

7 <sup>th</sup> Semester	REC7D008	Integrated Circuits and Systems	L-T-P 3-0-0	3 Credits
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**Module-I:****(10 hours)**

Analog Integrated circuit Design: an overview: Current Mirrors using BJT and MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Widlar Current source and Cascode current Mirror The 741 IC Op-Amp: Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; DC Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, Slew Rate, Relationship Between  $f_t$  and SR

**Module-II:****(6 hours)**

Linear Applications of IC op-amps: An Overview of Op-Amp (ideal and non-ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors. Filters: First and second order LP, HP, BP BS and All pass active filters, KHN.

**Module-III:****(8 hours)**

Digital Integrated Circuit Design- An Overview: CMOS Logic Gate Circuits: Basic Structure CMOS realization of Inverters, AND, OR, NAND and NOR Gates Latches and Flip flops: The Latch, The SR Flip-flop, CMOS Implementation of SR Flip- flops, A Simpler CMOS Implementation of the Clocked SR Flip-flop, D Flip-flop Circuits.

**Module-IV:****(6 hours)**

Non-Linear applications of IC Op-amps: Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Simple and Hold Circuits, Analog Multipliers and their applications. Op- amp as a comparator, Zero crossing detector, Schmitt Trigger, Astable multi vibrator, Mono stable multi vibrator, Generation of Triangular Waveforms

**Module-V:****(6 hours)**

D/A and A/D converters Integrated Circuit Timer: The 555 Circuit, Implementing a Mono stable Multi-vibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC. Phase locked loops (PLL): Ex-OR Gates and multipliers as phase detectors, Block Diagram of IC PLL, Working of PLL and Applications of PLL.

**Books:**

- [1] Sedra and Smith, “Microelectronic Circuits”, 6thEdition, Oxford University Press.
- [2] Michael Jacob, “Applications and Design with Analog Integrated Circuits”, PHI, 2nd Edition.