Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Electronics and communication Engineering

(Academic Year 2019-20)

Subject Code: EC606C-N	**Subject Title: CMOS ANALOG CIRCUIT DESIGN**
Pre-requisite	

Course Objective:

The educational objectives of this course are

- To present an introductory knowledge of analog IC design.
- To address the underlying concepts of different analog IC Design.

Teaching Scheme (Credits and Hours)

Teaching scheme				**Total Credit**	**Evaluation Scheme**					**Total Marks**
L	**T**	**P**	**Total**		**Theory**		**IE Marks**	**CIA Marks**	**Pract. Marks**	
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**				
03	00	02	05	04	03	70	30	20	30	150

Outline Of the Course:

Sr. No	**Title of the Unit**	**Minimum Hours**
1.	Amplifiers	09
2.	Differential & Operational amplifiers	10
3.	Digital phase locked loop	05
4.	Current sources and sinks &References	05
5.	Memory circuits	05
6.	Non linear analog &Dynamic circuits	05
7.	Data Converters(ADC & DAC architecture)	09
		48

Total hours (Theory): 48
Total hours (Lab): 16*2=32
Total hours: 80

Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Electronics and communication Engineering

(Academic Year 2019-20)

Detailed Syllabus

Unit No.	Topics	Lecture Hours	Weightage(%)
1.	**Amplifiers:** Gate-Drain connected loads: Common source and common gate amplifiers, the source follower, Current source load: The cascode connection and the Push pull amplifier, Noise and Distortion in Amplifiers: Modeling Amplifier noise, Class AB amplifier, feedback amplifier	**09**	**20**
2.	**Differential & Operational amplifiers:** The Source coupled pair: Current source load, CMRR, noise, matching, Source cross coupled pair: current source load, Cascode loads, Basic CMOS Opamp design	**10**	**20**
3.	**Digital phase locked loop:** The phase detector, Voltage controlled oscillator ,Loop filter	**05**	**10**
4.	**Current sources and sinks &References:** The current mirror: Cascode connection, transient response, matching in MOSFET mirrors, Wilson current mirror	**05**	**10**
5.	**Memory circuits:** RAM memory cell, DRAM and SRAM cells, Sense amplifier, Row/ column decoder	**05**	**10**
6.	**Non linear analog &Dynamic circuits:** Basic CMOS comparator design, Adaptive biasing, Analog multipliers, Level shifting	**05**	**10**
7.	**Data Converters(ADC & DAC architecture**): Digital Input code resistor string,R-2R ladder network current steering, Charge scaling and pipeline DAC, Two step flash ADC, pipeline ADC, Integrating ADC, Successive Approximation ADC	**09**	**20**
	Total	**48**	**100**

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcomes:
On successful completion of the course

- Students can understand designing of analog IC. They are aware of different analog ICs which are used in many Industrial applications.

TEXT BOOKS:

1. CMOS Analog circuit Design, second edition ,Philip E.Allen,Douglas R.Holberg,Oxford Press
2. R. J. Baker, H. W. Li and D. E. Boyce, "CMOS: Circuit Design, Layout and Simulation", IEEE Press, 1998. (Cheap Edition).

REFERENCE BOOKS:

1. B. Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-Hill, 2001. (Cheap Edition).

List of Experiments (Not limited to following. Subject teacher may modify the same)**:**

Sr. No.	Experiment Title
1.	Evaluate I/V characteristic of MOS transistor using spice.
2.	Evaluate on resistance of MOS switch using spice.
3.	Design and Compare the specifications of various topologies of Single stage Amplifiers using 1micron Technology model parameters.
4.	Design and compare the performance of CMOS Current Mirrors using 1micron Technology model parameters.
5.	Design and evaluate the performance of a Simple CMOS Differential amplifiers using 1micron Technology model parameters.
6.	Design and compare the performance of different Voltage references using 1micron Technology model parameters.
7.	Design and verify the specifications of CMOS operational Amplifier using 1micron Technology.
8.	Design and simulate CMOS two stage op-amp using 1micron Technology model parameters.
9.	Design and simulate CMOS Comparator using 1micron Technology model parameters.
10.	Design and simulate CMOS Current conveyor using 1micron Technology model parameters.
11.	Design and simulate Low voltage operational amplifier using 1micron Technology model parameters.