

IN3170 V24 - Lab 3

Andreas Engøy, Simen Norrud, Erik Røset & Daniel Tran

April 2024

Contents

1	Introduction	1
2	Theory	1
2.1	1
3	Materials and Methods	1
3.1	Equipment	1
3.2	Task 1a	2
3.3	Task 1b	2
3.4	Task 2	2
4	Results	3
4.1	Task 1	3
4.2	Task 2	3
5	Discussion	3
5.1	Inaccuracy in measurements	3
5.2	Assesment of values	3
5.3	Comparing task 1 and task 2	3
6	Appendix	3
6.1	Calculations	3

1 Introduction

2 Theory

2.1

3 Materials and Methods

3.1 Equipment

Component	Model	Quantity
Resistor	100k Ω	1
Capacitor	1 μ F	1
IC with 6 transistors	CD4007UBE	1
Copper wires	-	12
Printed Circuit Board	-	1
Soldering iron	-	1
Soldering wire	-	1
Oscilloscope	HP54622	1
Waveform generator	HP33120	1
Voltage source	HPE3631	1
Computer w/ "Cadence Virtuoso"	6.1.7	1
NMOSFET*	TSMC 65nm	3
Waveform generator*	-	2
Capacitor*	-	2

Table 1: List of components used in the experiment. Components marked with * are simulated in Cadence Virtuoso.

3.2 Task 1a

3.3 Task 1b

3.4 Task 2

4 Results

4.1 Task 1

4.2 Task 2

5 Discussion

5.1 Inaccuracy in measurements

Task 1a:

Task 1b:

5.2 Assesment of values

Task 1a:

Task 2:

5.3 Comparing task 1 and task 2

6 Appendix

6.1 Calculations

References

- [1] Philipp Häfliger. (2024). *Microelectronics Essentials* (beta 0.10). Department of Informatics, University of Oslo.
- [2] Philipp Häfliger (2018). *Excerpt of Sedra/Smith Chapter 15: Inverter Delay* [PDF]. Department of Informatics, University of Oslo. <https://www.uio.no/studier/emner/matnat/ifi/INF3410/h18/forelesningsfoiler/chapter15.pdf>
- [3] Neureuther, A.R. (2001). Lecture 24: CMOS Capacitance and Circuit Delay [PDF]. University of California, Berkeley. https://inst.eecs.berkeley.edu/~ee42/fa01/LectNotes/42_24.pdf