III Year I Semester	**L**	**T**	**P**	**C**
Code: 17EC502	**4**	**1**	**0**	**3**

LINEAR IC APPLICATIONS

Course objectives

The student will

1. Study differential amplifier analysis for different modes of operation for DC and AC Analysis.
2. Study and measurement of DC and AC characteristics of OP-AMP.
3. Study the linear and non-linear applications of operational amplifier.
4. Study the oscillators, active filters and analog multipliers.
5. Study IC 555 timer, PLL and VCO with their applications.

Study and understand different types of ADCs and DACs

UNIT-I

DIFFERENTIAL AMPLIFIERANALYSIS: Differential Amplifier- DC and AC analysis of Dual input Balanced output configuration, Properties of Dual Input Unbalanced Output differential amplifier and Single Input Balanced Output/Unbalanced Output differential amplifier, Level translator.

UNIT-II

CHARACTERISTICS OF OP-AMP : Integrated Circuits Classification, package types, Characteristics of ideal op-amp and practical op-amp, Temperature ranges, Power supplies, block diagram of op-amp, significance of each terminals, DC and AC characteristics.

Op-Amp parameters and Measurement: Input and Output Offset voltages and currents, slew rates, CMRR, PSRR, thermal drift ,Frequency Compensation.

UNIT-III

LINEAR AND NON-LINEAR APPLICATIONS OF OP- AMPS: Inverting and Non-inverting amplifiers, Integrator and differentiator ,Instrumentation amplifier, V to I, I to V converters, comparator (inverting and non-inverting types) , zero crossing detector, Schmitt trigger, AC amplifier, Triangular and Square wave generators, function generators, Precision rectifiers.

UNIT-IV

OSCILLATORS, ACTIVE FILTERS, ANALOG MULTIPLIERS, Voltage regulators:

RC phase shift oscillator, Wien bridge oscillator

Butter worth filters- 1st order, 2nd order -LPF, HPF filters, 1st order - Band pass, Band reject and All pass filters .analog multiplier circuits-Four Quadrant multiplier, applications of multipliers. Analog Multiplexer, Sample & Hold Circuits, IC 1496 Balanced Modulator.

Voltage Regulators:

IC723 voltage regulator, three terminal regulators (78XX and &79XX)

UNIT-V

TIMERS AND PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable operations and applications,Astable operation and applications.

PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, voltage controlled oscillator 566 functional block diagram.

UNIT-VI

DIGITAL TO ANALOG AND ANALOG TO DIGITAL 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.

Text books

1. Op-Amps and Linear ICs - Ramakanth A. Gayakwad, PHI,1987.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003

References

1. Operational Amplifiers and Linear Integrated Circuits–R.F.Coughlin and Fredrick Driscoll, PHI, 6th Edition.
2. Operational Amplifiers – C.G. Clayton, Butterworth and Company Publishers Ltd./ Elsevier, 1971.
3. OP-AMPS and linear integrated circuits –Sanjay Sharma,S.K.Kataria andSons , 2nd Edition 2012

Course Out comes :

After completion of this course the student will be able to

1. Design differential amplifier for the given specifications.
2. Analyze operational amplifier DC and AC characteristics.
3. Design of linear and non linear applications of op-amp for the given specifications.
4. Design of oscillators and active filters for desired bandwidth and gain.
5. Apply the concepts of 555 timers, PLL and VCO for communication applications.
6. Analyze A/D and D/A converters for signal processing applications.