



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ELECTRONIC DEVICES AND CIRCUITS LABORATORY								
III Semester: ECE EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
AECE05	Core	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			
Prerequisite: Applied Physics								

I. COURSE OVERVIEW:

This course provides the hands-on experience on designing circuits using Diodes, Bipolar Junction Transistors, Field Effect Transistors, UJTs and SCRs. Determine the gain, bandwidth and input output impedances of BJT and FET amplifiers. Provides the capability to extract the characteristics of semiconductor devices with simulation tools.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The behavior and characteristics of semiconductor devices for designing the semiconductor circuits such as amplifier and rectifiers.
- II. Estimation of device characteristics like gain, bandwidth, input and output resistance of bipolar junction transistors and field effect transistors amplifiers to derive appropriate small-signal model analysis of basic amplifier circuits.
- III. The analytical skills to model analog and digital integrated circuits at discrete and micro circuit level.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 Demonstrate the electronic instruments for measuring voltage, current and phase parameters
- CO 2 Experiment and determine the parameters of rectifiers and voltage regulators using the diode characteristics.
- CO 3 Examine the input and output characteristics of transistor (BJT and FET) configurations for determining input - output resistances.
- CO 4 Characterize BJT and FET amplifiers for estimating the voltage gain and Current gain.
- CO 5 Demonstrate the intrinsic stand-off ratio of the uni-junction transistor using volt ampere characteristics

IV. COURSE CONTENT:

EXERCISE-1: V-I CHARACTERISTICS OF P-N JUNCTION DIODE

Verification of V-I characteristics of both germanium and silicon PN diode and calculate static and dynamic resistance using hardware and digital simulation.

EXERCISE -2: ZENER DIODE CHARACTERISTICS AND VOLTAGE REGULATOR

Verification of V-I characteristics of Zener diode and perform Zener diode as a Voltage regulator using hardware and digital simulation.

EXERCISE -3: HALF WAVE RECTIFIER

Design a half-wave rectifier circuit and analyze the rectifier output with and without a filter.

EXERCISE -4: FULL WAVE RECTIFIER

Design a full-wave rectifier circuit and analyze the rectifier output with and without filter

EXERCISE -5: TRANSISTOR CB CHARACTERISTICS

Plot the input and output characteristics of a transistor in common base configuration.

EXERCISE -6: TRANSISTOR CE CHARACTERISTICS

Plot the input and output characteristics of a transistor in common Emitter configuration.

EXERCISE -7: FREQUENCY RESPONSE OF CE AMPLIFIER

Obtain the frequency response curve of the CE amplifier and determine the mid frequency gain, A_{mid} , lower and higher cutoff frequency.

EXERCISE -8: FREQUENCY RESPONSE OF CC AMPLIFIER

Design a common collector transistor (n-p-n) amplifier circuit and obtain the frequency response curve of the amplifier, mid frequency gain, A_{mid} , lower and higher cutoff frequency.

EXERCISE -9: FET CHARACTERISTICS

To study the drain and transfer characteristics of FET and find the drain resistance, trans-conductance, and amplification factor.

EXERCISE -10: FREQUENCY RESPONSE OF CS AMPLIFIER

Obtain the frequency response of common source FET amplifier and measure the voltage gain and bandwidth.

EXERCISE -11: FREQUENCY RESPONSE OF CD AMPLIFIER

To obtain frequency response of common drain FET amplifier and measure the voltage gain and bandwidth of CD amplifier

EXERCISE -12: TRANSISTOR AS A SWITCH

To observe the action of a Diode and Transistor as an electronic switch and measure the voltage across the transistor when it is ON and when it is OFF. Use LED at the output to check transistor ON and OFF

EXERCISE -13: CLIPPERS

Design non-linear wave shaping circuits as clippers.

EXERCISE -14: CLAMPERS

Design non-linear wave shaping circuits as clampers.

V. TEXT BOOKS:

1. J. Millman, C.C.Halkias, Millman's, "Integrated Electronics", Tata McGraw Hill, 2nd Edition, 2001.
2. J. Millman, C.C.Halkias and Satyabrata Jit, "Electronic Devices and Circuits", Tata Mc Graw Hill, 2nd Edition, 1998.

VI. REFERENCE BOOKS:

1. Mohammad Rashid, "Electronic Devices and Circuits", Cengage learning, 1st Edition, 2014.
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2009.

VII. ELECTRONICS RESOURCES:

1. <https://archive.org/details/ElectronicDevicesCircuits>
2. <http://www.tedpavlic.com/teaching/osu/ece327/>

VIII. MATERIALS ONLINE

1. Course Outline Description
2. Lab Manual