DEVICES AND CIRCUITS LAB REPORT – 7

EXPERIMENT NAME : Non- Ideal characteristics of Op Amp Circuits

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Hardware Exercise:

Objectives: Measurement of Offset Voltage, Bias Currents, Slew rate and Open-loop Gain of OpAmps

Equipment/Components Required:

1. Op-Amp µA 741
2. Resistors – 100 Ω
3. Regulated Power Supply
4. Variable Power Supply
5. Multimeter
6. Digital Storage Oscilloscope
7. Arbitrary Function Generator

Observations:

Part A: Input offset voltage

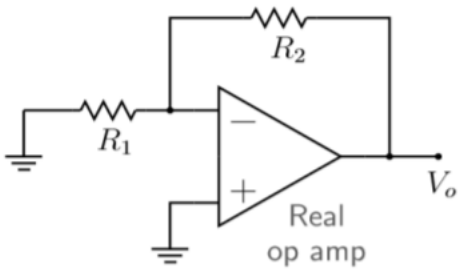


Figure 1: Offset voltage measurement

1. We have made the hardware setup as shown in the above figure
2. We kept resistors R1 = R2 = 10kohm
3. We measured output voltage(Vo) and we got it as Vo = 1.9mv
4. Offset voltage (Vos) = Vo/Av

Here Av = R2/R1=1

So, Vos = 1.9 mv

Part B: Offset current measurement

Figure 2: Circuits for Offset current measurement (a) I_{B^-} (b) I_{B^+}

1. We have made the hardware setup as shown in the above figure

The required values were found to be:

For circuit (a):

- V¬O = 0.25 V
- IB- = 2.5 nA

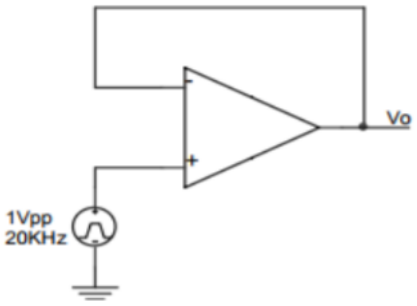
For circuit (b):

- VO = -0.22 V
- IB+ = 2.2 nA

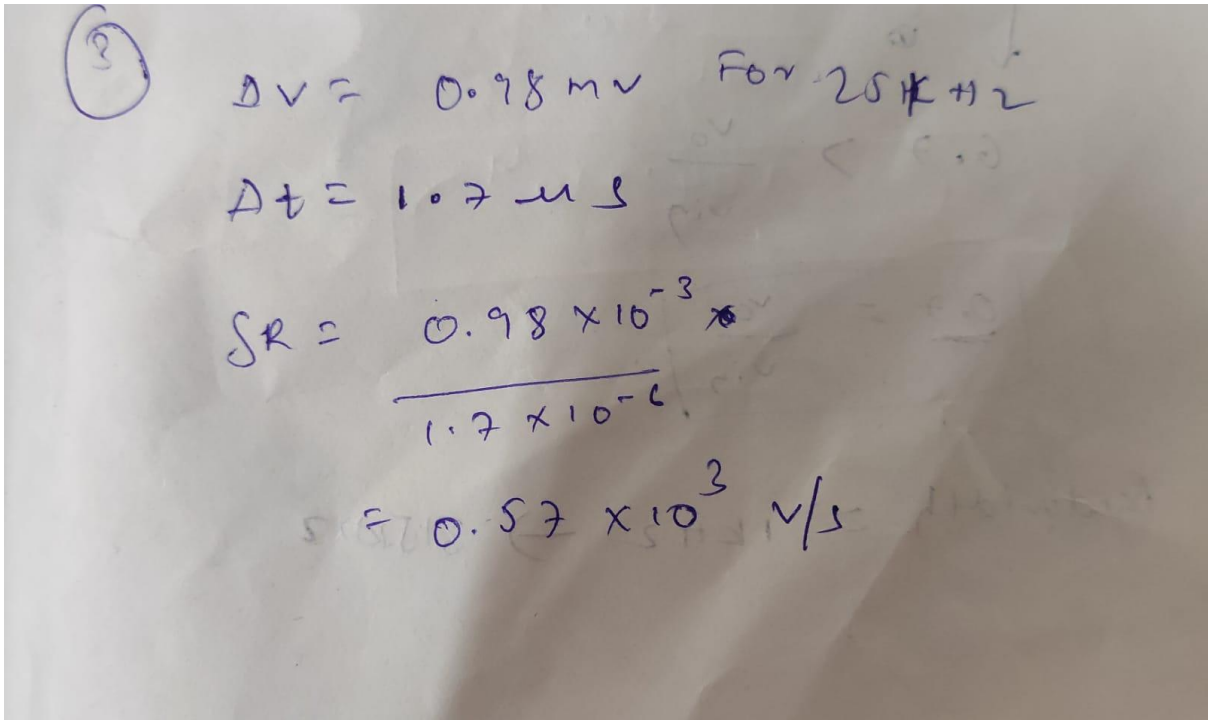
Therefore:

- IB = 0.3 nA
- IOS = 0.47 nA

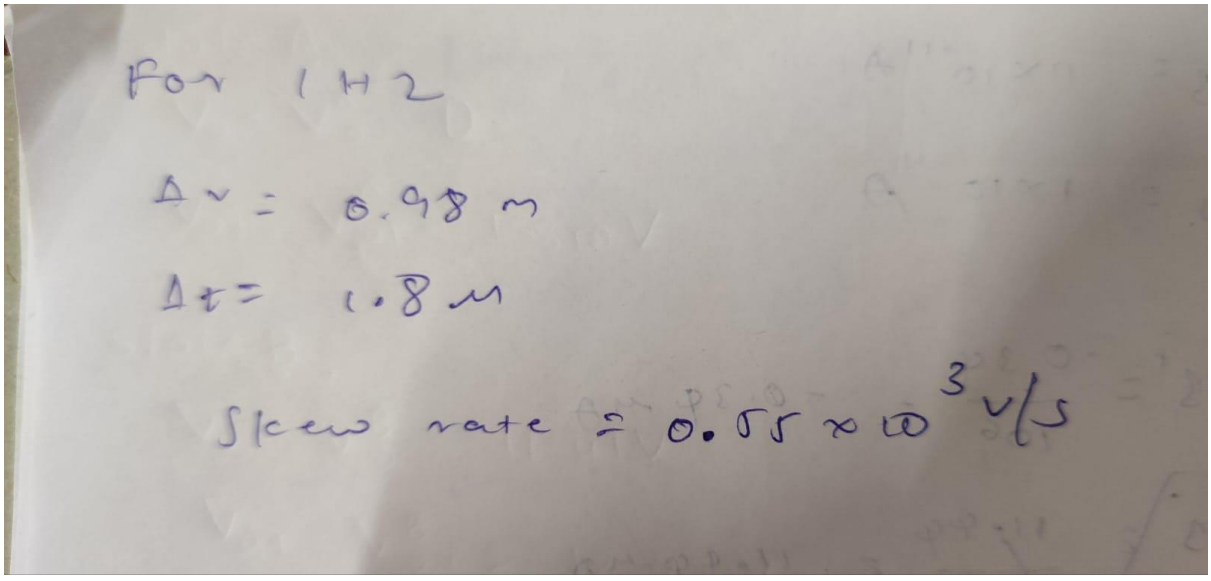
Part C: Slew rate and Bandwidth measurement



1. We have made the hardware setup as shown in the above figure



For 1k Hz



Part D: Bandwidth measurement:

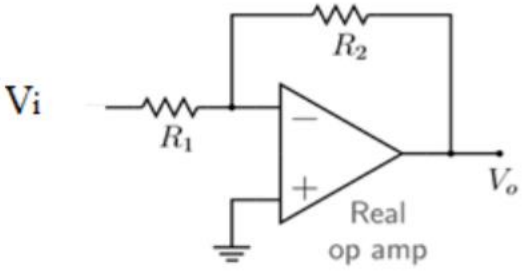


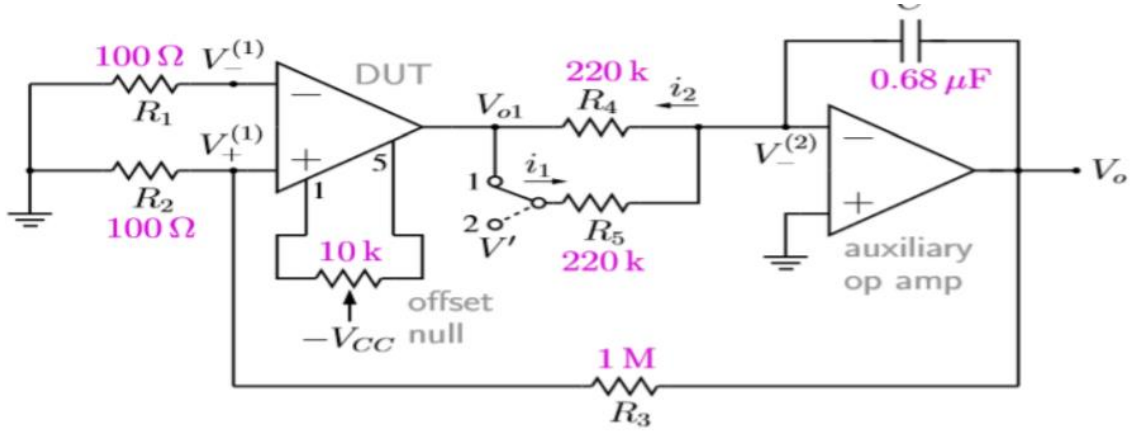
Figure 4: Bandwidth measurement

1. We have made the hardware setup as shown in the above figure
2. We varied the frequency from 1 kHz to 500 k Hz

freq	vout	gain in db
1000	1	0
2000	1	0
10000	1	0
20000	1	0
50000	1	0
100000	1	0
130000	0.98	0.17548
150000	0.97	0.26457
200000	0.89	1.0122
250000	0.85	1.41162
300000	0.72	2.85335
310000	0.71	2.97483
315000	0.7	3.09804
350000	0.63	4.01319
400000	0.57	4.8825
450000	0.51	5.8486
500000	0.45	6.93575

3. We got the gain 3 db at 315k Hz
4. So, the bandwidth is 1k Hz – 315k Hz

Part E: Measurement of DC open-loop gain :



1. We have made the hardware setup as shown in the above figure
2. The values were obtained as follows:

V_O	V_O^A	V_O^B	A_{OL}
0.067 V	0.06 V	-0.05V	227295.5

Discussion :

200020051:

In lab 7 we did Measurement of Offset Voltage, Bias Currents, Slew rate and Open-loop Gain of OpAmps and we found many characteristics related to opamps and these characteristics are same as data sheet of uA741 opamp.

In this lab we did all well and nothing went wrong

200020010:

Today in lab 7 we have done hardware excercise of opamp and we found characteristics of opamp Measurement of Offset Voltage, Bias Currents, Slew rate and Open-loop Gain of OpAmps and we got values correctly and we used dso in lab to find the bandwidth of opamp