

Dyson School of Design Engineering

DE 1.3 Electronics 2018- Learning Outcomes of Laboratory Sessions

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This document serves as a checklist for you to assess how much you have learned from the four experiments that you have completed.

Lab 1: Using the Oscilloscope

Measurement of AC and DC voltages with proper scaling in voltage and time axes; Make measurements on time and period with appropriate adjustment of the time axis; Make relative measurements; Effective use of the trigger mechanism to get a steady waveform; Adjustment of the high impedance x10 probe; Using the scope to measure various type of signals with appropriate degree of accuracy.

Lab 2: Electronic circuits

Voltage divider circuit and its use; Thévenin equivalent circuit; Effect of loading on a signal source; Nodal analysis with KCL/KVL to predict voltage measurements; RC network response to a rising step signal; RC time constant and its measurement; Trading off R with C in a RC network; frequency response of a RC circuit in log/log axes; meaning of dBs for voltage ratio measurements; Corner frequency and its relationship to RC time-constant; Using frequency response and DMM to determine unknown component values in a network with one or more resistors and one capacitor.

Lab 3: Operational Amplifiers

The principle of operation of a unity gain buffer amplifier and why it is useful; Designing and testing of non-inverting amplifier using opamp and how its gain is determined; Why AC coupling is necessary and how it is achieved; How to bias an AC coupled amplifier with a separate voltage reference; Gain-bandwidth Product of an opamp; Two-stage amplification; Amplifying a real-life signal (e.g. ultrasound); Peak detection with diode and a RC network.

Lab 4: Drive, Sense and Link

Using Python on Pyboard; digital I/O; analogue I/O; PWM signal and using it to control DC motor speed; magnetic and infrared sensors; serial communication between mobile phone and the Pyboard; UART signals; remote control of motors.