



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

LINEAR IC APPLICATIONS								
IV Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECD08	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisite: Digital System Design, Electronic Devices and Circuits								

I. COURSE OVERVIEW:

This course deals with the fundamental concepts of operational amplifiers, linear & nonlinear application of op-amp and digital Integrated circuits. It covers design and analysis of frequency selective and tuning circuits like oscillators, active filters, phase-locked loops and its use for communication applications, along with switching applications like that of comparators, learn IC based design of voltage regulators. This course forms the basis for the next level of course VLSI Design.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The DC and AC characteristics of operational amplifiers, and applications of operational amplifiers.
- II. The functional details IC 565 and phase locked loop
- III. The Different analog and digital data converters

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 Describe the principles and characteristics of op-amp circuits to perform arithmetic operations
- CO 2 Distinguish linear and non-linear applications of op-amp circuits to measure the output characteristics
- CO 3 Design frequency selective circuits using op-amp for audio and radio frequency ranges
- CO 4 Demonstrate the characteristics, operation and applications of multivibrators using IC555
- CO 5 Choose an appropriate A/D and D/A converter for signal-processing applications
- CO 6 Build the industry oriented applications using IC741 and IC555

IV. COURSE CONTENT:

MODULE - I: OPERATIONAL AMPLIFIERS (10)

Operational Amplifier: Differential Amplifier, DC and AC analysis of dual input balanced output configuration, dual input unbalanced output. Characteristics of Op-amps, Op-amp block diagram, ideal and practical Op-amp specifications. DC characteristics: Input & output offset voltages & currents, drift. AC characteristics: Frequency response, slew rate, CMRR and PSRR.

MODULE –II: APPLICATIONS OF OPERATION AMPLIFIERS (09)

Linear applications of Op-amps: Inverting and non-inverting amplifier, integrator, differentiator, instrumentation amplifier, AC amplifier. Non-linear applications of Op-Amps: Comparators, multi vibrators, log and anti-log amplifiers.

MODULE-III: WAVEFORM GENERATORS AND ACTIVE FILTERS (10)

Waveform Generators: Square wave, Triangle wave and saw-tooth waveform generators using op-amp.

Active Filters: Design and Analysis of 1st order Low pass filter, High pass filter, Band pass filter and Band reject filter using op-amp. Design and Analysis of 2nd order low pass and high pass filter with its characteristics using op-amp. Design and analysis of All-pass filter.

MODULE –IV: TIMERS & PHASE LOCKED LOOPS (10)

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

MODULE –V: DATA CONVERTERS (09)

Data converters: Introduction, classification, need of data converters. DAC techniques: weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC. ADC techniques: Flash converters, successive approximation, integrating ADC. DAC/ADC characteristics.

V. TEXT BOOKS:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003.
2. Floyd and Jain- Digital Fundamentals, 8th Ed., Pearson Education, 2005

VI. REFERENCE BOOKS:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International(p) Ltd, 2nd edition., 2003
2. John. F. Wakerly, "Digital Design Principles and Practices", Pearson, 3rd edition, 2009.
3. Salivahana, "Linear Integrated Circuits and Applications", TMH, 2008
4. William D. Stanley, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education India, 4th edition, 2009.

VII. ELECTRONICS RESOURCES:

1. NPTEL :: Integrated Circuits

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Definition and terminology
4. Tech-talk topics
5. Assignments
6. Model question paper - I
7. Model question paper - II
8. Lecture notes
9. Early learning readiness videos (ELRV)
10. Power point presentations