III Year I Semester	**L**	**T**	**P**	**C**
Code: 20EC6449	**3**	**0**	**0**	**3**

LINEAR AND DIGITAL ICs

Course Objectives:

1. To understand the basic building blocks of op-amp and its features.
2. To understand and analyze various linear and non-linear applications of different op-amps.
3. To understand and design various timer applications and converters.
4. To understand digital logic families and interfacing concepts for digital design.
5. To design various applications of digital ICs.

UNIT–I: Applications of Op-amps

Introduction to ICs, classification of ICs, Block diagram of op-amp, 741op-amp & its features, Op-Amp parameters & Measurement, Input & Output Offset voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques, Inverting and Non-inverting amplifiers, Integrator and differentiator, Adder and Subtractor, Instrumentation amplifier, V-to-I and I-to-V converters, Buffers, Comparators, Non-Linear function generation, Multivibrators, Triangular and Square wave generators, Precision rectifiers.

UNIT–II: Active Filters, Timers & Voltage Regulators

Active Filters: Design & Analysis of Butterworth active filters – 1st order,2nd order LPF, HPF, Band pass, Band reject and all pass filters, Sample & Hold circuits.

Voltage Regulators: IC723 voltage regulator, three terminal regulators (78XX and &79XX).

Timers: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger.

UNIT–III: PLL, A/D and D/A Converters

Phase Locked Loop: Introduction, Block schematic, Principles and description of individual blocks, 565 PLL, Applications of PLL, Applications of VCO (566).

A/D and D/A Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC and IC 1408 DAC, Different types of ADCs– parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications, Specifications AD574 (12-bit ADC).

UNIT–IV: Digital Logic Families and Interfacing

Introduction to logic families, Diode Logic, Transistor Logic, Diode-Transistor Logic, CMOS logic, CMOS steady state and dynamic electrical behaviour, CMOS logic families. transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of Logic Families.

UNIT–V: Digital ICs and its applications

Logic gates – IC7408, IC7432, IC7404, IC7400, IC7402, IC7486, Adder & Subtractor, Decoder & Encoder, Multiplexer & De-multiplexer, Magnitude Comparator, Latches-D, JK, T, SR, Flip Flops – D, JK, T, SR, Decade Counter.

Course Outcomes:

A student who successfully fulfils this course requirement will be able to:

S. No	Course Outcome	BTL
1.	Understand the basic building blocks of op-amp and its features.	L2
2.	Design op-amp and timer circuits for various applications.	L4
3.	Understand the concepts of PLL and analyze various converters.	L3
4.	Understand digital logic families and interfacing concepts for digital design.	L2
5.	Design digital ICs for various applications.	L4

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	3	3	-	-	-	-	-	-	-	-	1	-	-
CO 3	2	2	2	-	-	-	-	-	-	-	-	1	-	-
CO 4	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	1	2	-	-	-	-	-	-	-	-	-	-	-

Text Books:

1. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p)Ltd, 2nd Edition, 2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
3. Digital Design Principles &Practices – John F. Wakerly, PHI/ Pearson Education, 3rd Ed., 2005.

Reference Books:

1. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SK Kataria & Sons; 2nd Edition, 2010.
2. Design with Operational Amplifiers &Analog Integrated Circuits – Sergio Franco, McGraw Hill, 1988.
3. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition.
4. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, Zvonko Vranesic, McGraw Hill, 3rd Edition.