Course Number and Name

BEI012 Analog Integrated Circuit Design

Credits and Contact Hours

3 and 45

Course Coordinator's Name

Mr T.Vijayan

Text Books and References

REFERENCES:

1. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata McGraw Hill, 2001
2. Willey M.C. Sansen, "Analog Design Essentials", Springer, 2006.
3. Grebene, "Bipolar and MOS Analog Integrated circuit design", John Wiley & sons, Inc., 2003.
4. Phillip E.Allen, DouglasR.Holberg, "CMOS Analog Circuit Design", Second edition, Oxford University Press, 2002
5. Recorded lecture available at http://www.ee.iitm.ac.in/~ani/ee5390/index.html Jacob Baker "CMOS: Circuit Design, Layout, and Simulation, Third Edition", Wiley IEEE Press 2010 3rd Edition

Course Description

- To have an adequate knowledge in the measurement techniques for power and energy, power and introduce the meters used to measure current & voltage.

Prerequisites	Co-requisites
Linear Integrated Circuits	NIL

required, elective, or selected elective (as per Table 5-1)

selected elective

Course Outcomes (COs)

CO1: To describe about single stage amplifier.

CO2: To analyse high frequency and noise characteristics of amplifiers

CO3: To analyse about feedback circuits and about Op-Amp performance characteristics.

CO4: To learn about frequency compensation techniques.

CO5: To understand the stability of an Op-Amp.

CO6: To analyse Band gap references.

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	M	M	M	H	M		M			L	L
CO2	H	M	M	H	H		M			L	L
CO3	H	M		H	H		M			L	L
CO4	H	M		H	H		M			L	L
CO5	H	M	M	H	H		M			L	L
CO6	H			H	H		M			L	L

List of Topics Covered

UNIT I SINGLE STAGE AMPLIFIERS 9

Basic MOS physics and equivalent circuits and models, CS, CG and Source Follower cascade and folded cascade configurations, differential amplifiers and current mirror configurations.

UNIT II HIGH FREQUENCY AND NOISE OF CHARACTERISTICS AMPLIFIERS 9

Current mirrors, cascade stages for current mirrors, current mirror loads for differential pairs. Miller effect, association of poles with nodes, frequency response of CS, CG and source follower, cascade and differential pair stages Statistical characteristics of noise, noise in single stage amplifiers, noise in differential amplifiers.

UNIT III FEEDBACK AND OPERATIONAL AMPLIFIERS 9

Properties and types of negative feedback circuits, effect of loading in feedback networks, operational amplifier performance parameters, One-stage Op Amps, Two-stage Op Amps, Input range limitations, Gain boosting, slew rate, power supply rejection, noise in Op Amps.

UNIT IV STABILITY AND FREQUENCY COMPENSATION 9

General considerations, multiple systems, Phase Margin, Frequency Compensation, and Compensation of two stage Op Amps, Slewing in two stage Op Amps, and Other compensation techniques.

UNIT V BANDGAP REFERENCES 9

Supply independent biasing, temperature independent references, PTAT current generation, Constant-Gm Biasing.