



**COLORADO SCHOOL OF MINES
ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT**

**EENG-382
Engineering Circuit Analysis (Circuits II)
Spring 2014**

Handwritten Homework #3 (HW03)

Problem #1

Consider a Y-connected generator set in which each leg has an open circuit output voltage of 240V and a source impedance of $(0.1+j0.8) \Omega$. The transmission lines connecting the generator set to the loads each have an impedance of $(0.4+j3.2) \Omega$. The load consists of three Y-connected circuits. The loads are $Z_A = (59.5+j76) \Omega$, $Z_B = (39.5+j26) \Omega$, and $Z_C = (19.5+j11) \Omega$.

Use the neutral point of the generator set as the voltage reference.

- a) What are the magnitudes of the voltages across and currents in the three loads?
- b) What is the magnitude of the voltage at the neutral point of the load?

A ground rod is now placed at the neutral points of both the generator set and the load and the effective impedance through the ground between the two rods is 10Ω .

- c) What are the magnitudes of the voltages across and currents in the three loads?
- d) What is the magnitude of the voltage at the neutral point of the load?
- e) What is the magnitude of the ground current?

In addition to the ground rods, a fourth wire (the same as the others) is added to the transmission line to serve as a neutral wire.

- f) What are the magnitudes of the voltages across and currents in the three loads?
- g) What is the magnitude of the voltage at the neutral point of the load?
- h) What is the magnitude of the ground current?
- i) What is the magnitude of the current in the neutral conductor?