Lab Assignment 1: Equipment Familiarity and First Order Electrical Circuits

Lab 1 Checklist

Name:_____

I. Function Generator, Oscilloscope (10 pts total) 1. Highest measurable amplitude: sine, square, triangle wave. 2. Lowest measurable amplitude: sine, square, triangle wave. 3. Highest measurable frequency: sine, square, triangle wave. 4. Lowest measurable frequency: sine, square, triangle wave.

II. Digital Multimeter (DMM) (20 pts) 1. 80 Hz (a) Diagram of Figure 1. (b) x10 probe measurement of Vin and Vo. (c) DMM measurement of Vo. (d) Percent change in readings? (e) One sentence conclusion. 2. 300 KHz (a) DMM measurement of Vo. (b) Effect on oscilloscope readings? (c) Observations with square wave. (d) One sentence conclusion. 3. Using 10 M @80 Hz (a) DMM measurement of Vo. (b) Expected value? (c) One sentence conclusion.

III. Low pass RL circuit. (35 points total)

1. Diagram of the circuit (Fig. 2). Circuit diagrams can be cut from the lab assignment and pasted into your report.

2. Theoretical amplitude response. Using your measured values for R and L and your result from part (a) of the prelab, plot the circuit's theoretical amplitude response. Plot should be in dB vs. log10 of the frequency. Calculate or estimate (from the plot) the 3dB frequency.

3. Theoretical step response. Using your measured values for R and L and your result from part (b) of the prelab, plot the circuit's theoretical step response. Calculate or estimate the time constant .

4. DEMO: Have your TA or instructor initial this sheet, indicating that they have observed your circuit's operation for sinusoidal and step inputs. Circuit operates; input applied and output measured correctly. Circuit operation matches expected theoretical high and low frequency responses. (Show TA pre-lab analysis of frequency response.) Measured time constant, measured cutoff (3 dB) frequency,

and relationship between the two. (Show TA pre-lab analysis giving relationship between time constant and cutoff frequency).