

Department Core Course-11 (DCC)

EC303: Linear Integrated Circuit

Details of course:-

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Linear Integrated Circuits	3	0	2	Analog Electronics

Course Objective: To introduce Op Amp; a versatile building block and to design analog circuits and systems for signal conditioning, processing and generation functions.

Course Outcomes:

CO1: Describe the internal blocks of an operational amplifier along with its specifications.

CO2: Design circuits based on the linear and non-linear applications of an op-amp and special application Ics.

CO3: Design of active filters, impedance converters, operational transconductance amplifiers (OTA), and other basic building blocks using OTAs.

CO4: Analyze different analog multipliers and their applications in modulation, etc.

CO5: Apply specific ICs such as the IC 555 timer, and PLLs to demonstrate circuits for applications in communication.

S. No.	Content	Contact Hours
Unit 1	Operational Amplifier: The ideal Op Amp, Building blocks of analog ICs: current mirrors and repeaters, current and voltage sources, differential amplifiers, input stages, active load, gain stages, output stages, level shifters, non-ideal parameters, Monolithic IC operational amplifiers, specifications, slew rate and methods of improving slew rate.	10
Unit 2	Linear applications of IC op-amps: Inverting and non-inverting amplifier configurations, integrators, differentiators, summers, effect of finite GBP, stability consideration, active and passive compensation of op amp. Non-Linear applications of IC op-amps: Log/antilog modules, Precision Rectifier, Op-amp as comparator, Schmitt Trigger, Square and Triangular wave generator, mono stable and astable-multivibrators.	10
Unit 3	Analog filter design : Basics second order functions, op-amp RC and active filter design, immittance converters and inverters, generalized impedance converter, inductance simulation, Sinusoidal oscillators, amplitude stabilization and control. Operational Transconductance Amplifier (OTA), Basic building blocks using OTA, Application examples.	10
Unit 4	Analog Multiplier and its applications: Gilbert multiplier cell 2-quadrant and 4-quadrant operations, IC analog multiplier AD534, modulation, demodulation and frequency changing, voltage-	6

	controlled filters and oscillators.	
Unit 5	IC timer and phase locked loop: the IC 555 timer, operational modes, time delay, astable and monostable operations , voltage-controlled oscillators, IC PLL: basic PLL principle, three modes of operation, PLL as AM detector, FM detector, frequency synthesis, FM demodulator, PLL motor speed control and voltage to frequency converter.	6
Total		42

Books:-

S. No	Name of Books/Authors/Publisher
1	Applications and Design with Analog Integrated Circuits/ J. Michel Jacob/ PHI, 2004
2	Design of Analog Filters/Rolf Schaumann and Mac E.VanValkenburg/ Oxford Indian Edition, 2005
3	Analysis and Design of Analog Integrated Circuits/ Paul R.Gray, Robert G.Meyer/ Wiley, Third edition, 2009
4	Design with Operational Amplifiers and Analog Integrated Circuits/ Sergio Franco/ TMH, 2013
5	Microelectronic circuits: Analysis and Design/ M.H. Rashid/ CENGAGE Learning, 2 nd Edition, 2009