service course
to EEE

R-15

III Year I Semester

15AEC19-LINEAR AND DIGITAL IC APPLICATIONS

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Course Objectives:

1. *To introduce the basic building blocks of linear integrated circuits.*
2. *To teach the linear and non-linear applications of operational amplifiers.*
3. *To introduce the theory and applications of PLL.*
4. *To introduce the concepts of waveform generation and introduce some special function ICs*
5. *Exposure to digital IC's*

UNIT I: Introduction to Op-Amps and its frequency response

Introduction, Block diagram, Ideal Op-Amp, Equivalent circuit, Voltage Transfer curve, open loop op-amp configurations, Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier, frequency response of internally compensated op-amps and non compensated op-amps, open loop gain Vs frequency, circuit stability, slew rate. Feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers.

UNIT II: Op- Amps Applications–1:

DC and AC amplifiers, instrumentation amplifier, V to I and I to V converters, integrator, differentiator, Buffers. Non-Linear function generation, Multivibrators, Square and Triangular wave generators, Log and Antilog amplifiers, Precision rectifiers, Comparators, Zero crossing detector, Schmitt trigger, Characteristics and limitations

UNIT III

Specialized applications of Op-Amps: 555 timer IC (monostable & astable operation) & its applications, Voltage regulators, Design of Series Voltage Regulator, Series regulator with Current Pre-regulator.

CMOS Logic: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT IV

Bipolar Logic And Interfacing: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs –Specifications.

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages. Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT V

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders &subtractors, ALUs, Combinational multipliers, VHDL modes for the above ICs.

Sequential Logic Design: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

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Course Outcomes:

a. *Students will develop and build different Electronic circuits.*
b. *Student will be able to analyze different issues related to the development of Linear and Digital integrated circuits.*

TEXT BOOKS:

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
2. Digital Design Principles &Practices–John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
3. Digital System Design Using VHDL–Charles H. Roth Jr., Cengage Publications, 1st Edition.

REFERENCES:

1. Op amps & Linear Integrated Circuits Concepts & Applications, James M.Fiore, Cengage 2009.
2. Linear Integrated Circuits–D. Roy Chowdhury, New Age International (P) Ltd, 2nd Edition, 2003.
3. VHDL Primer–J. Bhasker, Pearson Education/ PHI, 3rdEdition.