COURSE CONTENT

ELECTRONIC CIRCUIT ANALYSIS LABORATORY								
IV Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AECE14	Core	-	-	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:

The Electronic Circuit Analysis Laboratory is designed to provide hands-on experience in designing, building, and analyzing analog electronic circuits. It focuses on the practical implementation of amplifiers, oscillators, power amplifiers, multivibrators, and waveform generators using discrete components and simulation tools. The lab strengthens understanding of frequency response, gain, feedback, waveform shaping, and time base generation.

.

II. COURSES OBJECTIVES:

The students will try to learn

I. The design and analyze multistage, tuned, and power amplifiers, and evaluate their gain, frequency response, distortion, and efficiency.
II. The implementation of feedback and oscillator circuits (RC, Hartley, Colpitts, Phase-shift) by deriving and verifying conditions for sustained oscillations.
III. To perform circuit simulations using industry-standard tools for amplifiers, oscillators, and waveform generators, and compare practical results with theoretical predictions.

III. COURSE OUTCOMES:

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

CO 1 Analyze multistage and power amplifiers and evaluate their frequency response and efficiency.
CO 2 Examine feedback and oscillator circuits and validate theoretical conditions for sustained oscillations.
CO 3 Develop and interpret waveform generation circuits such as multivibrators and time base generators
CO 4 Perform simulations to validate analog circuit performance using industry-standard software tools.
CO 5 Examine the suitable multi vibrator to generate non-sinusoidal waveforms for real time applications
CO 6 Apply the barkhausen criteria to oscillators for generating sine wave.

IV. COURSE CONTENT:

EXERCISE -1: GETTING STARTED EXERCISES
Familiarize with basic electronic components, circuit simulation tools, and measurement of fundamental parameters in electronic circuits.

EXERCISE -2: TWO-STAGE RC COUPLED AMPLIFIER
Design a two-stage RC coupled amplifier to demonstrate gain enhancement and study coupling capacitance effects.

EXERCISE -3: HARTLEY AND COLPITTS OSCILLATORS
Design Hartley and Colpitts oscillators for a specified frequency and observe their output waveforms.

EXERCISE -4: RC PHASE SHIFT OSCILLATOR
Design an RC phase shift oscillator and derive the practical gain condition for oscillations at a given frequency.

EXERCISE -5: TRANSFORMER-COUPLED CLASS A POWER AMPLIFIER
Design a transformer-coupled class A power amplifier, observe input/output waveforms, and calculate efficiency.

EXERCISE -6: CLASS B POWER AMPLIFIER
Design a class B power amplifier, analyze input/output waveforms, and evaluate harmonic distortion.

EXERCISE -7: BISTABLE MULTIVIBRATOR
Design a bistable multivibrator, analyze commutating capacitor effects, and record transistor waveforms.

EXERCISE -8: ASTABLE MULTIVIBRATOR
Design an astable multivibrator and observe transistor base and collector waveforms

EXERCISE -9: FEEDBACK AMPLIFIER
Simulate four feedback amplifier topologies and compare their frequency responses with and without feedback.

EXERCISE -10: MONOSTABLE MULTIVIBRATOR
Simulate a monostable multivibrator and analyze its input/output waveforms.

EXERCISE -11: SCHMITT TRIGGER
Simulate a Schmitt trigger for gain values greater than and less than one and analyze response behavior.

EXERCISE -12: BOOTSTRAP TIME BASE GENERATOR
Simulate a bootstrap time base generator using BJT and observe the output sweep waveform.

EXERCISE -13: MILLER SWEEP CIRCUIT
Simulate a Miller sweep circuit using BJT and observe the time base output waveform.

EXERCISE -14: COMPLEMENTARY SYMMETRY PUSH-PULL AMPLIFIER
Simulate a complementary symmetry push-pull amplifier and verify elimination of crossover distortion.

WEEK -15: SINGLE TUNED AMPLIFIER
Simulate a single tuned amplifier and determine the quality factor (Q) of its tuned circuit.

V. TEXT BOOKS:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, McGraw-Hill Education, 4th Edition, 2010.
2. Robert L. B. Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson, 11th Edition,2015.
3. Jacob Millman, Christos C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, McGraw-Hill, 2nd Edition, 2010.

VI. REFERENCE BOOKS:

1. Jacob Millman and Arvin Grabel, Microelectronics, McGraw-Hill Education, 2nd Edition, 2008.

VII. ELECTRONICS RESOURCES:

1. https://www.circuitlab.com/?utm_source=chatgpt.com
2. https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/?utm_source=chatgpt.com
3. https://electronics-resources.com/?utm_source=chatgpt.com
4. https://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf?utm_source=chatgpt.com

VIII. MATERIALS ONLINE

1. Course outline Description
2. Lab Manual