SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICRO LESSON PLAN

SUBJECT : LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

CODE : EE 6303

CLASS : II Year / III SEM

STAFF: Mr.A.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.

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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,, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers-V/I & I/V converters ,summer, differentiator and integrator.

UNIT III APPLICATIONS OF OPAMP 9

Instrumentation amplifier, Log and Antilog Amplifiers, first and second order active filters, , comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV SPECIAL ICs 9

Functional block, characteristics & application circuits with 555 Timer Ic-566 voltage controlled oscillator Ic; 565-phase lock loop Ic ,Analog multiplier ICs.

UNIT V APPLICATION ICs 9

IC voltage regulators –LM78XX,79XX Fixed voltage regulators - LM317, 723 Variable voltage regulators, switching regulator- SMPS- LM 380 power amplifier- ICL 8038 function generator IC.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. David A.Bell, ‘Op-amp & Linear ICs’, Oxford, 2013.
2. D.Roy Choudhary, Sheil B.Jani, ‘Linear Integrated Circuits’, II edition, New Age, 2003.
3. Ramakant A.Gayakward, ‘Op-amps and Linear Integrated Circuits’, IV edition, Pearson Education, 2003 / PHI. 2000.

REFERENCES:

1. Fiore,”Opamps & Linear Integrated Circuits Concepts & Applications”,Cengage,2010.
2. Floyd ,Buchla,”Fundamentals of Analog Circuits, Pearson, 2013.
3. Jacob Millman, Christos C.Halkias, ‘Integrated Electronics - Analog and Digital circuits system’,Tata McGraw Hill, 2003.
4. Robert F.Coughlin, Fredrick F. Driscoll, ‘Op-amp and Linear ICs’, PHI Learning, 6th

MICRO LESSON PLAN

Weak	Hours	LECTURE TOPICS	READING
UNIT I –IC FABRICATION			
I	1	IC classification	T2
	2	fundamental of monolithic IC technology	T2
	3	epitaxial growth	T2
	4	masking and etching	T2
II	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			
III	10	Ideal OP-AMP characteristics	T2
	11	DC characteristics	T2
	12-13	AC characteristics	T2
IV	14	differential amplifier	T2
	15	frequency response of OP-AMP	T1
	16	Basic applications of op-amp – Inverting and Non Inverting Amplifiers -AV Class	T2
	17	V/I & I/V converters, Summer	T2
	18	Differentiator and integrator.	T2
UNIT-III APPLICATIONS OF OPAMP			
V	19	Instrumentation amplifier, Log and Antilog Amplifiers	T2
	20	first and second order active filters	T2
	21	comparators	T2
	22	Multivibrators	T2
VI	23	waveform generators	T2
	24	Clippers, clampers	T2
	25	peak detector, S/H circuit-AV Class	T2
	26	D/A converter (R-2R ladder and weighted resistor types)	T2
	27	A/D Converters using OP-AMP	T2
UNIT IV SPECIAL ICs			
VII	28	Functional block	T2
	29-31	characteristics & applications Circuits with 555 timer	T2
VIII	32	566-voltage Controlled oscillator circuit	T2
	33-34	565-phase lock loop IC	T2
	35-36	Analog multiplier ICs –AV Class	T2
UNIT V APPLICATION ICs			
IX	37	IC voltage regulators	T1
	38-40	LM78xx,79xx Fixed Voltage Regulators	T1

X	41-42	LM317, 723 Variable Voltage regulators	T1
	43	switching regulator,SMPS	T1
	44	LM 380 power amplifier	T1
			T1
	45	ICL 8038 function generator IC	T1