

| III B.TECH- I SEMESTER | L | T | P | INTERNAL MARKS | EXTERNAL MARKS | TOTAL MARKS | CREDITS |
|---------------------------|---|------------------------------------|---|-------------------|-------------------|----------------|---------|
| | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| Code: R20EC3101 | | LINEAR AND DIGITAL IC APPLICATIONS | | | | | |

COURSE OBJECTIVES:

- To familiarize with the functioning of various Linear ICs such as OP AMP, Timer, Voltage Controlled Oscillator and Phase Locked Loop.
- To introduce different digital MSI ICs and memories.
- To familiarize in digital logic families and interfacing
- To extend logic gate concepts to realize combinational and sequential circuits.
- To familiarize with CAD tools and writing VHDL programs

COURSE OUTCOMES: At the end of the course, Students will be able to

- CO1:** Recall the basics of FET, MOSFET, amplifiers, standard memories and their characteristics [K1].
- CO2:** Extend the logic gate concept to realize basic combinational and sequential circuits for various Boolean expressions [K2].
- CO3:** Illustrate the operation of IC 555 timer, utilization of filters, VCO, data converters and PLL in the development of various circuits [K2].
- CO4:** Demonstrate the applications of Operational amplifier and IC 555 timer such as Adder, Subtractor, V-I, I-V converter, Differentiator, Integrator, and Triangular, Square wave generators, PWM, PPM generation respectively [K2].
- CO5:** Make use of the computer-aided design tools for development of complex digital logic circuits [K3].

SYLLABUS:**UNIT-I: OPERATIONAL AMPLIFIER AND ITS APPLICATIONS**

The Operational Amplifier, Ideal Operational Amplifier, Operational Amplifier internal circuit, DC and AC characteristics, compensation techniques, Analysis of data sheets of IC 741, Op-amp applications: Adder, Subtractor, V to I and I to V converters, Sample and Hold circuit, Log and Anti log Amplifiers, Integrator and Differentiator, Triangular and Square wave generators.

UNIT-II: D-A AND A-D CONVERTERS & 555 IC TIMER

Need for D-A and A-D conversion, Basic DAC techniques, A-D converters, DAC/ADC Specifications. 555 IC Timer- Pin diagram, functional description, Monostable and Astable operation.

UNIT-III: ACTIVE FILTERS, VCO & PHASE LOCKED LOOP

Active filters, Voltage Controlled Oscillator (VCO) - IC 566- Pin diagram, Block diagram Description, 565 IC PLL- Pin diagram, block schematic, basic principle of operation.

UNIT-IV: DIGITAL LOGIC FAMILIES AND INTERFACING

Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, TTL families, Emitter coupled logic, Comparison of CMOS, TTL and ECL.

**UNIT-V: DESIGN OF COMBINATIONAL & SEQUENTIAL LOGIC CIRCUITS**

Ripple adders and subtractors-74x999, 283, Design of decoders, Encoders, Priority encoder, Multiplexers, Demultiplexers, Parity circuits, Comparators, Simple Floating-Point Encoder and basic flip-flops with relevant Digital ICs, design of Counters, MSI Registers, Shift registers, bi-directional shift register, universal shift register with relevant Digital ICs.
History of VHDL, Design flow, program structure, Modeling Styles of VHDL, Example programs.

TEXT BOOKS:

- D.Roy Choudhury, Shail B.Jain,-Linear Integrated Circuits, 4th Multi Colour Edition, New Age International (p) Ltd, 2010.
- John F.Wakerly - Digital Design Principles & Practices, 3rdEdition, PHI/Pearson Education Asia, 2005.

REFERENCE BOOKS:

- Ramakanth, A. Gayakwad, —OP-Amps & Linear ICs, PHI, 1987.
- J. Bhasker, —VHDL Primer, 3rdEdition, Pearson Education/ PHI.
- Atul P.Godse and Deepali A. Godse, —Digital IC Applications, Technical Publ., Pune, 2005.
- K. LalKishore, V.S.V.Prabhakar, -VLSI Design, I.K International publishing house, Pvt Ltd.