

## ELECTRONIC DEVICES AND CIRCUITS LABORATORY

<b>III Semester: ECE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AEC101	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
<b>Contact Classes: Nil</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: 39</b>			<b>Total Classes: 39</b>	
<b>I. COURSE OVERVIEW:</b>								
<p>This course provides the hands-on experience by examining the voltage-current characteristics of diodes, Bipolar Junction Transistors, Field Effect Transistors and its applications. Analyze the devices for measuring device characteristic parameters for designing semiconductor circuits. Extract the characteristics of semiconductor devices using multiuse simulation tool</p>								
<b>II. OBJECTIVES:</b>								
<b>The course should enable the students to:</b>								
<p>I The behavior and characteristics of semiconductor devices for designing these semiconductor circuits such as amplifier and rectifiers.</p> <p>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.</p> <p>III The analytical skills to model analog and digital integrated circuits at discrete and microcircuit level.</p>								
<b>III. COURSE OUTCOMES:</b>								
<b>After successful completion of the course, students should be able to:</b>								
CO 1	Analyze the semiconductor diode characteristics for measuring the static, dynamic resistances and cut-in voltage.						Analyze	
CO 2	Construct the pn junction diode and Zener diode characteristics for the diode applications such as rectifiers and voltage regulator.						Apply	
CO 3	Examine the input and output characteristics of transistor (BJT and FET) configurations for determining the input - output resistances.						Analyze	
CO 4	Compare BJT and FET amplifiers for estimating the voltage gain and Current gain.						Analyze	
CO 5	Calculate the intrinsic stand-off ratio of the uni junction transistor using volt – ampere characteristics.						Apply	
CO 6	Determine holding, latching current and break over voltage of silicon controlled rectifier using volt - ampere characteristics.						Apply	
<b>IV. SYLLABUS:</b>								
<b>LIST OF EXPERIMENTS</b>								
<b>WEEK-1</b>	<b>ELECTRONIC WORKSHOP PRACTICE</b>							
<p>Identification, specifications, testing of R, L, C components (Color Codes), potentiometers, switches (SPDT, DPDT and DIP), coils, gang condensers, relays, bread boards, PCBs, identification, specifications and testing of active devices, diodes, BJTs, low power JFETs, MOSFETs, power transistors, LEDs, LCDs, optoelectronic devices, SCR, UJT, DIACs.</p>								
<b>WEEK-2</b>	<b>ELECTRONIC WORKSHOP PRACTICE</b>							
<p>Study and operation of</p> <p>a. Multimeters (Analog and Digital)</p>								

b. Function Generator c. Regulated Power Supplies d. Study and Operation of CRO	
<b>WEEK-3</b>	<b>PN DIODE CHARACTERISTICS</b>
Verification of V-I characteristics of PN diode and calculate static and dynamic resistance using hardware and digital simulation.	
<b>WEEK-4</b>	<b>ZENER DIODE CHARACTERISTICS AND VOLTAGE REGULATOR</b>
Verification of V-I characteristics of Zener diode and perform Zener diode as a Voltage regulator using hardware and digital simulation.	
<b>WEEK-5</b>	<b>HALF WAVE RECTIFIER</b>
Verification of half wave rectifier without and with filters using hardware and digital simulation.	
<b>WEEK-6</b>	<b>FULL WAVE RECTIFIER</b>
Verification of Full Wave Rectifier without and with filters using hardware and digital simulation.	
<b>WEEK-7</b>	<b>TRANSISTOR CB CHARACTERISTICS</b>
Verification of Input and Output characteristics of CB configuration using hardware and digital simulation.	
<b>WEEK-8</b>	<b>TRANSISTOR CE CHARACTERISTICS</b>
Verification of Input and Output Characteristics of CE configuration using hardware and digital simulation.	
<b>WEEK-9</b>	<b>FREQUENCY RESPONSE OF CE AMPLIFIER</b>
Determine the Gain and Bandwidth of CE amplifier using hardware and digital simulation.	
<b>WEEK-10</b>	<b>FREQUENCY RESPONSE OF CC AMPLIFIER</b>
Determine the Gain and Bandwidth of CC amplifier using hardware and digital simulation.	
<b>WEEK-11</b>	<b>UJT CHARACTERISTICS</b>
Verification of V-I Characteristics of UJT using hardware and digital simulation.	
<b>WEEK-12</b>	<b>SCR CHARACTERISTICS</b>
Verification of V-I Characteristics of SCR using hardware and digital simulation.	
<b>WEEK-13</b>	<b>FET CHARACTERISTICS</b>
Verification of V-I Characteristics of FET using digital simulation.	
<b>WEEK-14</b>	<b>FREQUENCY RESPONSE OF CS AMPLIFIER</b>
Determine the Gain and Bandwidth of CS amplifier using digital simulation.	
<b>WEEK-15</b>	<b>FREQUENCY RESPONSE OF CD AMPLIFIER</b>
Determine the Gain and Bandwidth of CS amplifier using digital simulation.	
<b>Reference Books:</b>	

1. J. Millman, C.C.Halkias, "Millman's Integrated Electronics", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2001.
2. J. Millman, C.C.Halkias and Satyabrata Jit, "Millman's Electronic Devices and Circuits", Tata McGraw Hill, 2<sup>nd</sup> Edition, 1998.
3. Mohammad Rashid, "Electronic Devices and Circuits", Cengage learning, 1<sup>st</sup> Edition, 2014.
4. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5<sup>th</sup> Edition, 2009.

**Web References:**

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

**Course Home Page:**

**LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS**

S. No	Name of the Equipment	Range
1	Regulated Power Supply	0-30V DC
2	Cathode Ray Oscilloscope	0-20 MHz
3	Digital voltmeter	0-1V, 0-20 V
4	Digital ammeter	0-200 mA, 0-200 $\mu$ A
5	Resistors	1K $\Omega$ , 100K $\Omega$ , 470 $\Omega$ , 150 $\Omega$ , 10K $\Omega$ , 47K $\Omega$ , 1M $\Omega$ , 2.2k $\Omega$ , 220K $\Omega$
6	Capacitors	0.01 $\mu$ F, 0.01 $\mu$ F, 100 $\mu$ F(Electrolytic) , 10 $\mu$ F (Electrolytic)
7	Diodes	1N4007, 4V7, 6V2.
8	Transistors	BC107, 2N2646, C106MG /XL084.
9	Semiconductor Trainer Kit	--
10	Connecting Wires and Patch cords	--
11	Decade resistance box	10 $\Omega$ -100k $\Omega$
12	Decade Capacitance box	10 $\mu$ F-100 $\mu$ F
13	Function Generator	10Hz-1M Hz
14	Digital Multimeters	0-20V/ 0-200mA/10 $\Omega$ -10k $\Omega$
15	Bread Board	--