

3/4 B.Tech. FIFTH SEMESTER
LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS

EE5T6**Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objectives:**

- To learn about the linear and non-linear applications of Op-amp.
- To understand the applications using 555 timer and PLL.
- To study about the various combinational and sequential digital integrated circuits.

Course Outcomes:

At the end of this course, students will be able to:

1. Build internal design concept of Op-amp related to its characteristics
2. Identify various linear and non-linear applications using op-amp
3. Develop different order active filters and applications using timer and PLL ICs.
4. Validate and verify various combinational and sequential digital ICs

UNIT I

Characteristics of Op-Amps: Introduction to OP-amp, Op-amp Block Diagram, ideal and practical Op-amp specifications, interpreting datasheets.

Linear Applications of Op-Amps: Inverting and Non-inverting amplifier, Integrator and differentiator, Summing and Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers.

UNIT II

Non-Linear Applications of Op-Amps: Comparators, Multivibrators, Triangular and Square wave generators, sine wave generation: principle, Wien-bridge, phase-shift, quadrature oscillators, Log and Anti log amplifiers, Precision rectifiers, clampers.

Active Filters: Introduction, classification, Butter worth filters – 1st order, 2nd order LPF, HPF, Band pass, Band reject and All pass filters qualitative, quantitative analysis and frequency response, Switched capacitor filters: working principle, advantages and disadvantages

UNIT III

Timers: Introduction to 555 timer, functional diagram, Mono stable and Astable operations and applications, Schmitt Trigger. Voltage controlled oscillator -566, applications.

Phase Locked Loops: PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication and frequency translation

UNIT IV

Combinational Logic Design: Introduction, Design and Analysis procedures, Decoders, encoders, multiplexers and demultiplexers, Code Converters, comparators, adders & subtractors, Ripple Adder,

Binary Parallel Adder, Binary Adder-Subtractor, Combinational multipliers, ALU Design considerations of the above combinational logic circuits with relevant Digital ICs.

UNIT V

Sequential Logic Design: Introduction, Latches, and flip-flops, Flip-Flop Conversions, Counters, Design of Counters using Digital ICs, Counter applications, Synchronous design methodology, Shift Registers, Modes of Operation of Shift Registers, Ring Counter, Johnson Counter, Design considerations of the above sequential logic circuits with relevant Digital ICs.

Learning Resources**Text Books:**

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.
2. Digital Design Principles & Practices By John F. Wakerly, PHI Publications, Third Edition., 2005

Reference Books:

1. Op-Amps and Linear Integrated Circuits , - Ramakanth A. Gayakwad, PHI, 4th Edition, 2009
2. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition, 2005.
3. Digital Design By M. Morris Mano, Michael D.Ciletti Pearson Education, 4rd Edition, 2007.