



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**  
**An Autonomous Institution**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **23ECB202 – LINEAR INTEGRATED CIRCUITS** **II YEAR/ III SEMESTER**

#### **UNIT 4 – ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTER**

##### **TOPIC 4.1 – Analog and Digital Data Conversions**





# Analog and Digital Data Conversions



- Analog-to-digital conversion (ADC) transforms continuously varying analog signals into discrete digital representations
- while digital-to-analog conversion (DAC) does the opposite, converting digital signals back into analog form.





# Analog-to-Digital Conversion (ADC)



## Definition

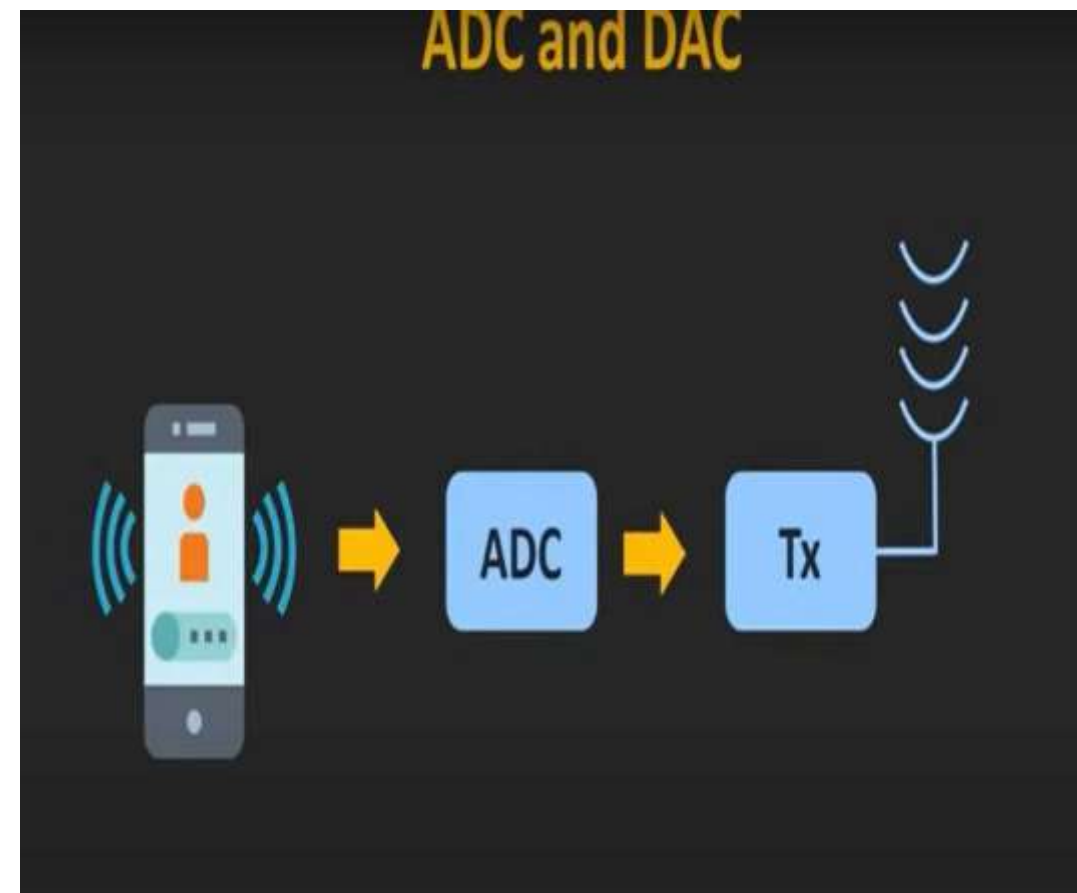
- ADC is the process of converting a continuous analog signal (like voltage, sound, or light) into a digital signal

## Process

- ADCs sample the analog signal at regular intervals, quantize the sampled values, and then encode them into a digital format, typically a binary number

## Types

- successive approximation
- dual slope and
- delta-sigma converters.





# Analog-to-Digital Conversion (ADC)



## Key Concepts

- **Sampling:** Taking periodic snapshots of the analog signal at specific time intervals
- **Quantization:** Assigning a discrete digital value to each sample based on its amplitude
- **Coding:** Representing the quantized values as a binary number

## Applications

- audio recording
- image processing
- and data acquisition





# Digital-to-Analog Conversion (DAC)



## Definition

- DAC converts digital signals (represented as binary numbers) into a continuous analog signal

## Process

- DACs take a digital input and produce an output voltage or current that corresponds to the digital value

## Types

- weighted resistor DACs
- R-2R ladder DACs





# Digital-to-Analog Conversion (DAC)



## Key Concepts

- **Decoding:** Interpreting the digital input and determining the corresponding analog value
- **Output:** Producing a continuous analog signal based on the decoded digital input

## Applications

- audio playback
- display systems, and
- control systems



**THANK YOU**