

III B.Tech I Semester

15AEC25 - LINEAR IC APPLICATIONS

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Course objectives: To make the students understand basic concepts in the design of electronic circuits using linear integrated circuits and their applications. To introduce some special function IC's.

UNIT –I**DIFFERENTIAL AMPLIFIER AND OPAMPS**

Differential amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level translator.

Operational amplifiers: 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.

UNIT –II**OP-AMP WITH NEGATIVE FEEDBACK AND FREQUENCY RESPONSE**

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, close loop frequency response, circuit stability, slew rate.

UNIT-III**OP-AMP APPLICATIONS-1**

DC and AC amplifiers, peaking amplifiers, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas bi-quad filter.

UNIT-IV**OP-AMP APPLICATIONS-2**

Oscillators: Phase shift and Wien bridge oscillators, square, triangular and sawtooth wave generators, comparators, Zero crossing detector, Schmitt trigger, Characteristics and limitations.

Specialized applications: 555 timer IC (Monostable & Astable operation) & its applications, PLL operating principles; Monolithic PLL, applications, analog amplifier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V**ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS**

Analog and Digital Data Conversions ,D/A Converter -specifications-Weighted resistor type , R-2R ladder type ,Voltage Mode And current- Mode R-2R ladder types _switches for D/A Converters, High speed sample-and – hold circuits, A/D Converters-specifications-Flash type-Successive Approximation type-Single slope type-Dual slope type –A/D Converter using Voltage –to–Time Conversion–Over sampling A/D Converters..

Course Outcomes: Upon completion of the course, students will be able to:

- a. Understanding basic building block of linear integrated circuits and its characteristics.
- b. Analyze the linear non-linear and specialized applications of operational amplifiers.
- c. Understand the theory of ADC and DAC.

TEXT BOOKS:

1. D.RoyChowdhury, "Linear integrated circuits", 2nd Edition, New Age International (P) Ltd, 2003.
2. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", 4th Edition, PHI, 1987.
3. TL082 Data sheet: <http://www.ti.com/lit/ds/symlink/tl082.pdf>

REFERENCES:

1. R.F.Coughlin and Fredrick Driscoll, "Op-amps and Linear ICs", 6th Edition, PHI.
2. David A.Bell, "Op-amps and Linear ICs", 2nd Edition, Oxford University press, 2010.

