



C-DAC & Gujarat Technological University
M.E. Electronics & Communication Engineering
(VLSI & Embedded Systems Design)
Gandhinagar

Semester – II

2725206: Analog and Mixed Signal IC Design (Elective II & III)

UNIT – I

Review of transistor operation, Single stage amplifiers and Differential amplifier MOS I/V characteristics. Transistor second order effects. Small signal analysis. Small signal model. Gain of common-source stage amplifier using small signal analysis. Common-source stage with resistive load, diode-connected load, current-source load, triode load, source degeneration. Source follower stage. Common-gate stage. Cascode stages. Single-ended and differential operation. Basic differential pair. Common-mode response. Differential pair with MOS loads. Gilbert Cell.

UNIT – II

Current Mirrors, Response of Amplifiers, Noise characteristics Basic and cascode current mirrors. Using active current mirrors as loads. The Miller theorem. Frequency response of source follower, common-gate amplifier, cascode stage, differential pair. Noise characteristics. Noise types: thermal noise, flicker noise. Representation of noise in circuits. Properties of feedback circuits. Feedback Configurations. Effect of loading in feedback.

UNIT – III

Operational amplifiers Operational amplifier's performance parameters. One-Stage Op Amps. Two-Stage Op Amp. Op Amps Gain Boosting. Op Amps Common-Mode Feedback. Op Amps Input Range Limitation: unity-gain buffer, extension of input CM range, variation of equivalent transconductance with the input CM level. Op Amps Slew Rate. Noise in Op Amps and Power Supply.

References:

1. R.J. Baker, H.W. Li, D.E. Boyce. CMOS. Circuit design, Layout, and Simulation (2nd Edition), 2005. 1038p.
2. P. Horowitz, W. Hill, Electronic Circuit Design: Art and Practice, 2001. 192p.
3. B. Razavi, Design of Analog CMOS Integrated Circuits, 2000. 684p.
4. R.J. Baker, CMOS Mixed-Signal Circuit Design, 2002. 502p
5. B. Razavi. Principles of Data Conversion System Design. 1994. 272P