

## 1. Introduction to Linear Integrated Circuits

- \* Definition and classification
- \* Advantages and limitations
- \* Fabrication technologies

## 2. Operational Amplifiers (Op-Amps)

- \* Internal structure and operating principle
- \* Ideal and practical characteristics
- \* Key parameters (gain, bandwidth, offset, slew rate)

## 3. Basic Operational Amplifier Configurations

- \* Inverting and non-inverting amplifiers
- \* Voltage follower
- \* Differential amplifier

## 4. Linear Applications of Operational Amplifiers

- \* Summing and subtracting amplifiers
- \* Integrator and differentiator
- \* Instrumentation amplifiers

## 5. Frequency Response and Stability

- \* Bandwidth and unity-gain frequency
- \* Frequency compensation
- \* Oscillations and stability criteria

## 6. Special-Purpose Linear Integrated Circuits

- \* Power amplifiers
- \* Voltage comparators
- \* Voltage references

## 7. Linear Integrated Circuits for Signal Generation

- \* Oscillators (sinusoidal, square, triangular)
- \* Multivibrators
- \* Timing circuits

## 8. Linear Voltage Regulators

- \* Fixed and adjustable regulators
- \* Thermal and overcurrent protection

- \* Practical applications

## 9. Practical Applications and Case Studies

- \* Signal conditioning

- \* Measurement circuits

- \* Sensor–system interfaces

## 10. Limitations and Trends in Linear Integrated Circuits

- \* Noise and drift

- \* Integration with digital circuits

- \* Technological evolution