CHENNAI INSTITUTE OF TECHNOLOGY

Department of Electronics and Communication Engineering
Linear and Digital Integrated Circuits Lab

Instructional Objectives:

- To understand the basic of linear and digital ICs and specialfunction ICs.
- To study the AC and DC characteristics of operational amplifier.
- To design and test the linear and nonlinear applications of operational amplifiers.
- To design and test the digital circuits and verify its performance.
- To use SPICE and HDL software for circuit design and test its performance.

Students Outcomes:

At the end of the course, the student will be able to:

- Selection of linear and digital ICs for various applications.
- Design the various electronics systems such as amplifiers, oscillators, power supplies ADCs and DACs as per the required gain / bandwidth.
- Design any combinational and sequential circuits.
- Analyze the working of special function ICs such as PLL, VCO and frequency multiplier and etc.
- Analyze the performance of amplifiers, oscillators, power supplies ADCs and DACs using SPICE software and HDL for digital circuits.

Major Equipments available in the Lab

S. No.	Name of the Equipments	Range	Quantity
1	Cathode Ray Oscilloscope (CRO)	0-30 MHz	15
2	Function Generator(FG)	0-3 MHz	15
3	Regulated Power Supply(RPS)	0-30V / 2A	15
4	Digital IC Trainer Kits		15
5	IC Testers (Analog and Digital)		5
6	Various electronics components and ICs	Adequate Nos.	
7	Ammeters, Voltmeters, Multi meters		

Courses Offered

S.No.	ODD Semester	Class	No. of Sessions	EVEN Semester	Class	No. of Sessions
1	Digital Systems Laboratory	3rd SemCSE	4	Linear and Digital Integrated Circuits Laboratory	4th Sem EEE	2
				Linear Integrated Circuits Laboratory	4th Sem ECE	4
Percentage of Lab Utilization : 40%				Percentage of Lab Utilization : 60%		

List of Experiments

Linear Integrated Circuits Laboratory   IV Sem ECE

Design and Analysis of the following Circuits

01. Inverting, non inverting and differential amplifiers.
02. Integrator and differentiator.
03. Instrumentation amplifier.
04. Active low-pass, high-pass and band-pass filters.
05. Astable & monostable multivibrators using op-amp.
06. Schmitt trigger using op-amp.
07. Phase shift and wien bridge oscillators using op-amp.
08. Astable and monostable multivibrators using NE555 Timer.
09. PLL characteristics and its use as frequency multiplier, clock synchronization.
10. R-2R ladder type D- a converter using op-amp.
11. DC power supply using LM317 and LM723
12. Study of SMPS.

Simulation Using Spice

01. Active low-pass, High-pass and band-pass filters using op-amp.
02. Astable and Monostable multivibrators using NE555 Timer.
03. A / D converter.
04. Analog multiplier.

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List of Experiments

Digital Systems Laboratory   III Sem CSE

01. Verification of boolean theorems using basic gates.
02. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
03. Design and implement half / full adder and subtractor.
04. Design and implement combinational circuits using MSI devices:
    - 4 – bit binary adder/subtractor
    - Parity generator/checker
    - Magnitude comparator
    - Application using multiplexers.
05. Design and implement shift-registers.
06. Design and implement synchronous counters.
07. Design and implement asynchronous counters.
08. Coding combinational circuits using HDL.
09. Coding sequential circuits using HDL.
10. Design and implementation of a simple digital system (Mini Project).

Linear and Digital Integrated Circuits Laboratory   IV Sem EEE

01. Implementation of Boolean Functions, Adder and Subtractor circuits.
02. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa.
03. Parity generator and parity checking.
04. Encoders and Decoders.
05. Counters: Design and implementation of 3-bit modulo counters as synchronous and asynchronous types using FF IC's and specific counter IC.
06. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's.
07. Study of multiplexer and de multiplexer.
08. Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.
09. Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator, integrator and differentiator.
10. Voltage to frequency characteristics of NE/ SE 566 IC.
11. Variability Voltage Regulator using IC LM317.