EEE 51: Second Semester 2017 - 2018

Lecture 1

Introduction

Administrative Stuff

- Sections:
  - THQ, THR, THU, THX, WFX
- Instructors
  - Louis Alarcon (louis.alarcon@eee.upd.edu.ph)
  - Maria Theresa de Leon (theresa.de.leon@eee.upd.edu.ph)
  - Rico Jossel Maestro (rico.maestro@eee.upd.edu.ph)
  - Christopher Santos (christopher.santos@eee.upd.edu.ph)

- Class Webpage:
  - www.up-microlab.org/resources/classes
  - Lecture notes, handouts, homeworks, announcements
  - EEE account is needed to access the files

Grading

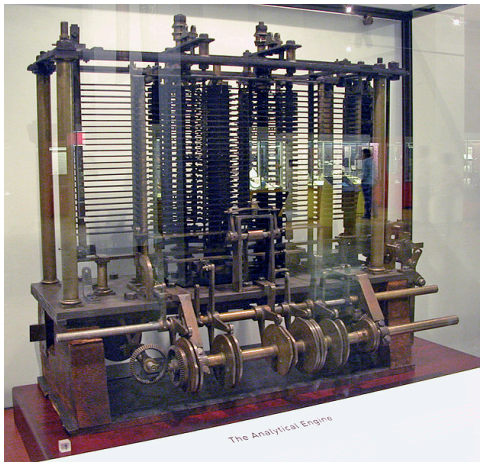
- Midterm Exam (30%)
  - Saturday, March 24, 2018, 1-4pm
- Comprehensive Final Exam (40%)
  - Thursday, May 24, 2018, 1-4pm
- Homeworks (30%)
  - Approximately 1 per week

EEE 51 Prerequisites

- Semiconductor device basics (EEE 41)
  - Diodes
  - Transistors (BJT, MOSFET)
- Circuit Analysis (EEE 31, 33, 35)
  - KCL, KVL
  - R, RC, RLC
  - DC and transient analysis
- Math!

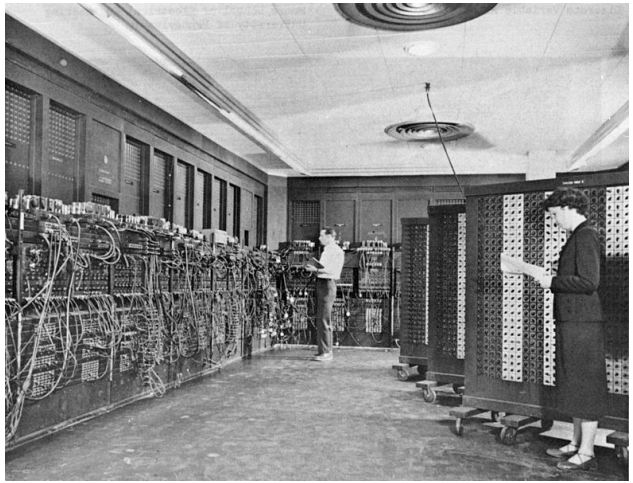
Electronic Circuits

- Semiconductor Electronic Circuits
  - BJTs, MOSFETs
  - Small, fast, low power



[Wikipedia]

Babbage Analytical Engine (1837) – never built



ENIAC (1946): 167 m^2 [Wikipedia]
100 kHz, 150 kW, 30 tons

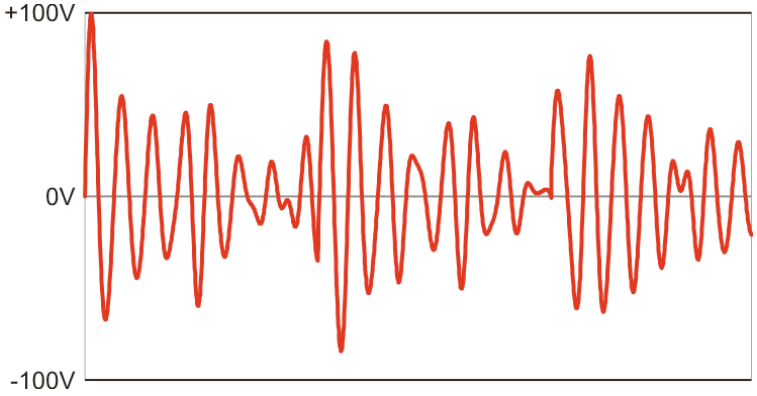
[Intel]

Core i7 (2012): 3.4 GHz
50 W, 160 mm^2

Analog vs. Digital

Analog Signals

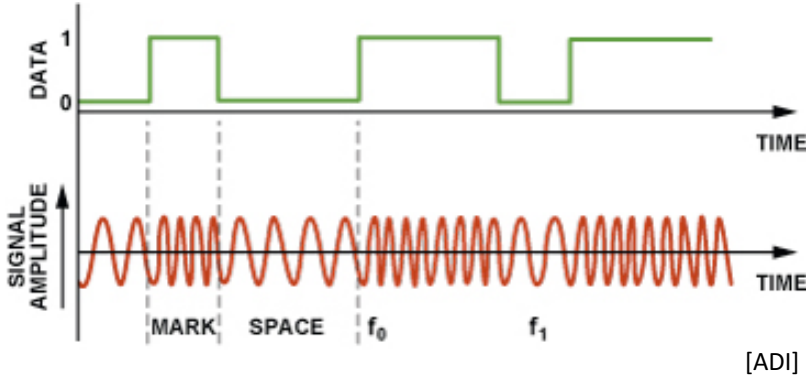
- Contains an “infinite” amount of information
- Limited by noise and other non-idealities



Audio signal [QSC Audio]

Digital Signals

- Contains a limited amount of information
  - This is intentional
- Usually just 1 “bit”

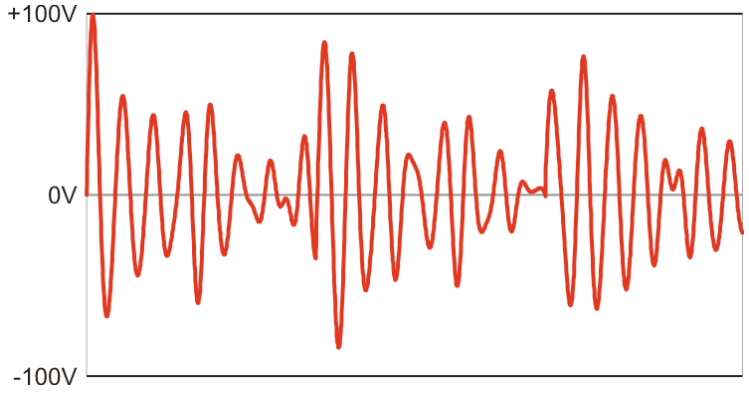


[ADI]

FSK signal

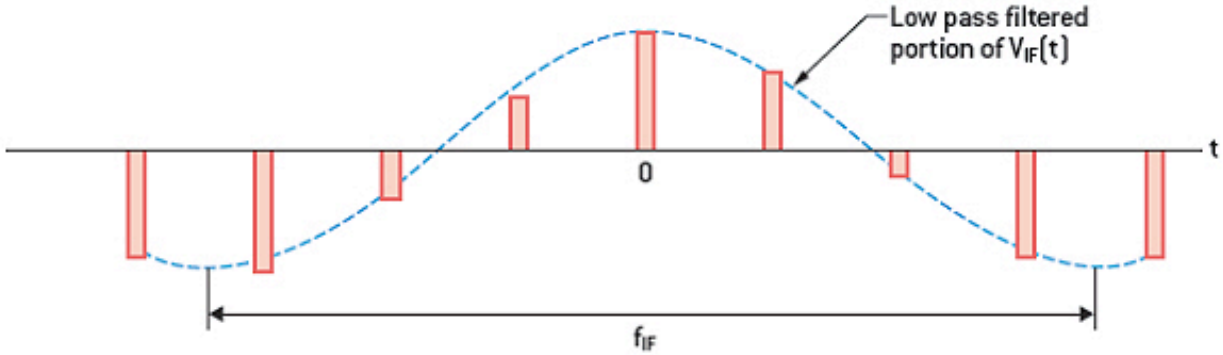
Continuous Time vs. Discrete Time

- Continuous Time
  - Valid all the time



[QSC Audio]

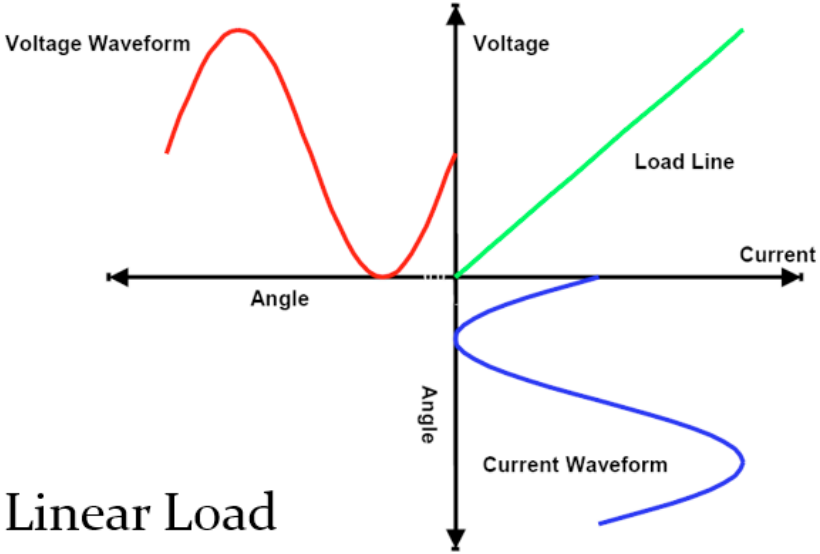
- Discrete Time
  - Signals are valid only at certain times

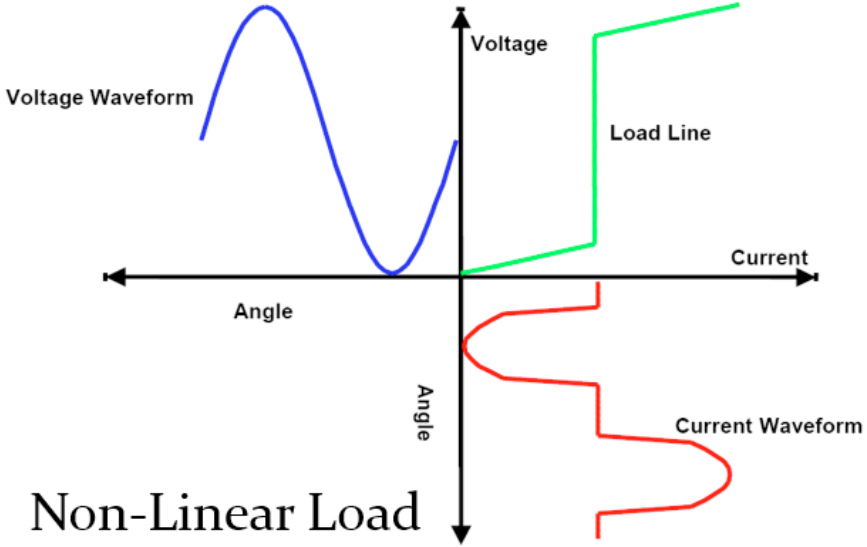


[New Electronics, UK]

Linear vs. Nonlinear

- Linear circuits
  - Utilize the linear relationships between voltages and currents





[powerquality.sg]

EEE 51 at a glance…

- Analog, continuous-time, linear, semiconductor electronic circuits
  - Amplifiers and sinusoidal oscillators
- Translinear circuits

- Analysis
  - Circuit → Parameters/performance → Metrics → Comparison/Evaluation
- Design
  - Specifications → Metrics → Parameters → Circuit

How do I pass EEE 51?

- EEE 51 provides the tools to enable you to analyze and design electronic circuits
- Your task:
  - **Understand** and know when and how to apply these tools to achieve a certain goal (analysis and/or design)

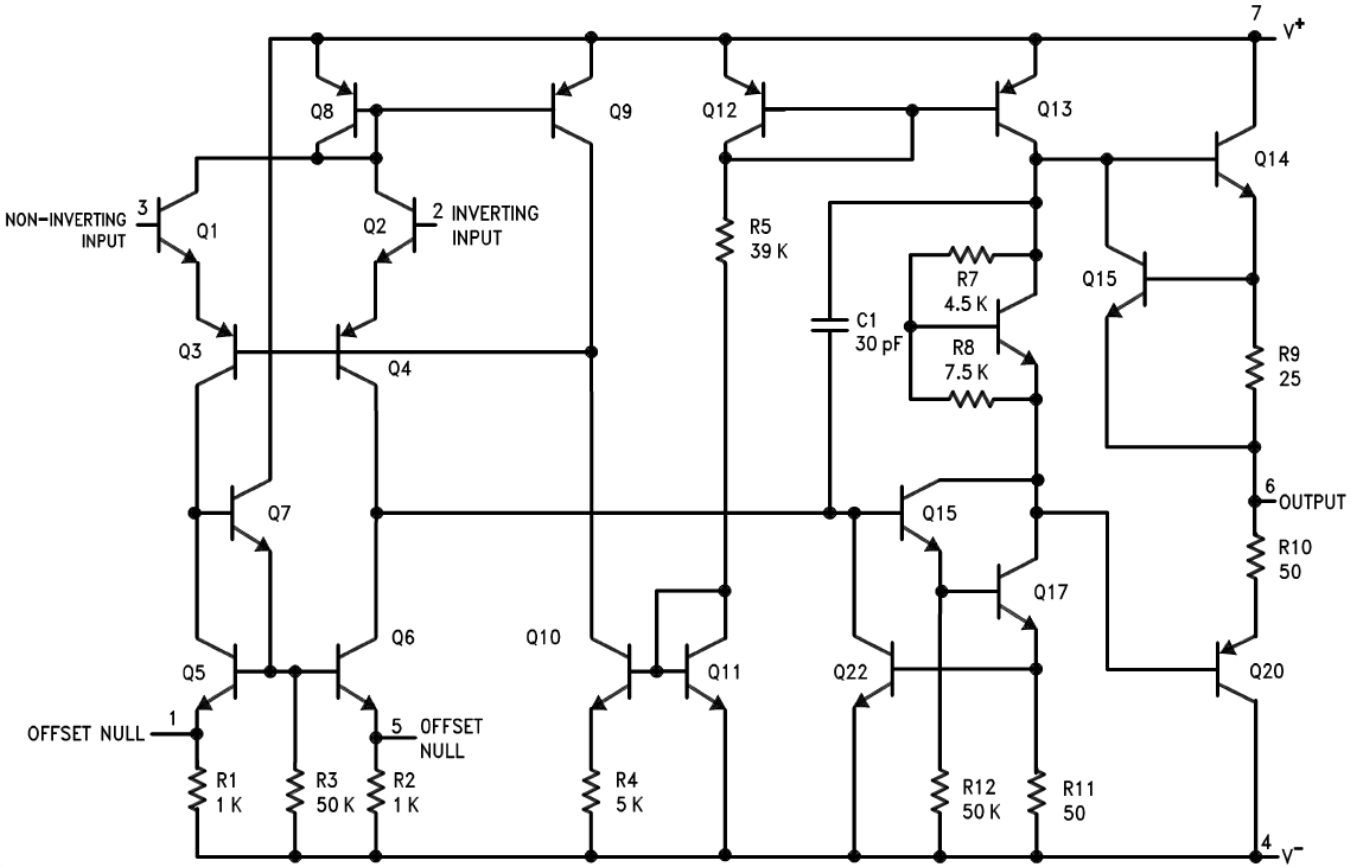
- Memorization alone does not work
- Exams problems
  - Yes, these are problems not questions
  - Test your understanding of how to apply these tools

How do I pass EEE 51 exams?

- You need to understand the concepts and apply them to solve any (EEE 51) problem
  - This is how you pass EEE 51
  - And this mindset is what differentiates a great engineer from a mediocre one

How do we go from EEE 41 (and 31, 33, 35, etc.)…

- To this? → For example: The LM741 Operational Amplifier



Transistors: Our Building Blocks

- Transistors
- Single-Stage Amplifiers
- Cascaded Amplifiers
- Current Sources
- Differential Amplifiers
- Frequency Response of Amplifiers
- Feedback Amplifiers
- Sinusoidal Oscillators
- Translinear Circuits

Next Meeting

- Transistor models
- Linearization
- Two-Port Networks