

LINEAR AND DIGITAL IC APPLICATIONS

V Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECB19	Core	L	T	P	C	CIA	SEE	Total
		2	1	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
<p>COURSE OBJECTIVES:</p> <p>Students will try to learn:</p> <ul style="list-style-type: none"> I The basic building blocks, characteristics and applications of operational amplifier. II The functional details of logic families, combinatorial and sequential digital circuits (ICs) used in digital design. III Different IC models which are basic for Mixed signal integrated circuits in future. <p>COURSE OUTCOMES:</p> <p>After successful completion of the course, Students will be able to:</p> <ul style="list-style-type: none"> CO 1 Interpret the DC and AC analysis of differential amplifiers as a building block of operational amplifier. CO 2 Explain the specifications of ideal and practical operational amplifier and their DC, AC characteristics. CO 3 Build various linear application circuits such as mathematical operation, wave shaping circuits using op-amp operating with negative feedback in closed loop configuration. CO 4 Experiment with comparator (open loop configuration) and change the characteristics of it by adding feedback to model multivibrators. CO 5 Model the function generator with variable amplitude and frequency modulation capability using IC 741 Op-amp. CO 6 Demonstrate importance, types voltage regulators and their applications in pulse width modulation, push pull bridges. CO 7 Design frequency selective circuits using OPAMP for audio and radio frequency ranges. CO 8 Determine the function of Phase Locked Loop and their applications using operational amplifier as IC565. CO 9 Explain the fundamental frequency of monostable and astable Multivibrators using IC555 timer. CO 10 Choose appropriate Analog to Digital and Digital to Analog converters for data processing in Microprocessor, Digital signal processing and Communication. CO 11 Compare the digital logic family circuits which are basics for digital gates along with the characteristics for digital design. CO 12 Make use of commercially available sequential and combinational digital ICs to function as Latch, Flip flop, Registers and Counters. 								

UNIT - I	OPERATIONAL AMPLIFIER	Classes: 08
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.		
UNIT – II	APPLICATIONS OF OPERATIONAL AMPLIFIERS	Classes: 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, triangular, saw tooth, square wave generators, log and anti-log amplifiers. Introduction to voltage regulators, features of 723 Regulator, three terminal voltage regulators.		
UNIT – III	ACTIVE FILTERS AND TIMERS	Classes: 09
Active Filters: Classification of filters, 1st order low pass and high pass filters, 2nd order low pass, high pass, band pass, band reject and all pass filters. Timers: Introduction to 555 timer, functional diagram, mono-stable, astable operations and applications, schmitt trigger. PLL: Introduction, block schematic, principles and description of individual blocks, 565 PLL.		
UNIT - IV	DATA CONVERTERS	Classes: 10
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.		
UNIT - V	DIGITAL IC APPLICATIONS	Classes: 09
Study of digital logic families such as Resistor Transistor Logic (RTL), Diode Transistor Logic (DTL), Transistor Logic (TTL), Emitter Coupled Logic and CMOS. Characteristics of digital logic families containing fan-in, fan-out, power dissipation, propagation delay and noise margin, Familiarity with commonly available 74XX & CMOS 40XX series ICs-Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register(IC 74194), Synchronous counters (74LS93,74HC163), Decade Counters, (74HC190).		
TEXT BOOKS:		
<ol style="list-style-type: none"> 1. D.RoyChowdhury, “Linear Integrated Circuits”, New age international (p)Ltd, 2 nd Edition, 2003. 2. Ramakanth A. Gayakwad, “Op-Amps &linear ICs”, PHI, 3rd Edition, 2003. 3. JohnF.Wakerly, “Digital Design Principles and Practices”, Prentice Hall, 3 rd Edition, 2005. 4. M. MorrisMano, Michael D. Ciletti, “Digital Designl,Pearson Education/PHI, 3 rd Edition, 2008 		
REFERENCES:		
1.Salivahanan, “Linear Integrated Circuits and Applications”, TMH, 1 st Edition, 2008. New Age International, 1 st Edition, 2006.		
Web References:		
<ol style="list-style-type: none"> 1. https://www.nptel.ac.in 2. https://www.svecw.edu.in 3. https://www.smartzworld.com 4. https://www.crectirupati.com 		
E-Text Books:		
<ol style="list-style-type: none"> 1. https://books.google.co.in/books?isbn=8122414702 2. https://books.google.co.in/books?isbn=013186389 		