Course Code	Course Title	L	P	U
EC323T	**Linear Integrated Circuits and Applications**	**3**	**0**	**3**

Scope & objective of the course: Integrated Circuits also known as IC's have revolutionized the electronic and consumer electronics industry ever since their invention. They are extremely popular because of their small size, less weight and effective working capability. This course intends to impart basic concepts of operational amplifiers (Op-Amps) and their applications, so that, students can design and analyze a wide variety of Linear Integrated Circuits.

Course Outcome: After completion of the course students will be able to

- Gather knowledge about the designing and manufacturing process of ICs.
- Acquire knowledge on the fundamentals of Op-amps.
- Acquire knowledge on commonly used applications of Op-amps.
- Develop competence in Op-amp circuit analysis.
- Develop design competence in Op-amp Circuits.
- Be able to understand and apply the fundamentals of PLL and the 555 timer IC.

Module 1: Introduction to electrical ICs.

Classification of ICs,IC manufacturing process.

Module 2: To gather basic knowledge of op-amps.

Differential amplifier, current mirror, block diagram of a typical op-amp, characteristics of an ideal op-amp, electrical parameters of an op-amp, single voltage biasing, open loop configurations, disadvantages, closed loop configurations, offset & bias compensation, non inverting amplifier & applications, inverting amplifier & applications.

Module 3: To comprehend different application of op-amps as basic comparators.

Astablemultivibrator, monostablemultivibrator, triangular wave generator, Schmitt trigger, zero crossing detector, precision rectifier, peak detector, sample and hold circuit, RC phase shift oscillator, pulse width controller, voltage limiter.

Module 4: To realize application of op-amps as active filters.

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Low pass filter, high pass filter, band pass filter, band reject filter (first and second order).

Module 5: To understand operation of op-amp as converters.

D/A converter: binary weighted resistor type, ladder type.

A/D converter: simultaneous (flash) A/D converter, counter type, successive approximation converter, sigma delta converter, dual slope converter.

Module 6: To gather basic knowledge of (PLL) and realize.

Phase locked loop: basic principles of PLL, VCO, applications of PLL as frequency multiplier, AM demodulator, FM demodulator.

Module 7: Application of IC 555 as multivibrator.

The 555 timer: functional block diagram, IC 555 as astablemultivibrator and monostablemultivibrator.

,Module 8: Case study and development of a small project

Case study of different types of existing projects and development of small projects

Text book(s):

T1: Linear Integrated Circuits: D. Roy Choudhury and S. B. Jain: New Age International (P) Limited Publishers, 4th Edition.

Reference book(s):

R1: Analog Electronics: L. K. Maheshwari and M. M. S. Anand: Prentice-Hall of India Private limited.

R2: Linear Integrated Circuits: T. R. Ganesh Babu and B. Suseela:Scitech Publications (India) Pvt. Ltd., 4th Edition.

R3: Operational Amplifiers and Linear Integrated Circuits: Robert F. Coughlin and Frederick F. Driscoll: Prentice-Hall, 6th Edition.

Lecture wise plan:

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Lecture	Learning objective	Topics to be covered	Reference (Sec. No. of Text /Ref Books)
1 - 3	Introduction to electrical ICs.	Classification of ICs, IC manufacturing process.	T1: Ch- 1. R1: Ch- 1.
4 - 21	To gather basic knowledge of op-amps.	Differential amplifier, current mirror, block diagram of a typical op-amp, characteristics of an ideal op-amp, electrical parameters of an op-amp, single voltage biasing, open loop configurations, disadvantages, closed loop configurations, offset & bias compensation, non inverting amplifier & applications, inverting amplifier & applications	T1: Ch- 2, 3, 4.
22 - 30	To comprehend different application of op-amps as basic comparators.	Astablemultivibrator, monostablemultivibrator, triangular wave generator, Schmitt trigger, zero crossing detector, precision rectifier, peak detector, sample and hold circuit, RC phase shift oscillator, pulse width controller, voltage limiter.	T1: Ch- 5.
31 - 33	To realize application of op-amps as active filters.	Low pass filter, high pass filter, band pass filter, band reject filter (first and second order).	T1: Ch- 7.
34 - 38	To understand operation of op-amp as converters.	D/A converter: binary weighted resistor type, ladder type. A/D converter: simultaneous (flash) A/D converter, counter type, successive approximation converter, sigma delta converter, dual slope converter.	T1: Ch- 10, 11.

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39 - 43	To gather basic knowledge of (PLL) and realize application of IC 555 as multivibrator.	Phase locked loop: basic principles of PLL, VCO, applications of PLL as frequency multiplier, AM demodulator, FM demodulator. The 555 timer: functional block diagram, IC 555 as astablemultivibrator and monostablemultivibrator.	T1: Ch- 8, 9.

Evaluation Scheme:

Component	Duration	Weightage (%)	Remarks
Internal I		25	
Mid Term Exam	2 hrs.	20	Closed Book
Internal II		25	
Comprehensive Exam	3 hrs.	30	Closed Book

1. **Attendance Policy:** A Student must normally maintain a minimum of **75% attendance** in the course without which he/she shall be disqualified from appearing in the respective examination.

2. **Make-up Policy:** A student, who misses any component of evaluation for genuine reasons, must immediately approach the instructor with a request for make-up examination stating reasons. **The decision of the instructor in all matters of make-up shall be final**.

3. **Chamber Consultation Hours:** During the Chamber Consultation Hours, the students can consult the respective faculty in his/her chamber without prior appointment.

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