EE3006* Experiment-4 Lab Report

Putta Shravya - EE22B032
Polamuri Hasmitha - EE22B075
Vasireddy Yasaswi - EE22B040

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1. Design and build the difference amplifier OD as shown in Figure 1 for gain = 1. Choose appropriate resistors so that the minimum input impedances for v1 and v2 are 20 kΩ and 10 kΩ respectively.

(a) Measure vo for v1 = 3 V, v2 = 2.5 V. Calculate Ad.

Measured Vo = 0.54 V

Ad = 0.54/0.5 = 1.08

(b) Measure vo for v1 = v2 = (1 V, 2 V, 3 V). Calculate Acm in each case.

For V1 = V2 = 1V : Acm = 1.5

For V1 = V2 = 2V : Acm = 2.5

For V1 = V2 = 3V : Acm = 3.5

(c) Calculate CMRR for the differential amplifier for each of the 3 cases and compare with the CMRR calculated

Calculated CMRR = 750 (using formula)

Observed CMRR: For V1 = V2 = 1V : CMRR = 720

For V1 = V2 = 2V : CMRR= 432

For V1 = V2 = 3V : CMRR = 308.57

2. Design and build the instrumentation amplifier shown in Figure 2 for gain = 11 by suitably choosing resistors R and RG. The circuit for OD maybe used from part 1.

(a) Measure vo for v1 = 3 V, v2 = 2.5 V. Calculate Ad.

Measured Vo = 5.519 V

Ad = 5.519/0.5 = 11.039

(b) Measure vo for v1 = v2 = (1 V, 2 V, 3 V). Calculate Acm in each case.

For V1 = V2 = 1V : Acm = 3.9

For V1 = V2 = 2V : Acm = 13.6

For V1 = V2 = 3V : Acm = 23.2

(c) Calculate CMRR for the instrumentation amplifier for each of the 3 cases.

Calculated CMRR = 78.94 (using formula)

Observed CMRR: For V1 = V2 = 1V : CMRR = 2843.584

For V1 = V2 = 2V : CMRR= 815.44

For V1 = V2 = 3V : CMRR = 478.017

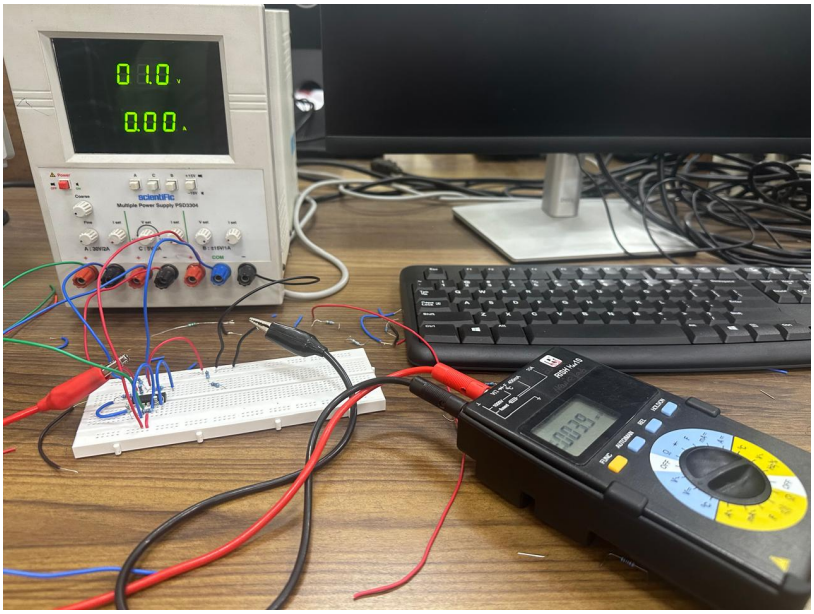


Figure 1: Measuring Acm for Instrumental Amplifier

3. Find the offset voltage of operational amplifier OA1 using the circuit in Figure 4. Choose = 0.0001 and C from the available values of 1, 10, 100 nF. Choose R3 appropriately.

Vx = 1.916 V

Offset = beta*Vx

= 0.0001*1.916

= 0.1916mV

4. Close switch S as shown in Figure 4 to find the dc gain of OA1.

(a) Set Vin to +10 V and note Vx and Vo

Vo = 10.17 V

Vx = 1.770 V

(b) Set Vin to -10 V and note Vx and Vo

Vo = 10.18 V

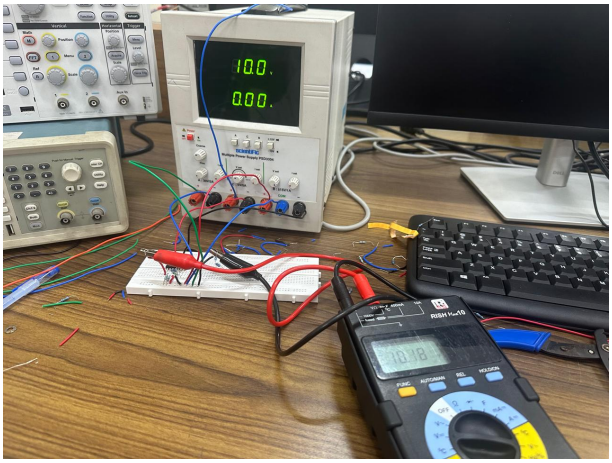
Vx = 1.944 V

Find Vo and Vx and compute gain

Change in Vx = 0.174 V

Change in Vo = 0.01 V

Gain = Change in Vo/(beta*Change in Vx) = 574.71



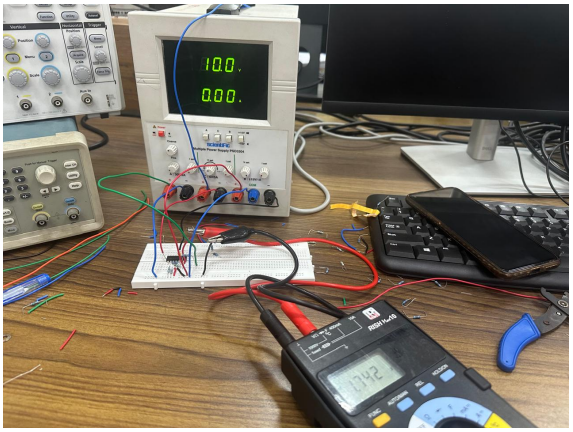


Figure 2: Measurement of Offset and dc Gain of OpAmp