



## COURSE CONTENT

LINEAR AND DIGITAL IC APPLICATION								
IV Semester: ECE								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2540409	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 33	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:33			
Prerequisites: knowledge on Switching theory and logic design.								

**Course Overview:** The course covers operational amplifiers, waveform generators, active filters, data converters, and digital ICs. It introduces both theoretical principles and practical applications, including voltage regulation, logic circuits, memory devices, and programmable IC systems. Students gain skills in designing, testing, and applying both analog and digital circuits in real-world scenarios.

### Course Objectives:

The students will try to learn

- Fundamental characteristics, configurations, and applications of operational amplifiers and voltage regulators.
- Working principles of IC 555 timers, IC 565 phase-locked loops, and their use in waveform generation and signal processing.
- Architecture, techniques, and performance parameters of digital-to-analog and analog-to-digital converters.
- Design and application of combinational logic integrated circuits using TTL and CMOS families.
- Concepts of sequential logic circuits and semiconductor memories, including ROM and RAM architectures.

### Course Outcomes:

After successful completion of the course, students shall be able to

- A thorough understanding of operational amplifiers with linear integrated circuits
- Attain the knowledge of functional diagrams and design applications of IC555 and IC565
- Acquire the knowledge and design the Data converters
- Understanding of the different families of digital integrated circuits and their characteristics
- Combinational and Sequential logic ICs for practical engineering applications

### Module – I: Operational Amplifiers

7L

Ideal and Practical Op-Amp Characteristics, Features of 741 Op- Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

## Module – II: Op-Amp, IC-555 & IC565 Applications

6L

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle, and Applications.

## Module – III: Data Converters

7L

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

## Module – IV: Combinational Logic ICs

7L

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

## Module – V: Sequential Logic IC's and Memories

6L

Familiarity with commonly available 74XX & CMOS40XX Series ICs– All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMs & Applications, RAM Architecture, Static & Dynamic RAMs.

### TEXT BOOKS

1. Op-Amps & Linear ICs– Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals –Floyd and Jain, Pearson Education, 8<sup>th</sup> Ed., 2005.

### REFERENCE BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2<sup>nd</sup> Ed., 2003.
2. Digital Design Principles and Practices–John. F. Wakerly, Pearson 3<sup>rd</sup> Ed., 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH, 2008.

### REFERENCE LINKS

1. <https://www.youtube.com/watch?v=LFa8jnwqCk&list=PLc3zKsWdO93dmQH0jzD4AEdqXA1CIWChj>
2. [https://www.youtube.com/watch?v=wk91\\_VKWJ70&list=PLc3zKsWdO93dmQH0jzD4AEdqXA1CIWChj&index=2](https://www.youtube.com/watch?v=wk91_VKWJ70&list=PLc3zKsWdO93dmQH0jzD4AEdqXA1CIWChj&index=2)
3. <https://www.youtube.com/watch?v=T5rq69oisJs&list=PLc3zKsWdO93dmQH0jzD4AEdqXA1CIWChj&index=3>
4. <https://www.youtube.com/watch?v=T5rq69oisJs&list=PLc3zKsWdO93dmQH0jzD4AEdqXA1CIWChj&index=3>

### MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech Talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper–I
8. Model question paper–II

9. Lecture notes

10. Drshya Siksha Sangrah Videos(DSSV)