جامعة بيرزيت
BIRZEIT UNIVERSITY

Electrical and Computer Engineering Department

Power Electronics-ENEE 3305

An Assignment on Power Supply Design Using Rectifiers and Voltage Regulators

Fall 2017

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Assign. #2

Dc Power Supply

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Abstract:

- **1)** The aim of this assignment is to design a three phase full wave rectifier to converte the Ac voltage(380VRMS) to the DC voltage(12 Volt and 15A) and is connected to the regulator via a step down transformer.

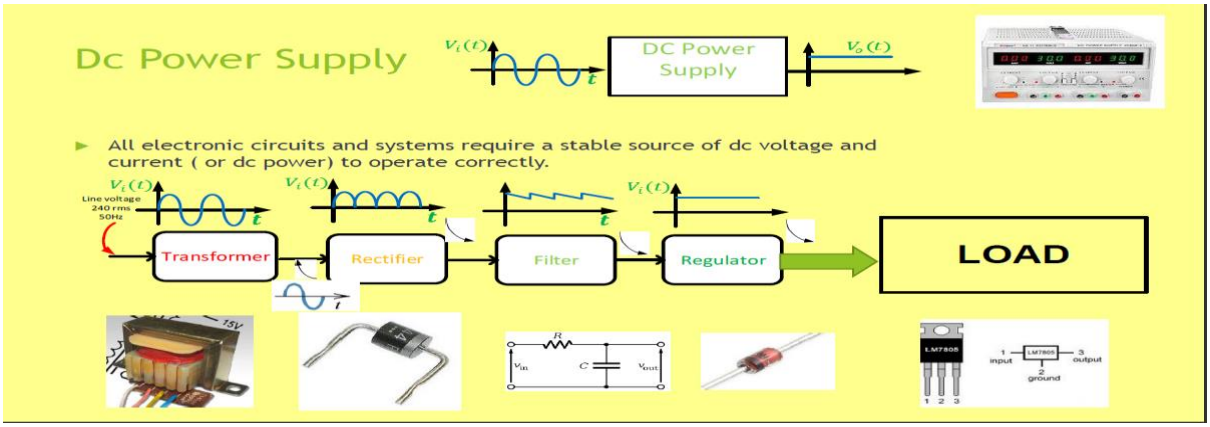
  2) To show the design steps of the step-down transformer, the capacitor at the input of the linear regulator, and the linear regulator.

  3) Show the Orcad circuit and its simulations.

- The methods used: in this assignment we use orcad simulation.

Theory:

- **A group of circuits that convert the supply standard ac voltage (220 V, 50 Hz) provided by the wall outlet to constant dc voltage**



Calculation:

from the qustion: V_l =12V and I_l=15A>>> so, R_l=$\frac{12}{15}$ =0.8

Assume ΔV=20V

- **ΔV=$\frac{I}{C*6*f}$**

  20=$\frac{15}{c*6*50}$

  So, C=2500µ

- **Vm=$\frac{\Delta V}{2}$ +16 = 26V**

  To find the turns ratio:

  $\frac{310}{26}$ =12

- **V_o =(1+$\frac{R2}{R1}$)*V_z**

  Assume Vz=6Volt.

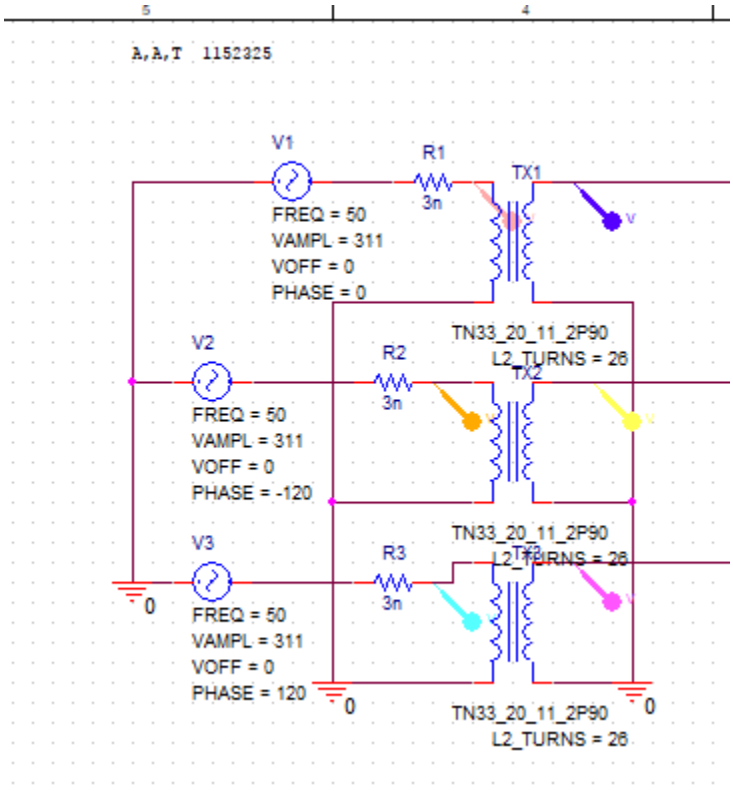
  >>12=6+6$\frac{R2}{R1}$

  R2=R1>>=R

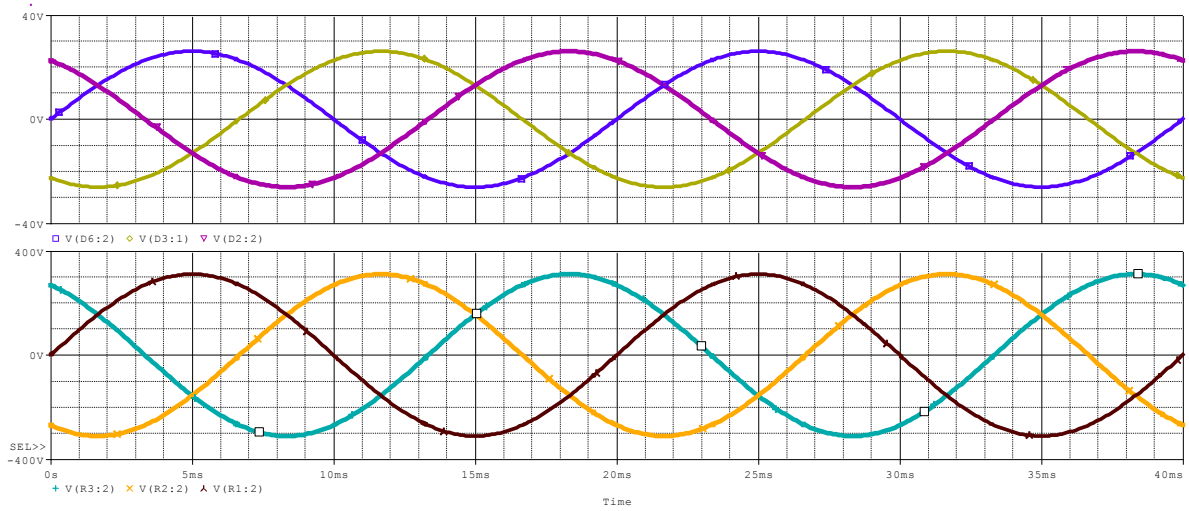
  Hence, assume R=100K.

- **the attenuation ripple:**
- **65= 20log(ΔVin/ΔVo)**
- **65=20log(20/ΔVo)**

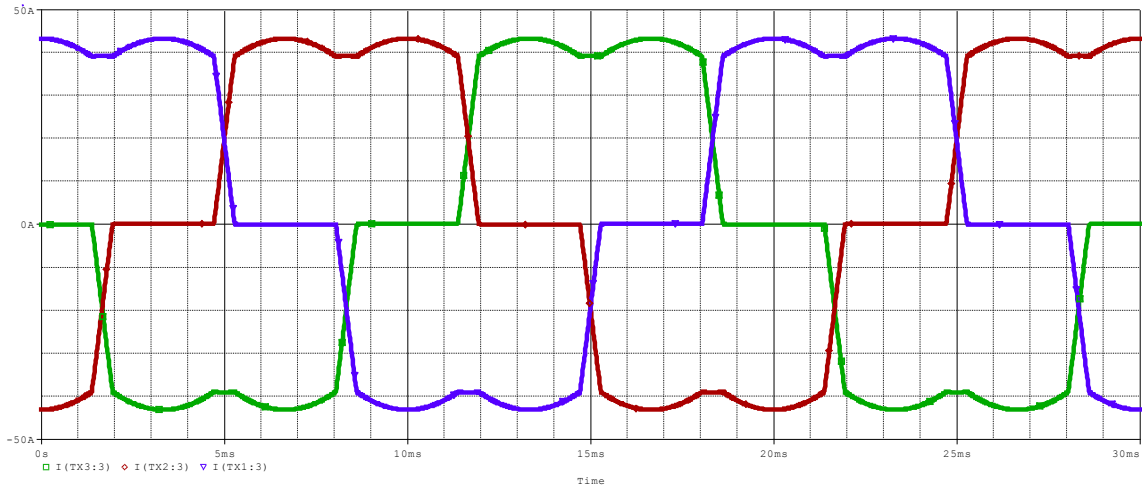
Stage one the input and output voltages from the transformer:



The result:

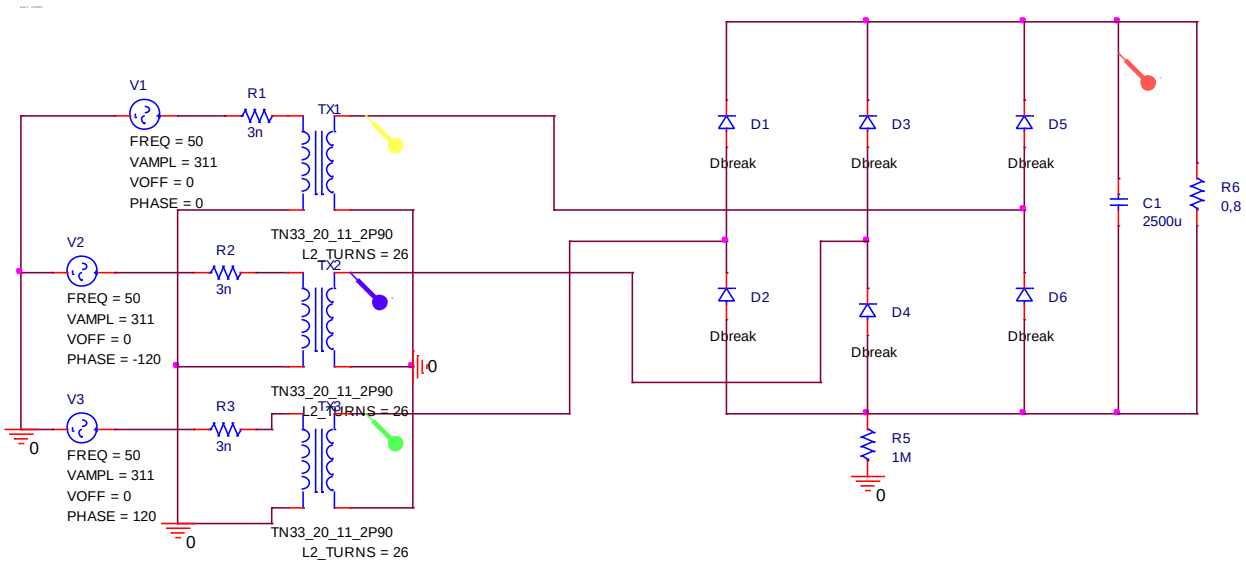


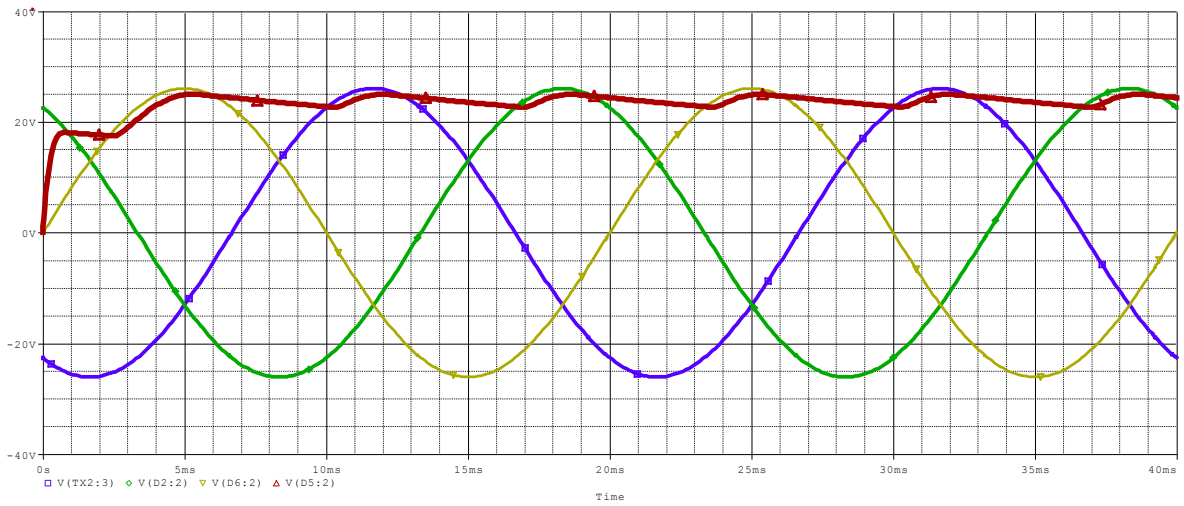
Current in the secondary



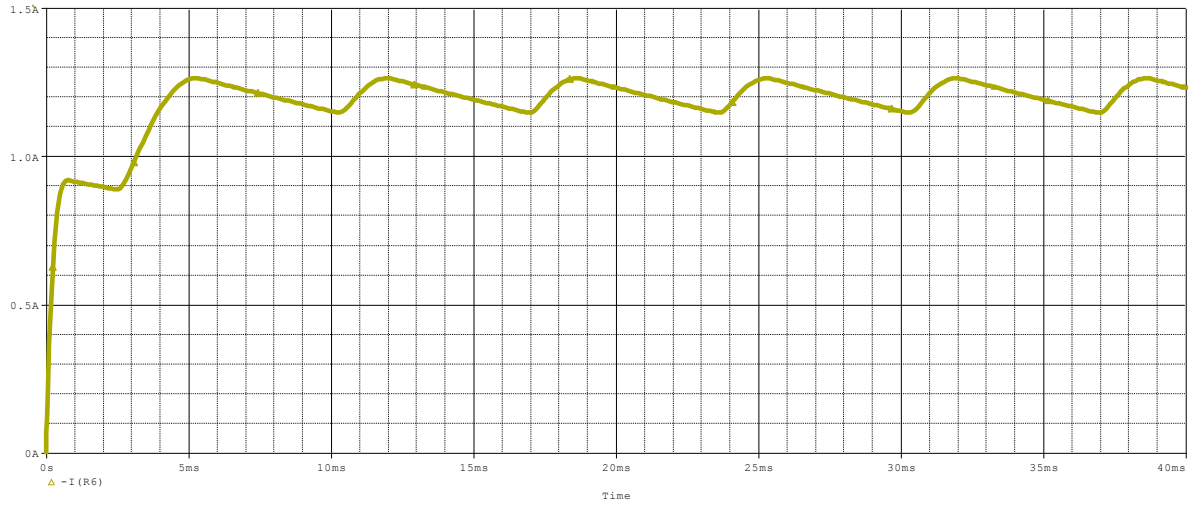
The output from the capacitor:

Circuit diagram:

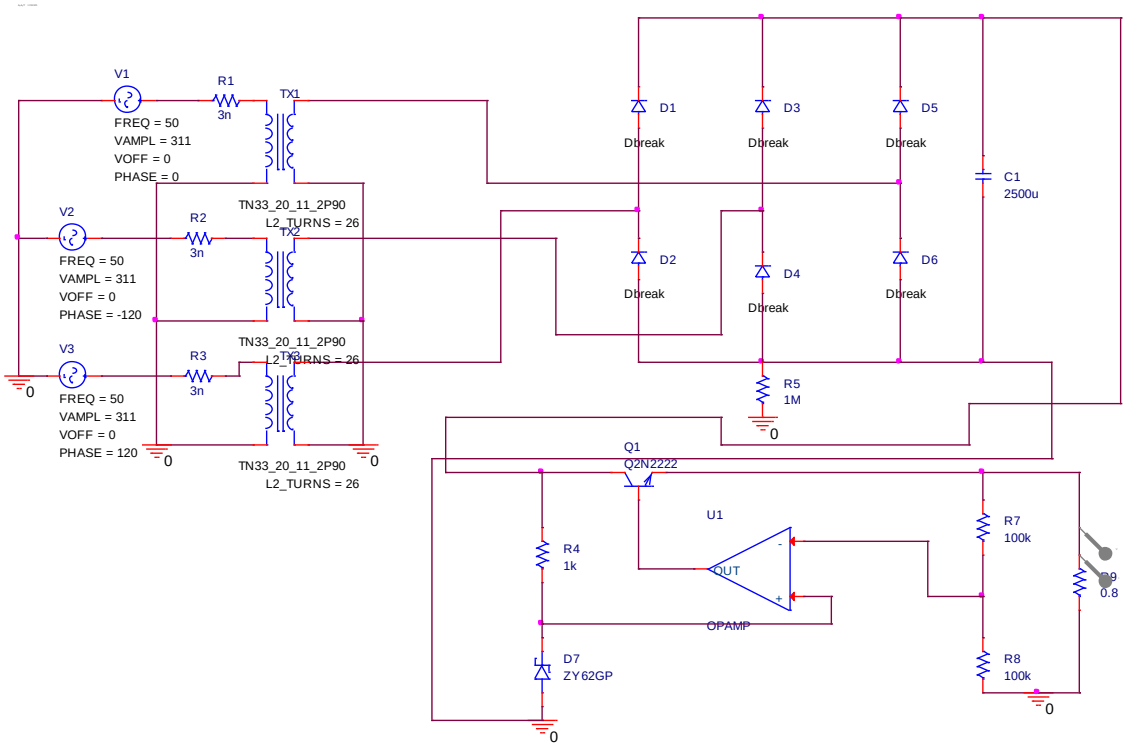



40V
20V
0V
-20V
-40V
0s
5ms
10ms
15ms
20ms
25ms
30ms
35ms
40ms
V(TX2:3)
V(D2:2)
V(D6:2)
V(D5:2)
Time

Current at the capacitor:



The output from the regulater:



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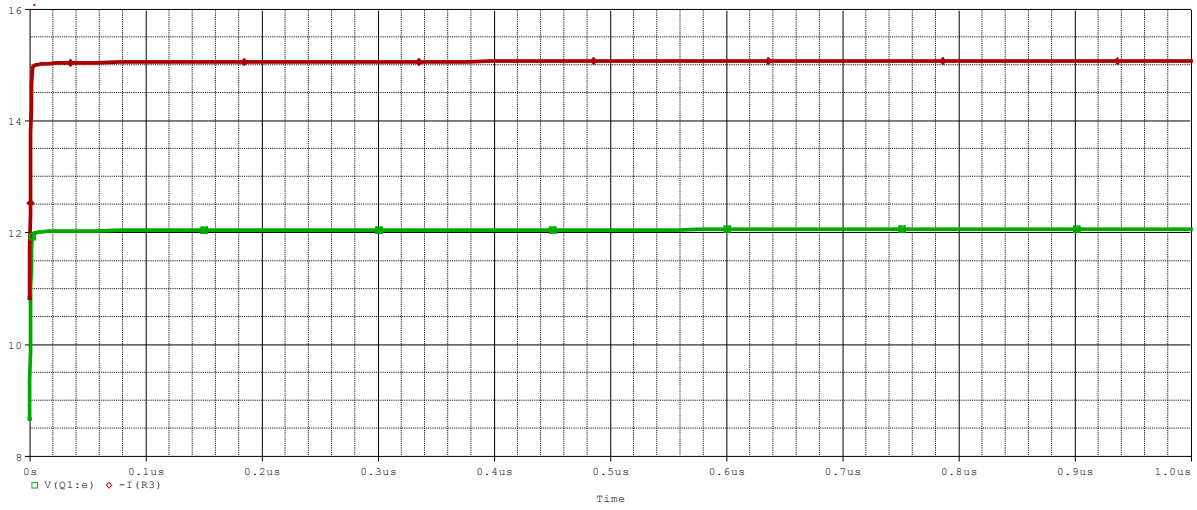
The final output from the DC power supplay:



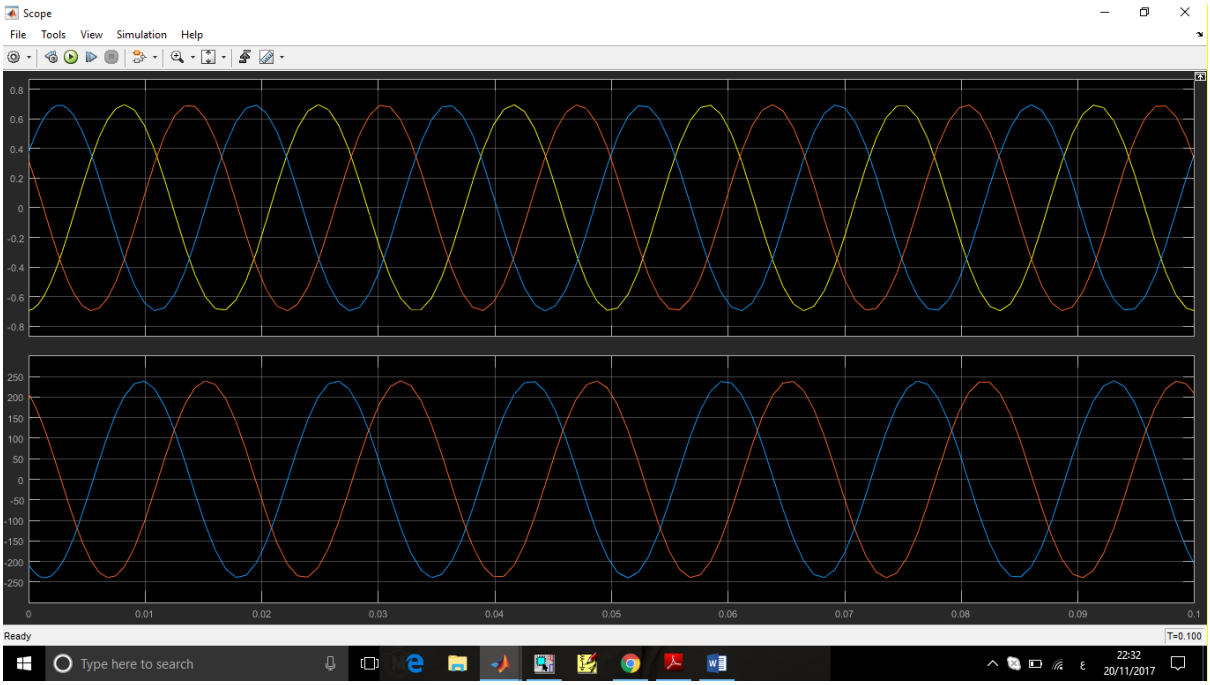
Conclusion:

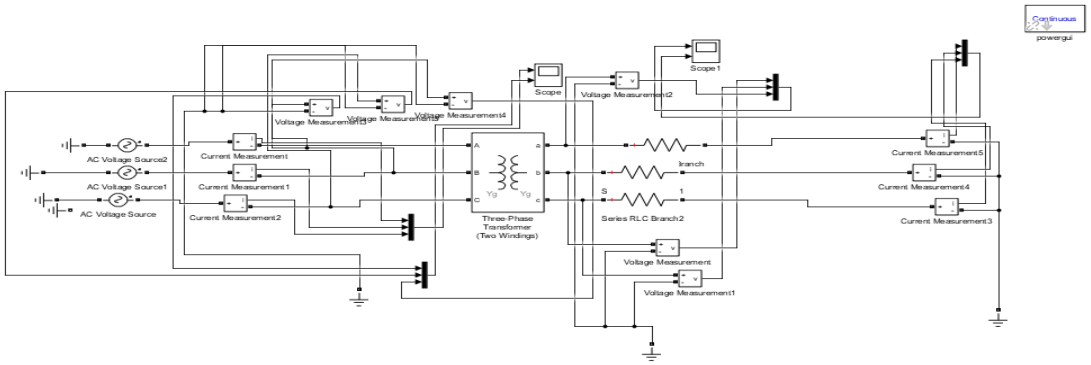
Not That: The aim of DC power supply is to get a DC current and voltages at the output, this operation must be pass from many stages, when I design the DC power supply I take with the intonation the minimum coast for the components and the minimum size of the DC voltages.

The practical design maybe different from the practical project since that the voltage drop at the component in orcad is zero ”IDEAL CASE” but in practical we find the voltage drop at the component.

The main error and problem we face in this assignment is the orcad cannot graph the currents at different nodes.

Try to solveASSI. Use MATLAB Simulink. >>.




Continuous
powergui
Scope1
Scope
Voltage Measurement2
Voltage Measurement4
Voltage Measurement3
Voltage Measurement5
AC Voltage Source2
AC Voltage Source1
AC Voltage Source
Current Measurement
Current Measurement1
Current Measurement2
A
B
C
a
b
c
Yg
Yg
Three-Phase
Transformer
(Two Windings)
Rranch
S
t
Series RLC Branch2
Current Measurement5
Current Measurement4
Current Measurement3
Voltage Measurement
Voltage Measurement1