

## INTEGRATED CIRCUITS APPLICATIONS

<b>V Semester: EEE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AEC008	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: 15</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>	
<b>I. COURSE OVERVIEW:</b>								
<p>This course introduces the fundamental concepts of operational amplifier, linear and non-linear applications of op-amp and digital Integrated circuits. It focus on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuits. It provides the knowledge on comparators; digital IC's for combination and sequential circuit designsand the basis for the next level of course VLSI Design.</p>								
<b>II. OBJECTIVES:</b>								
<b>The course should enable the students to:</b>								
<ul style="list-style-type: none"> <li>I The basic building blocks, characteristics and applications of operational amplifier.</li> <li>II The functional details of logic families, combinatorial and sequential digital circuits (ICs) used in digital design.</li> <li>III Different IC models which are basic for Mixed signal integrated circuits in future.</li> </ul>								
<b>III. COURSE OVERVIEW:</b>								
<b>After successful completion of the course, students should be able to:</b>								
CO 1	Describe the principles and characteristics of op-amp circuits to perform arithmetic operations.			Understand				
CO 2	Distinguish linear and non-linear applications of op-amp circuits to measure the output characteristics.			Understand				
CO 3	Design frequency selective circuits using OPAMP for audio and radiofrequency ranges.			Analyze				
CO 4	Demonstrate the characteristics, operation and applications of Multi-vibrators using IC555 timer.			Understand				
CO 5	Choose an appropriate A/D and D/A converter for signal processing applications.			Apply				
CO 6	Analyze the characteristics of sequential and combinational digital integrated circuits for digital circuit design.			Analyze				
<b>IV. SYLLABUS:</b>								
<b>UNIT-I</b>	<b>INTEGRATED CIRCUITS</b>						<b>Classes: 08</b>	
<p>Integrated Circuits: Classification of integrated circuits, Package types and temperature ranges; Differential Amplifier: DC and AC analysis of Dual input Balanced output Configuration; Properties of differential amplifier configuration: Dual Input Unbalanced Output, Single Ended Input, Balanced/ Unbalanced Output; DC Coupling and Cascade Differential Amplifier Stages, Level translator. Characteristics of OP-Amps: Op-amp Block Diagram, ideal and practical Op-amp specifications, DC and AC characteristics, 741 op-amp &amp; its features; Op-Amp parameters &amp; Measurement: Input &amp; Out put Off set voltages &amp; currents, slew rate, CMRR, PSRR, drift.</p>								
<b>UNIT-II</b>	<b>APPLICATIONS OF OP- AMPS</b>						<b>Classes: 09</b>	
<p>Linear applications of Op- Amps: Inverting and non-inverting amplifier, integrator, differentiator, instrumentation amplifier, AC amplifier; Non-linear applications of Op-Amps: Comparators,</p>								

multivibrators, triangular and square wave generators, non- linear function generation, log and anti log amplifiers.		
<b>UNIT-III</b>	<b>ACTIVE FILTERS AND TIMERS</b>	<b>Classes: 09</b>
Active Filters: Classification of filters, 1 <sup>st</sup> order low pass and high pass filters, 2 <sup>nd</sup> order low pass, high pass, band pass, band reject and all pass filters. Timers: Introduction to 555 timer, functional diagram, monostable, astable operations and applications, Schmitt Trigger; PLL: Introduction, block schematic, principles and description of individual blocks, 565 PLL.		
<b>UNIT-IV</b>	<b>DATA CONVERTERS</b>	<b>Classes: 10</b>
Data converters: Introduction, classification, need of data converters; DAC techniques: Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, DAC characteristics; ADC techniques: Integrating, successive approximation, flash converters, A/D characteristics.		
<b>UNIT-V</b>	<b>DIGITAL IC APPLICATIONS</b>	<b>Classes: 09</b>
Combinational Design Using TTL/ CMOS ICs: Logic delays, TTL/CMOS interfacing, adders, multiplexer, demultiplexer, decoder, encoder; Sequential design using TTL/ CMOS ICs: SR, JK, T, and D flip-flops; Counters: Synchronous and asynchronous counters, decade counter; Registers: Shift registers, universal shift register, Ring counters and Johnson counters.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. D. Roy Chowdhury, "Linear Integrated Circuits", New age international (p) Ltd, 2<sup>nd</sup> Edition, 2003.</li> <li>2. Ramakanth A. Gayakwad, "Op-Amps &amp; linear ICs", PHI, 3<sup>rd</sup> Edition, 2003.</li> <li>3. John F. Wakerly, "Digital Design Principles and Practices", Prentice Hall, 3<sup>rd</sup> Edition, 2005.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Salivahanan, "Linear Integrated Circuits and Applications", TMH, 1<sup>st</sup> Edition, 2008.</li> </ol>		
<b>Web References:</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.nptel.ac.in">https://www.nptel.ac.in</a></li> <li>2. <a href="https://www.svecw.edu.in">https://www.svecw.edu.in</a></li> <li>3. <a href="https://www.smartzworld.com">https://www.smartzworld.com</a></li> <li>4. <a href="https://www.crectirupati.com">https://www.crectirupati.com</a></li> </ol>		
<b>E-Text Books:</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://books.google.co.in/books?isbn=8122414702">https://books.google.co.in/books?isbn=8122414702</a></li> <li>2. <a href="https://books.google.co.in/books?isbn=013186389">https://books.google.co.in/books?isbn=013186389</a></li> </ol>		
<b>Course Home Page:</b>		