ANALOG AND PULSE CIRCUITS LABORATORY

IV Semester: ECE

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB15	Core	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

I. COURSE OVERVIEW:

The objective of this course is to meet the requirements of practical work meant for circuit designing, analysis and provides hands-on experience by examining the pulse circuits and measuring instruments. This lab covers the analysis of the linear, non-linear wave shaping circuits, oscillators and multi vibrators. Students will proficiency with the capability to use simulation tools for performing analysis of various amplifier circuits, wave shaping circuits and multi vibrator applications.

II. OBJECTIVES:

The course should enable the students to:

I	The basic amplifier circuits using common emitter and common base configurations.
II	The multi vibrator circuits using transistors for real time applications.
III	The principle of oscillation and design of oscillators.
IV	The response of linear and non linear wave shaping circuits for sinusoidal, pulse andramp inputs.

III. COURSE OUTCOMES:

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

CO 1	**Analyze** the single stage and multistage Bipolar Junction Transistor (BJT) amplifiers for determining the voltage gain and bandwidth. .	Analyze
CO 2	**Build** linear and non-linear wave shaping circuits to obtain theresponse for sine and square wave inputs.	Apply
CO 3	**Analyze** voltage series and current shunt feedback amplifier circuits for determining amplifier characteristics.	Analyze
CO 4	**Apply** the barkhausen criteria to oscillators for generating sine wave.	Apply
CO 5	**Examine** the suitable multi vibrator to generate non-sinusoidal waveforms for real time applications	Apply
CO 6	**Examine** the frequency response of class-A power amplifiers and single tuned voltage amplifier circuits using Bipolar Junction Transistor (BJT).	Analyze

IV. SYLLABUS:

LIST OF EXPERIMENTS

WEEK-1	BASIC AMPLIFIERS/ LINEAR WAVESHAPING
a. Simulate frequency response of common emitter amplifier and common base amplifier. b. Design RC low pass and high pass circuit for different time constants.	
WEEK -2	BASIC AMPLIFIERS/ LINEAR WAVESHAPING
a. Design RC low pass and high pass circuit for different time constants b. Simulate frequency response of common emitter amplifier and common base amplifier.	
WEEK -3	TWO STAGE RC COUPLED AMPLIFIER/ NON-LINEAR WAVESHAPING
a. Simulate frequency response of two stage RC coupled amplifier. b. Design transfer characteristics of clippers and clampers	

WEEK - 4	**TWO STAGE RC COUPLED AMPLIFIER/ NON-LINEAR WAVESHAPING**
a. Design transfer characteristics of clippers and clampers. b. Simulate frequency response of two stage RC coupled amplifier.	
WEEK -5	**SINGLE TUNED AMPLIFIERS/ TRANSISTOR AS A SWITCH**
a. Simulate a single tuned amplifier. b. Design of transistor as a switch.	
WEEK-6	**SINGLE TUNED AMPLIFIERS/ TRANSISTOR AS A SWITCH**
a. Design of transistor as a switch. b. Simulate a single tuned amplifier.	
WEEK -7	**FEEDBACK AMPLIFIERS/ COMPARATOR**
a. Simulate voltage series feedback amplifier and current shunt feedback amplifier. b. Design of comparator circuit.	
WEEK-8	**FEEDBACK AMPLIFIERS/ COMPARATOR**
a. Design of comparator circuit. b. Simulate voltage series feedback amplifier and current shunt feedback amplifier	
WEEK-9	**RC PHASE SHIFT OSCILLATOR USING TRANSISTOR/ MULTIVIBRATORS**
a. Simulate sine wave generated for a particular frequency by an RC phase shift oscillator. b. Design different types of multivibrators and plot its waveforms.	
WEEK-10	**RC PHASE SHIFT OSCILLATOR USING TRANSISTOR/ MULTIVIBRATORS**
a. Design different types of multivibrators and plot its waveforms. b. Simulate sine wave generated for a particular frequency by an RC phase shift oscillator.	
WEEK-11	**OSCILLATORS/ SCHMIT TRIGGER**
a. Simulate sine wave generated for a particular frequency by Colpitts and Hartley oscillator. b. Design a Schmitt trigger circuit.	
WEEK-12	**OSCILLATORS/ SCHMIT TRIGGER**
a. Design a Schmitt trigger circuit. b. Simulate sine wave generated for a particular frequency by Colpitts and Hartley oscillator.	
WEEK-13	**POWER AMPLIFIERS/ UJT AS A RELAXATION OSCILLATOR**
a. Simulate class A power amplifier (transformer less) and class B power amplifier. b. Design of UJT as a relaxation oscillator.	
WEEK-L4	**POWER AMPLIFIERS/ UJT AS A RELAXATION OSCILLATOR**
a. Design of UJT as a relaxation oscillator. b. Simulate class A power amplifier (transformer less) and class B power amplifier.	

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. J. Millman, C. C. Halkias, “Integrated Electronics”, Tata McGraw-Hill. 1st Edition, 2008.
4. B. P. Singh, Rekha Singh, “Electronic Devices and Circuits”, Pearson, 1st Edition, 2006.
5. Behzad Razavi, “Design of Analog CMOS Integrated Circuits”, Tata McGraw-Hill, 1st Edition, 2002.

Web References:

1. http://www.tedpavlic.com/teaching/osu/ece327/
2. http://www.ee.iitkgp.ac.in
3. http://www.citchennai.edu.in

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS

HARDWARE: Desktop Computer Systems 18 nos

SOFTWARE : NI Multisim

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S No	Name of the Equipment	Range
1	Dual Dc Regulated Power Supply	0-30V DC
2	Cathode Ray Oscilloscope	0-20 MHz
3	Function Generator	0-10 MHz
4	Semiconductor Kits	0-15 V
5	Resistors	100Ω,150 Ω,820 Ω,1k Ω,1.5k Ω, 2.2kΩ, 10kΩ, 22k Ω, 47k Ω
6	Capacitors	0.1μF, 0.001μF, 0.022μF, 0.0022μF 0.0033μF,100pF, 1000μF, 22μF
7	Diode	1N4007,4148
8	UJT	2N2646
9	Transistors	BC107,2N2222
10	Inductors	1mH,5mH
11	Probes / Connecting wires	--