



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ANALOG AND DIGITAL CIRCUITS LABORATORY								
IV Semester: EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECD17	Core	L	T	P	C	CIA	SEE	Total
		0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: There are no prerequisites to take this course.								

I. COURSE OVERVIEW:

The objective of this laboratory course is to meet the requirements of practical work meant for components basics, analysis and design and provides hands-on experience by examining the characteristics of various semiconductor devices and measuring instruments. This lab covers the analysis of the characteristics of semiconductor devices and functionality of the digital circuits to use as elementary blocks in analog and digital circuit applications. Students will proficiency with the capability to use simulation tools for performing various analysis of semiconductor devices, combinational and sequential circuit applications.

II. COURSE OBJECTIVES:

The students will try to learn:

- I The characteristics and applications of diodes.
- II The characteristics of transistor in different configurations.
- III The function and applications of gates.
- IV The different combinational circuits.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO1 Apply the PN junction characteristics for the diode applications such as half wave and full wave rectifier.
- CO2 Apply the volt-ampere characteristics of PN junction diode, Zener diode for finding cut-in voltage, static and dynamic resistance.
- CO3 Analyze the input and output characteristics of transistor configurations for determining the input-output resistances.
- CO4 Identify the functionality of Boolean expressions using gates such as and, or, not, and, nor, nor and xnor.
- CO5 Build combinational circuits such as adder, subtractor, multiplexers and comparators realization using low level elementary blocks.
- CO6 Construct shift registers using the functionality of the flip flops.

IV. COURSE CONTENT:

Week – 1: PN JUNCTION DIODE CHARACTERISTICS

Verification of V-I characteristics of PN diode and calculate static and dynamic resistance

Week – 2: TRANSISTOR CE CHARACTERISTICS

Verification of Input and Output characteristics of CE configuration

Week – 3: TRANSISTOR CB CHARACTERISTICS

Verification of Input and Output characteristics of CB configuration

Week – 4: HALF WAVE AND FULL WAVE RECTIFIER

Verification of Half wave rectifier and Full wave rectifier without and with filters

Week – 5: DRAIN AND TRANSFER CHARACTERISTICS FIELD EFFECT TRANSISTOR

Verification of drain and transfer characteristics of J FET configuration

Week – 6: RC PHASE SHIFT OSCILLATOR

Determine the Gain and Bandwidth of RC phase shift oscillator

Week – 7: INVERTING AND NON INVERTING AMPLIFIERS USING OP-AMP

Determine the gain of inverting and non inverting amplifiers using op-amp

Week – 8: INTEGRATOR AND DIFFERENTIATOR USING OP-AMP

Plot the output of Integrator And Differentiator Using Op-Amp

Week – 9: BASIC LOGIC GATES

Verification of truth tables of basic logic gates

Week – 10: ADDER / SUBTRACTOR

Design a 4 – bit Adder / Subtractor

Week – 11: MULTIPLEXER, DECODERS

Design and realization of 8x1 using 2x1 MUX

Week – 12: SHIFT REGISTER

Design and realization of an 8 bit parallel load and serial out shift register using flip-flops

Week – 13: SYNCHRONOUS COUNTERS

Design and realization of synchronous counters

Week – 14: ASYNCHRONOUS COUNTERS

Design and realization of asynchronous counters

V. REFERENCE BOOKS:

1. Jacob Millman, Herbert Taub, Mothiki S PrakashRao, “Pulse Digital and Switching Waveforms”, Tata McGraw-Hill, 3rd Edition, 2008.
2. David A. Bell, “Solid State Pulse Circuits”, PHI, 4th Edition, 2002.
3. D Roy Chowdhury, “Linear Integrated Circuits”, New Age International (p) Ltd, 2nd Edition, 2003.
4. Ramakanth A. Gayakwad, “Op-Amps & linear ICs”, PHI, 3rd Edition, 2003.

VI. WEB REFERENCES:

1. <http://www.tedpavlic.com/teaching/osu/ece327/>
2. <http://www.ee.iitkgp.ac.in>
3. <http://www.citchennai.edu.in>
4. <http://american.cs.ucdavis.edu/academic/ecs154a.sum14/postscript/cosc205.pdf>
5. <http://www.ece.rutgers.edu/~marsic/Teaching/DLD/slides/lec-1.pdf>

VII. MATERIALS ONLINE

1. Course template
2. Lab Manual