INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ELECTRONIC DEVICES AND CIRCUITS LABORATORY								
III Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AECD06	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
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
CO 6	Build and determine holding, latching current and break over voltage of silicon-controlled rectifier usingvolt - ampere characteristics.

IV. LIST OF EXPERIMENTS:

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

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

WEEK-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.

WEEK-3: HALF WAVE RECTIFIER

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

WEEK-4: FULL WAVE RECTIFIER
Design a full-wave rectifier circuit and analyze the rectifier output with and without filter

WEEK-5: TRANSISTOR CB CHARACTERISTICS
Plot the input and output characteristics of a transistor in common base configuration.

WEEK -6: TRANSISTOR CE CHARACTERISTICS
Plot the input and output characteristics of a transistor in common Emitter configuration.

WEEK -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.

WEEK -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.

WEEK -9: UJT CHARACTERISTICS
Verification of V-I Characteristics of UJT using hardware and digital simulation.

WEEK -10: SCR CHARACTERISTICS
To observe and analyze the V-I Characteristics of Silicon Control Rectifier (SCR) and determine holding, latching current and break over voltage.

WEEK -11: FET CHARACTERISTICS
To study the drain and transfer characteristics of FET and find the drain resistance, trans-conductance, and amplification factor.

WEEK -12: FREQUENCY RESPONSE OF CS AMPLIFIER
Obtain the frequency response of common source FET amplifier and measure the voltage gain and bandwidth.

WEEK -13: FREQUENCY RESPONSE OF CD AMPLIFIER
To obtain frequency response of common drain FET amplifier and measure the voltage gain and bandwidth of CD amplifier

WEEK -14: CLIPPERS AND CLAMPERS
Design non-linear wave shaping circuits as clippers and 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, 2ndEdition, 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 template
2. Lab Manual