Electrical Circuits LAB #1 - Instrumentation & Processes

Objectives

Understanding of instrumentation and lab processes used in Electrical Circuits Labs.

Material

- Textbook: Electrical Circuits by Nilsson & Lecture material
- www.EngrCS.com
- Instruments: Power Supply, Function Generator Multi-Meter and Oscilloscope
- Supplies:
  - Electrical Tool Box
  - Proto Board
  - Probes & Connecting Cables

Experiment 1

Each team should complete a team assessment which at minimum should include the following information for each team members:

- Name
- Past experience in Electrical Circuits and Engineering
- Expected outcomes from the lab

Experiment 2

Based on in-class presentation covering power supply, function generator, Multi-Meter and oscilloscope instruments, complete the following steps:

1) Identify & document controls for the Power Supply and draw a diagram of a usage example.

2) Identify & document controls for the Function Generator and draw a diagram of a usage example. Ensure that your controls include:
   a. Frequency control
   b. Amplitude control
   c. DC bias/offset control

3) Identify & document controls for the Multi-Meter and draw a diagram of a usage example. Ensure that your controls include:

   a. Range Selector
   b. Resistance, Current and Voltage Control
   c. Measurement read out

4) Identify & document controls for the Oscilloscope and draw a diagram of a single channel usage example. Ensure that your controls include:
   a. Channel One Vertical control
   b. Time domain Control
   c. Screen layout and screen horizontal/vertical division definition

Experiment 3

Identify and catalog the types of components in your toolbox. Additionally, for resistors only, identify four different valued resistors that you find in your toolbox:

- First using the color bands calculate the resistors' value, include tolerance for each resistor (See Appendix)
- Second using Multi-Meter to measure the resistors' value. Are these values within the resistor tolerances?

Report Requirements

Reports must be prepared individually even if the experiments are performed as a team. All reports must be computer printed (formulas and diagrams may be hand drawn) and at minimum:

For each experiment include:

a) Clear problem statement; specify items given and to be found
b) Theory and process used
c) Resulting circuit diagram, tables, graphs, calculations and other results

For the overall report include:

a) Cover sheet with your name, lab, date of completion and team members' names
b) Lessons learned from this lab
c) A new experiment and expected results which provide additional opportunity to practice the concepts in this lab

Appendix - Resistor Color Bands

Resistor Value Color Bands:

Band Colors	*Value Bands, 1st & 2nd*	*Multiplier Color Band, 3rd*
BLACK	0	x1
BROWN	1	x10
RED	2	x100
ORANGE	3	x1,000 or 1K
YELLOW	4	x10,000 or 10K
GREEN	5	x100,000 or 100K
BLUE	6	x1,000,000 or 1M
VIOLET	7	x10,000,000 or 10M
GRAY	8	x100,000,000 or 100M
WHITE	9	x1000,000,000 or 1G

Note: If third band is gold then divide by 10 and if silver divide by 100.

Resistor Tolerance Color Bands:

Band Colors	*Tolerance Color Band, 4th*
GOLD	5%
SILVER	10%
NONE	20%