INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ANALOG ELECTRONICS LABORATORY								
IV Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AECD14	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: Electronic Devices and Circuits								

I. COURSE OVERVIEW:
This course provides hands-on experience in designing electronic circuits and pulse circuits using transistors. The course aims at practical experience with the characteristics and theoretical principles of linear and nonlinear devices and pulse circuits. It provides the capability to design and simulate amplifiers and wave-shaping circuits. Design power amplifiers, feedback amplifiers, clippers, and clampers, and end determine the gain, bandwidth of amplifiers, and calculation of distortion in power amplifiers.

II. COURSES OBJECTIVES:
The students will try to learn

I. The design and analysis of single-stage and multistage amplifiers such as a basic amplifier, and two-stageamplifiers and determine the gain and bandwidth.
II. Design and analysis of the transistor clipper and clamper circuits, also measure the voltage limits of bothbiases and unbiased clipping circuits.
III. The concept of feedback and design feedback amplifiers, such as current series feedback amplifiers andRC phase shift oscillators.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO 1 Illustrate Bipolar Junction Transistor (BJT) amplifier circuits and their frequency response at low, mid, and high frequencies for determining amplifier characteristics.
CO 2 Summarize the concept of feedback amplifiers for the distinction between negative and positive feedback.
CO 3 Design the RC and LC Oscillators for a given frequency and compare the theoretical and practical frequency values.
CO 4 Identify the suitable large signal amplifiers or power amplifiers for practical applications with given specifications.
CO 5 Analyze the response of linear and non-linear wave shaping circuits for impulse and pulse inputs with different time constants.
CO 6 Build bi-stable, monostable, and Astable multivibrator circuits using transistors for real-time applications.

IV. LIST OF EXPERIMENTS:

WEEK-1: FREQUENCY RESPONSE OF BASIC AMPLIFIERS
Design RC coupled common emitter amplifier, determine the gain at different frequencies, and calculate the bandwidth from frequency response characteristics.

WEEK-2: CURRENT-SERIES FEEDBACK AMPLIFIER
Design a current series feedback amplifier and analyze the performance with and without feedback.

WEEK-3: RC PHASE SHIFT OSCILLATOR
Design RC phase shift oscillator and compare the theoretical and practical frequency.

WEEK-4: LINEAR AND NON-LINEAR WAVE SHAPING
Design the linear and nonlinear wave shaping circuits and determine the frequency response characteristics.

WEEK-5: RELAXATION OSCILLATOR
Design a UJT relaxation oscillator to generate pulses with variable frequency.

WEEK -6: MULTIVIBRATOR
Design an astable multivibrator to generate a square wave of 1 KHz.

WEEK -7: SAMPLING GATES
Design sampling gate circuit and verify the output and input waveforms.

WEEK -8: SINGLE TUNED AMPLIFIER
Design and simulate a single-tuned amplifier and calculate the resonant frequency and gain.

WEEK -9: TWO STAGE RC COUPLE AMPLIFIER
Design and simulate a two stage RC coupled amplifier and determine the frequency response characteristics.

WEEK -10: LC OSCILLATOR
Design and simulate Hartley and Colpitts LC oscillator and compare the theoretical and practical frequency.

WEEK -11: DIFFERENTIAL AMPLIFIER
Design and simulate differential amplifier and calculate the common mode and differential mode gain.

WEEK -12: TRANSISTOR AS A SWITCH
Design and simulate transistor switch circuits and determine the switching characteristics.

WEEK -13: COMPARATOR
Design and simulate the comparator circuit and determine the comparator characteristics.

WEEK -14: SCHMITT TRIGGER
Design and simulate Schmitt trigger circuit and determine the Schmitt trigger characteristics.

V. TEXT BOOKS:

1. Jacob Millman, Electronic Devices and Circuits, Tata McGraw Hill Education, 3rd edition, 2014.
2. Jacob Millman, Herbert Taub , Mothiki S. PrakashRao, “Pulse Digital and Switching Waveforms”, TataMcGraw-Hill, 3rd edition, 2008.

VI. REFERENCE BOOKS:

1. Robert L. Boylestead, Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson, 11th edition,2009.
2. David A. Bell, “Solid State Pulse Circuits”, PHI, 4th edition, 2002

VII. ELECTRONICS RESOURCES:
1. https://archive.org/details/ElectronicDevicesCircuits
2. https://www.electronics-tutorials.ws/

VIII. MATERIALS ONLINE
1. Course template
2. Lab Manual