

Institute:	Institute of Technology
Name of Programme:	B.Tech. Electronics & Communication Engineering
Course Code:	2EC102
Course Title:	Analog Electronics
Course Type:	<input checked="" type="checkbox"/> Core/ <input type="checkbox"/> Value Added Course/ <input type="checkbox"/> Departmental Elective/ <input type="checkbox"/> Institute Elective/ <input type="checkbox"/> University Elective/ (<input type="checkbox"/> Open Elective Any other)
Year of Introduction:	2023-24

Credit Scheme

L	T	Practical component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

At the end of the course, students will be able to -

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| 1. comprehend the fundamentals of the op-amp and its basic amplifier configurations. | BL 2 |
| 2. analyse the linear and non-linear applications of the operational amplifier. | BL 4 |
| 3. apply the principles of op-amp to develop filters, oscillators and data converters. | BL 3 |
| 4. built and test op-amp circuits to determine performance of different applications. | BL 5 |

Unit No.	Syllabus	Teaching hours
I	Operational Amplifier and its characteristics & Parameters: Differential Amplifier, Block Diagram Representation of the op-amp, Ideal op-amp., Equivalent Circuit, op-amp, Measurement of Input Offset Voltage, Input Offset Current, Input Bias Current, Differential Input Resistance, Output resistance, Offset Voltage Adjustment Range, Input Voltage Range, Output Offset Voltage Swing, CMRR, Slew rate, PSRR, Gain Bandwidth Products, Transient Response, Power Consumption.	06
II	Operational Amplifier Applications: Linear Applications: Inverting and Non-Inverting Amplifier, Summing, Scaling and Averaging Amplifier, Instrumentation Amplifier, Integrator, Differentiator, Voltage to Current Converter with floating and grounded load, Current to Voltage Converter, Voltage Follower. Non-Linear Applications: Comparator, Zero Crossing Detector, Schmitt Trigger, Voltage Limiters, Log/ Antilog Amplifier.	11
III	Active Filters: Classification of filters, Magnitude and frequency Scaling, Magnitude and attenuation characteristics of ideal and practical filters, Low pass and High pass filters, Band Pass and Band reject filters.	05
IV	Oscillators: Oscillator Principles, Types of Oscillators, Phase shift oscillator, Wein Bridge oscillator, Square wave oscillator, Triangular wave, and Sawtooth Generator.	05
V	A/D and D/A Converters: Data converter operations, principle, and applications, Classification of Analog to Digital and Digital to Analog converter.	03

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

List of Experiment:

Sr. No.	Title of the experiment	Hours
1.	Differential Amplifier using Bipolar Junction Transistor.	04
2.	Measurements of Electrical Parameters Measurements for IC μ A741.	02
3.	Audio Amplifier using Open loop and closed loop configuration of OPAMP IC μ A741.	02
4.	Mathematical Operations using OPAMP IC μ A741	02
5.	Temperature to voltage converter using Instrumentation Amplifier	02
6.	Audio frequency filter using OPAMP IC μ A741	02
7.	High-Speed Low Noise Comparator	02
8.	RC Phase Shift Oscillator Using OPAMP IC μ A741	02
9.	Digital to Analog Converter using OPAMP IC μ A741	04
10.	IC555 Timer as Multivibrator	04
11.	Design and implement the analog filter using universal active filter IC	04
12.	Design and implement the Wien Bridge Oscillator	04
13.	Design and implement the Quadrature Oscillator	04
14.	Design and implement the Triangular-Wave Generator	04
15.	Design and implement the Sawtooth-Wave Generator.	04

Suggested Readings:

1. Ramakant A. Gayakwad, op-amp and Linear Integrated Circuits, Prentice-Hall India
2. Sergio Franco, Design with an operational amplifier and analog ICs, Tata Magraw hill
3. J. Michael Jacob, Application and design with analog Ics, Prentice Hall India
4. J.V. Wait, L.P. Huelsman, and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill.