EE 618 2018 [ZELE]

Course Projects I and II

Project I

Specifications

Design an Operational Transconductance Amplifier in SCL 180nm technology (fully differential input, single ended output) to meet the following specifications:
[**Note:** For two stage OTA designs, R_Z tracking must be implemented for pole-zero cancellation.]

- DC gain $\geq$ 100dB.
- Unity gain frequency $\geq$ 90 MHz.
- Output voltage swing $\geq 1V_{p-p}$.
- Slew rate $\geq 200V/\mu s$.
- Phase Margin $\geq 60°$.
- Input referred spot noise (Thermal only) $= 20\,nV/\sqrt{Hz}$.
- Input Common mode voltage = 0.9V.
- Output load capacitance = 1pF (From analogLib).
- VDD = 1.8V
- Power consumption $\leq$ 2mW.

Course Project - I

- Design and Simulate the OTA to meet the specifications
  (SCL 180nm technology)
- Hand calculations - must.
- Supporting documents are provided on moodle
  Simulations / Analysis details
  Test Benches
- Report template – (Must be typed)
  Please follow the template unless you can do something better
  Show all relevant calculations

Course Project I – Grading (10% overall)

- Reports will be graded (50 points) based on the following grading criteria:

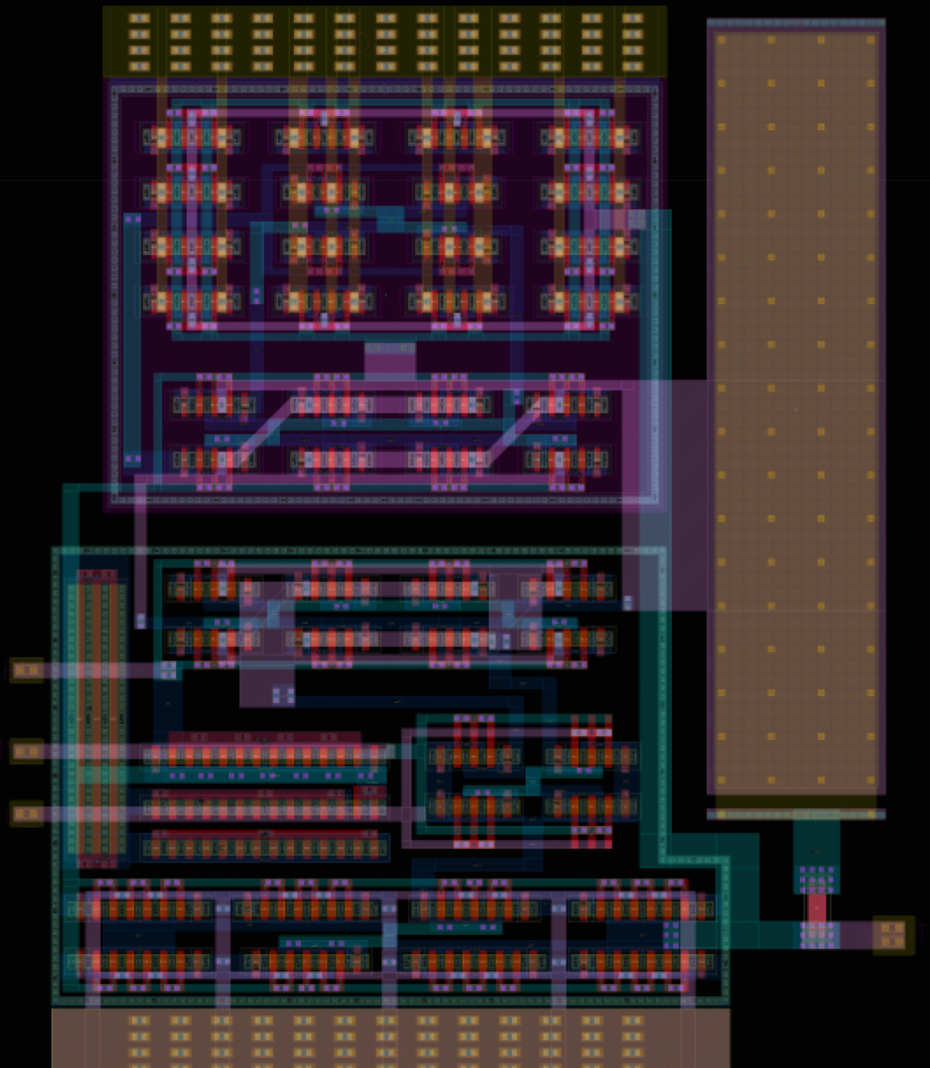
Initial design/Hand calculations	10
Simulation results	20
Quality of report	10
Viva	10
Bonus (Architectures)	+ 12.5

- BONUS Architectures: Folded cascode, Gain boosting, Slew rate enhancement, Rail-to-rail OTA or any other architecture.
- Viva will focus on the explanation of design flow and showing results on your laptop.

Course Project - II

- Students will layout the OTA designed in Course Project – I
- Layouts - common centroid and other matching techniques
- Schematic and Post layout simulations
- Poster presentation – Invited Guests

Example OTA Layout



TIMELINE

- Project I – uploaded — 25th September
- Project II – uploaded — 10th October

- Hand-calculations reviewed by TAs — 3rd October
- Project I – Final Report submission — 15th October
- Project I – Viva — 17th October
- Project II – Final Report submission — 5th November
- Project II – Viva/Poster Presentation — 10th November