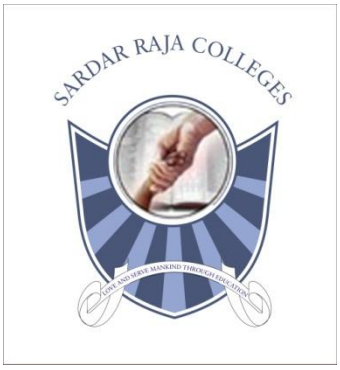
SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MICRO LESSON PLAN



SUBJECT : LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

CODE : EE 2254

CLASS : II Year / IV SEM

STAFF: Mr.Justin Diraviam, Asso.Prof,
DEPT. OF EEE.

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION

This subject introduces the characteristics and applications of linear integrated circuits. Topics include op-amp circuits, waveform generators, active filters, IC voltage regulators, and other related topics. Upon completion, students should be able to construct, analyze, verify, and troubleshoot linear integrated circuits using appropriate techniques and test equipment. An integrated circuit (IC), sometimes called a chip or microchip, is a semiconductor wafer on which thousands or millions of tiny resistors, capacitors, and transistors are fabricated.

A linear integrated circuit (linear IC) is a solid-state analog device characterized by a theoretically infinite number of possible operating states. It operates over a continuous range of input levels. In contrast, a digital IC has a finite number of discrete input and output states.

Within a certain input range, the amplification curve of a linear IC is a straight line; the input and output voltages are directly proportional. The best known and most common, linear IC is the operational amplifier or *op amp*, which consists of resistors, diodes, and transistors in a conventional analog circuit. There are two inputs, called inverting and non-inverting. A signal applied to the inverting input results in a signal of opposite phase at the output. A signal applied to the non-inverting input produces a signal of identical phase at the output. A connection, through a variable resistance , between the output and the inverting input is used to control the amplification factor .

Linear ICs are employed in audio amplifiers, A/D (analog-to-digital) converters, averaging amplifiers, differentiators, DC (direct-current) amplifiers, integrators, multivibrators, oscillators, audio filters, and sweep generators. Linear ICs are available in most large electronics stores. Some devices contain several amplifiers within a single housing.

555 is a very commonly used IC for generating accurate timing pulses. It is an 8pin timer IC and has mainly two modes of operation: monostable and astable. In monostable mode time delay of the pulses can be precisely controlled by an external resistor and a capacitor whereas in astable mode the frequency & duty cycle are controlled by two external resistors and a capacitor. 555 is very commonly used for generating time delays and pulses.

OBJECTIVES

- To study the IC fabrication procedure
- To study characteristics:realize circuits;design for analysis using Op-amp ICs.
- To study the applications of Op-amp.
- To study internal functional blocks and the applications of special ICs like timers,PLL circuits,regulator circuits,ADCs.

EE2254	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (Common to EEE, EIE & ICE)	L T P C 3 0 0 3

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance and FETs.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – summer, differentiator and integrator.

UNIT III APPLICATIONS OF OPAMP 9

Instrumentation amplifier, first and second order active filters, V/I & I/V converters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R-2R ladder and weighted resistor types), A/D converter - Dual slope, successive approximation and flash types.

UNIT IV SPECIAL ICs 9

555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications, Analog multiplier ICs.

UNIT V APPLICATION ICs 9

IC voltage regulators - LM317, 723 regulators, switching regulator, MA 7840, LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler, opto electronic ICs.

L = 45 TOTAL = 45PERIODS

TEXT BOOKS

1. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. (2000)
2. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

REFERENCES

1. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', Tata McGraw Hill, 2003.
2. Robert F.Coughlin, Fredrick F.Driscoll, 'Op-amp and Linear ICs', Pearson Education, 4th edition, 2002 / PHI.
3. David A.Bell, 'Op-amp & Linear ICs', Prentice Hall of India, 2nd edition, 1997

MICRO LESSON PLAN

Hours	LECTURE TOPICS	READING
	UNIT I –IC FABRICATION	
1	IC classification	T2
2	fundamental of monolithic IC technology	T2
3	epitaxial growth	T2
4	masking and etching	T2
5	diffusion of impurities	T2
6	Realization of monolithic ICs and packaging	T2
7	Fabrication of diodes-AV Class	T2
8	Fabrication of capacitance	T2
9	Fabrication of resistance and FETs	T2
	UNIT-II CHARACTERISTICS OF OPAMP	
10	Ideal OP-AMP characteristics	T2
11	DC characteristics	T2
12	AC characteristics	T2
13	offset voltage and current	T2
14	voltage series feedback and shunt feedback amplifiers	T1
15	differential amplifier	T2
16	frequency response of OP-AMP	T2
17	Basic applications of op-amp – summer – AV Class	T2
18	Differentiator and integrator.	T2
	UNIT-III APPLICATIONS OF OPAMP	
19	Instrumentation amplifier	T2
20	first and second order active filters	T2
21	V/I & I/V converters	T2
22	comparators	T2
23	Multivibrators	T2
24	waveform generators	T2
25	clippers	T2
26	clampers	T2
27	peak detector	T2
28	S/H circuit-AV Class	T2
29	D/A converter (R-2R ladder and weighted resistor types)	T2
30	A/D converter -Dual slope type	T2
31	A/D converter- successive approximation type	T2
32	A/D converter - flash type	T2

UNIT IV SPECIAL ICs		
33	555 Timer circuit	T2
34	Functional block	T2
35	characteristics & applications	T2
36		T2
37	566-voltage Controlled oscillator circuit	T2
38		T2
39	565-phase lock loop circuit functioning and applications	T2
40	Analog multiplier ICs –AV Class	T2
41		T2
UNIT V APPLICATION ICs		
42	IC voltage regulators	T1
43	LM317, 723 regulators	T1
44	switching regulator	T1
45	MA 7840, LM 380 power amplifier	T1
46		T1
47	ICL 8038 function generator IC	T1
48	isolation amplifiers	T1
49	Opto coupler -AV Class	T1
50	Opto electronic ICs	T1