



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, and digital IC's for combination and sequential circuit designs. 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 OPAMP for audio and radio frequency ranges
- CO 4 Demonstrate the characteristics, operation and applications of Multi-vibrators using the IC555
- CO 5 Choose an appropriate A/D and D/A converter for signal-processing applications
- CO 6 Analyze the characteristics of sequential and combinational digital integrated circuits for digital circuit design.

IV. COURSE CONTENT:

MODULE - I: OPERATIONAL AMPLIFIERS (10)

Introduction, Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

MODULE –II: APPLICATIONS OF OPERATION AMPLIFIERS (09)

Active Filters, Characteristics of Bandpass, Band reject and All-Pass Filters, Analysis of 1st order and LPF & HPF Butterworth Filters, Waveform Generators: Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

MODULE –III: ANALOG AND DIGITAL DATA CONVERTERS (10)

Introduction, Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders.

LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

MODULE –IV: DIGITAL ICS-I (10)

Permeability, Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs -Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

MODULE –V: DIGITAL ICS-II (09)

Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

V. TEXT BOOKS:

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

VI. REFERENCE BOOKS:

1. D. Roy Chowdhury, “Linear Integrated Circuits”, New Age International(p) Ltd,2nd education., 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
2. NPTEL :: Digital IC design
3. NPTEL :: Digital Integrated Circuits
4. NPTEL :: Digital IC Design

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