

## **EC6012 CMOS ANALOG IC DESIGN**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

- To study designs with better precision in data conversion
- To study various ADC and DAC circuit architectures

#### **UNIT I SAMPLE AND HOLD**

Properties of MOS Switches, multiplexed input architectures, recycling architecture, open and closed loop sampling architectures, switched capacitor and current mode architectures.

#### **UNIT II BUILDING BLOCK OF DATA CONVERSION CIRCUITS:**

9 Amplifiers, open loop and closed loop amplifiers, gain boosting, common mode feedback, bipolar, CMOS and BiCMOS comparators.

#### **UNIT III PRECISION TECHNIQUES**

Comparator cancellation, input and output offset storage principles, comparators using offset cancelled latches, opamp offset cancellation, ADC and DAC calibration techniques.

#### **UNIT IV ADC/DAC ARCHITECTURES**

DAC Performance metrics, reference multiplication and division, switching and logical functions of DACs, Current steering architectures, DAC Performance metrics, Flash ADC architecture, Gray encoding, thermometer encoding and metastability.

#### **UNIT V OVER SAMPLING CONVERTERS**

Delta sigma modulators, alternative modulator architectures, quantization and noise shaping, decimation filtering, implementation of Delta sigma modulators, delta sigma DACs,

#### **TEXT BOOK:**

1. B. Razavi "Data Conversion System Design" IEEE Press and John Wiley, 1995.

#### **REFERENCE:**

1. Phillip Allen and Douglas Holmberg "CMOS Analog Circuit Design" Second Edition, Oxford University Press, 2004