Lab 14 Notebook

Actual gain should be (0.7 * max gain) because measuring at -3dB point

Optical Sensor

- R_D = 100
- R_E = 2.2k
- Average Voltage Without Finger = 286.34 mV
- Average Voltage With Finger = 170.04 mV

High Pass Filter

- R_1 = 24 kΩ
- R_2 = 560 kΩ
- R_3 = 220 kΩ
- C_1 = 1 μF
- Calculated Gain = 24.333
- Calculated Cutoff = 0.723 Hz
- Network
  - Gain at 4.9862 Hz (saturated range) is 24.15   (Percent Error = %)
  - At 723 Hz (cutoff), gain is 17.56
    - Expected Cutoff Gain (-3dB point) = 17.0331
    - Cutoff Gain Error = 3%
- Scope
  - At 1kHz, Measured Gain = 2.4659 / 0.10165 = 24.26
    - Gain Error = 0.3%
    - Amplitude was 50 mV

Passive High Pass Filter

- R = 55 kΩ
- C = 10 μF

Low Pass Filter

- R_4 = 10 kΩ
- R_5 = 150 kΩ
- R_6 = 475 kΩ
- C_2 = 0.1 μF
- Calculated Gain = 16
- Calculated Cutoff = 3.351
- Network
  - Gain at 468.69 mHz (saturated range) is 15.83   (Percent Error = 1.0625%)
  - At 3.351 (cutoff), gain is 10.57
    - Expected Cutoff Gain (-3dB point) = 11.2
    - Cutoff Gain Error = 5.625%

- Scope
  - At 1 Hz, Measured Gain = 0.26852 / 0.020462 = 13.123
    - Gain Error = 17.98%
    - Amplitude was 10 mV

Band Pass Filter

- Scope
  - At 2 Hz, Measured Gain = 6.0212 / 0.020462 = 294.263
    - Expected Band Pass Gain (0.7 * max) = 272.53
    - Band Pass Gain Error = 7.39%
    - Amplitude was 10 mV
- Network
  - At 723 Hz (low cutoff), gain is 248.5
  - At 3.351 Hz (high cutoff), gain is 255.2
  - At 1.5814 Hz (Max Gain), gain is 300
  - Waveform
    - Range: 100 mHz to 10 Hz
    - 10 mV Amplitude

Analog to Digital

- R_7 = 100 kΩ
- R_8 = 1 MΩ
- R_9 = 82 kΩ
- C_3 = 1 μF