Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

Department of ECM   **PVP12**

3/4 B.Tech. FIFTH SEMESTER

EM5T1   **IC APPLICATIONS**   **Credits: 4**

Lecture: 4 periods/week   **Internal assessment   : 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 mark**

Course Objectives:

- To enable the students to understand the fundamentals of integrated circuits and designing electronic circuits using it

Learning Outcomes:

- The student will gain the basics of linear integrated circuits and Digital integrated circuits and its applications.
- The student will able to design simple electronic & filter circuits for particular application.
- The student understands analog to digital converters (ADC), and digital to analog converters (DAC)
- The student will gain knowledge in designing a stable voltage regulators and understands the applications of PLL and special ICs and Study the characteristics and performance of digital circuits built using various MOS technologies.

UNIT I
Integrated Circuits: Classification, chip size and circuit complexity, basic information of Opamp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential, Op-amp characteristics - DC and AC.

UNIT II
OP-AMP Applications: Basic application of Op-amp, instrumentation amplifier, ac amplifier, V toI and I to V converters, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators.

Unit III
Active Filters : Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters.
Oscillators: Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave .

UNIT IV
Timers: Introduction to 555 timer, functional diagram, monostable and astable operations .
D-A Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC.
A-D Converters: Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, specifications of converters.

UNIT V

CMOS Logic: Introduction to logic families, CMOS logic, CMOS steady state electrical behaviour, CMOS dynamic electrical behaviour, CMOS logic families.

UNIT VI

Combinational Logic Design: Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, n-Bit Parallel Subtractor, Binary Adder-Subtractor, coders, decoders, multiplexers and demultiplexers, ALUs, Combinational multipliers, Barrel Shifter.

UNIT VII

Sequential Logic Design: Introduction, The Basic Bistable Element, Latches, and flip-flops, Flip-Flop Conversions, SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Counter applications, Design considerations of the above sequential logic circuits with relevant Digital ICs.

UNIT VIII

Sequential Circuits: MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, shift registers & applications.

Memories : ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

Learning resources

Text Books:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.
2. Digital Design principles & practices- John F. Wakerly ,3rd Ed. ,2010.

Reference Books :

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed.,2003.
2. Fundamentals of digital design –Anand kumar, PHI,11th Ed.2006.
3. Operational Amplifiers & Linear Integrated Circuits – R.F. Coughlin & Fredrick F. Driscoll, PHI, 1977.
4. Digital Fundamentals – Floyd and Jain, Pearson Education,8th Edition, 2005.