BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
INSTRUCTION DIVISION
II SEMESTER 2015-2016
Course Handout Part II

Date: 13-1-2016

In addition to part -I (General Handout for all courses appended to the time-table) this portion gives further specific details regarding the course.

Course No. : **MEL G632**
Course Title : **Analog IC Design (5 unit)**
Instructor-in-charge : **ANU GUPTA**

1. Scope and Objective of the Course:

This course aims at thorough understanding of the behavior of analog circuits and systems. The course focuses on basic concepts in Analog IC design; different Design techniques for designing of analog and mixed-signal VLSI circuits like operational amplifiers, trans-conductance amplifiers, advanced biasing circuits, switched capacitor circuits including in depth understanding of linear building block like differential amplifiers, current mirrors, references, comparators, cascode and buffer amplifiers. Performance characterization and improvement of linear integrated circuits in terms of PSRR, CMRR, slew rate, offset, noise, sensitivity and stability is also envisaged. The simulation of high-performance linear integrated systems, their layout considerations using powerful EDA tools like Cadence, mentor graphics is also stressed upon.

2. Text Book:

Design of Analog CMOS Integrated Circuits
Author: Behzad Razavi
Publisher: TATA McGRAW Hill 2001

3. Reference Books:

- *R 1.* *Analysis and Design of Analog Integrated Circuits*
  Author : Paul R. Gray & Robert G. Meyer
  Publishers : Wiley (International edition)

- *R 2.* *Analog Integrated Circuit Design*
  Author : David Johns & Ken Martin
  Publishers : John Wiley & Sons 1997.

- *R 3.* *Analog VLSI Design – NMOS and CMOS*
  Author : Malcom R. Haskard & Ian C. May

- *R 4.* *Analog VLSI: signal and Information Processing*
  Author : Mohammed Ismail, Terri Fiez
  Publishers : McGRAW-HILL International Edition, 1994.

- *R5* *CMOS Analog Circuit Design*

Author : Phillip E. Allen & Dogulas R. Holberg
Publishers : Harcourt Bruce Jovanovich College Publishers, 1987

- *R6. Design of analog Integrated Circuits and Systems*
  Author : K. R. Laker & Willy M. C. Sansen
  Publishers : McGRAW-HILL International Edition, 1994.
- *R7. IEEE Journal of Solid St. Circuits and other Journals.*

- *R8 Analog MOS Integrated Circuits for Signal Processing*
  Author : R . Gregorian & G .C Temes
  Publishers : Wiley (International edition, 1986)

- *R9. CMOS MIXED SIGNAL CIRCUIT DESIGN*
  Author : R . Jacob Baker
  Publishers : IEEE Press (Wiley Inter-science 2002)

4. Course Plan:

S. No.	Topic	Approx. No. of Lectures	Reference to text book/ref book
01.	Introduction, brief overview of MOS models for Analog Circuits MOS switch, Noise, Capacitors, Resistors	2	Chap-1, R5, IEEE papers
02.	Single Stage Amplifiers, frequency response of amplifiers	4	Chap-3, R5
03.	Source Coupled Amplifiers	4	Chap-4, R5
04.	Advanced Current Biasing Circuits	6	Chap-5, 11, R5
05	Noise	4	Chap. 7
06.	Operational Amplifiers, Offset voltage, Uncompensated Compensated op-amp, Op-amp, frequency response	10	Chap-9, 10, R5
07.	Comparators and Latch	5	R5
08.	Switched Capacitor circuits-selected portion	5	Chap-12, R5
09.	Analog Technology and Layouts -overview	1	Chap-13, 18
10.	Overview of mixed signal Circuits like A/D and D/A converters	1	R5, and other references , IEEE papers
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5. Evaluation Scheme :

Component	Duration	Weightage	Date, & Time	Venue	Remarks
Mid-semester Test	90 min	25	16/3 4:00- 5:30 PM		CB/ OB
Analog design project / take home weekly lab-assignments	continuous	40	Spread throughout the semester		OB
Comprehensive	3 hrs.	35	9/5 AN		CB

		100			

6. **Laboratory for take home assignments:** minimum 3 hrs for lab work shall be assigned every week. Timings will be announced in the class.
7. **Chamber Consultation Hour**: To be announced in the class.
8. **Make-up**: Make-up will be given only on genuine reasons. Prior permission is necessary.
9. **Notice:** Notice will be displayed on EEE Notice Board and intrabits

Instructor-in-charge
MEL G632