

# Circuits for Analog System Design - Video course

## COURSE OUTLINE

Introduction to linear IC applications.

Design and error budget analysis of signal conditioners for low level ac and dc applications.

Signal conditioners with instrumentation autozero/chopper/isolation/ charge amplifiers.

Design and applications of active filters and high frequency circuits.

Design of multi channel low level and high level data acquisition systems using ADC/DAC, SHA and Analog multiplexers.

Designing of low power circuits for transducers.

## COURSE DETAIL

Sl.No.	Topics	No.of Hours
1	Review of transistor basis-Transistor as a switch, transistor as amplifier.	2
2	Problems in the transistor amplifier. Temperature drift and device to device variation. How to solve them. 3-transistor op amp to solve the above problem.	2
3	Use of op-amp for different applications and basic issues in use of op amps.	2
4	Designing a linear power supply using op amp. Selection of components.	2
5	Design of heat sink and design of transformer for the linear power supply.	2
6	Design of low drop out regulators.	2
7	Design of temperature indicator using IC sensors. Errors due to resistance drift, Op amp offset voltage drift, offset current drift. Error budgeting.	2
8	Design of an on/off temperature controller. Design of different types of heater drive circuits. Thyristor and	2



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## Electronics & Communication Engineering

### Pre-requisites:

1. Electric circuits, Networks.

### Coordinators:

**Prof. M.K. Gunasekaran**  
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	transistor based drive circuit design. Error budgeting.	
9	Design of proportional temperature controller circuit using thermocouple temperature Sensor. Error budgeting. Design of heater drive circuits using triacs and transistors. Use of pulse width modulation circuits. Use of MOSFETS and IGBTs. Short circuit protection techniques.	2
10	Design of PID temperature controllers. Basics of PID parameter selection.	2
11	Design of constant current sources with error budgeting.	2
12	Design of 4-20 ma current transmitter for resistance sensors.	2
13	Design of 4-20 ma current transmitter for LVDT sensor. Design of oscillator circuits.	2
14	Errors in the op amp circuit for ac amplifiers, Errors in ac application.	2
15	Use of Instrumentation amplifier and its basis.	2
16	Designing of a capacitor measurement circuit. Ratio transformer technique. Differential capacitor measurement. Errors in the capacitance measurement.	2
17	Phase sensitive detection and use of the same for lock-in amplifier design.	2
18	ADC /DAC converter types. Use of ratio metric converters.	2
19	Error budgeting for the different types of ADC/DAC.	2
20	Band gap zenors and other reference diodes.	2
	<b>Total</b>	40

**References:**

1. Franco S, Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill Book Co., 1988.
2. Paul Horowitz and Winfield Hill, The Art of Electronics (2<sup>nd</sup> Edition), Cambridge University Press, 1992.