look up the other books on reserve.

1. A power plant produces 150MW power at 400V, and is connected to a transmission line with resistance 100 Ohms that delivers power to a home at 115 V. Design two transformers needed to ensure that the power dissipated in the transmission line is 2% of that produced assuming ideal transformers.

{ Hint: Break the problem into the various bits that were discussed in class. The meaning of “design”, is that you should calculate the ratio of the transformer windings. }[50]

2. A pack of batteries produces a voltage of 60V in a circuit containing three resistances  $R_1, R_2, R_3$  with magnitude 5, 3 and 1 ohms. Imagine two configurations that were not considered in class, and represent a slight challenge to the class- These are
  - a)  $R_1, R_2$  in parallel and  $R_3$  in series with this combination.[25]
  - b)  $R_1, R_2, R_3$  all in parallel simultaneously, (i.e. imagine twisting three end points of each resistor into one knot for each of the two endpoints).[25]

For each configuration, calculate the current, power dissipated and voltage drop across each resistor.