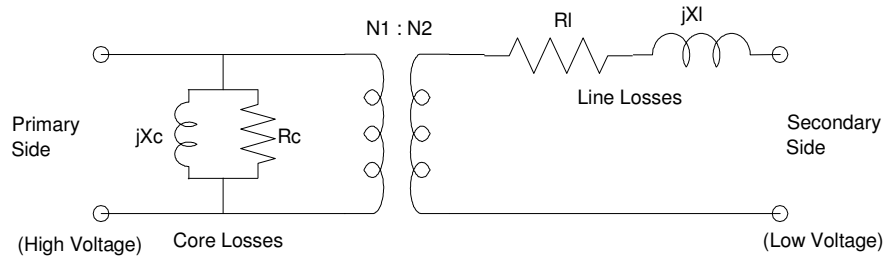# ECE 111: Homework 15

Week #15 - ECE 331 Energy Conversion. Due 8am, Tuesday May 3rd

Please submit as a Word or pdf file to BlackBoard or email to Jacob_Glower@yahoo.com with header ECE 111 HW#15

www.BisonAcademy.com

1) Determine the circuit model for a 9.6kV : 240V transformer is tested with the following test results:

Transformer Model

	V	Power	pf
Open-Circuit Test	V1 = 9.6kV	105 W	0.03
Short-Circuit Test	V2 = 24V	22 W	0.95

For the utility grid on the back of the page....

2) Convert the voltages and impeances to the 120V node (right side)

3) Determine the voltages at each node

4) Determine the efficiency of this system
   • Ignoring the core losses
      - Assumes a large number of customers share these losses
   • Including the core losses
      - Assumes a single customer

Top circuit labels:

214
1000km

240kV : 13.2kV

1.07
5km

13.2kV : 120V

0.0214
100m

240kV

j1.5M   5M

j5k   20k

1.44

240kV Transmission Line

Transformer

13.2kV Transmission Lines

Transformer

Residential: 120V

10kW Load

Coal plants

Minneapolis

Residence

Bottom circuit node labels:

V0   V1   V2   V3