NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN PART-1			
Name of the programme and specialization	III Year, V Sem B. Tech - EEE		
Course Title	INTEGRATED CIRCUITS LABORATORY		
Course Code	EELR14	No. of Credits	2
Course Code of pre-requisite subject(s)	MAIR32	EEPC10	EEPC16
Session	July 2023	Section	B
Name of the Faculty	Dr. C.Nagamani	Department	Electrical and Electronics Engineering
Email	cnmani@nitt.edu	Telephone No.	+91 2503254
Pre-requisite Course	Knowledge on the electronic circuits, circuit theory and mathematics are essential.		
Course Type	ELR		

Syllabus (approved in BoS)

- Understanding of Op-Amp Imperfections
- Linear Applications of Op-Amp
- Non-Linear Applications of Op-Amp
- Design of Active filters using Op-Amp
- Analog-to-Digital Conversion
- Digital-to-Analog conversion
- Timing circuits using 555 Timer
- Combinational and Sequential logic circuits
- Design of Code converter with seven-segment display

Mini-Project

COURSE OBJECTIVES

The main objective of the course is to give the students an insight into the design details of the basic linear integrated circuits. The course also equips the students to test and evaluate the various experiments to understand the operation of operational amplifier, Wave generators, Timer, Filter circuits, ADC, DAC.

COURSE OUTCOMES	Aligned Programme Outcomes (PO)
Upon completion of the course, the students will be able to 1. Understand the non-ideal behavior of Op-amp. 2. Analyze and prepare the technical report on the experiments carried out. 3. Design application-oriented circuits using Op-amp and 555 timer ICs. 4. Create and demonstrate live project using ICs.	

COs / POs		Course outcomes (COs)			
		1	2	3	4
Programme Outcomes (POs)	1	H	H	H	L
	2	H	H	H	H
	3	H	M	H	H
	4	M	H	M	H
	5	H	L	H	H
	6	L	L	L	L
	7	L	L	M	L
	8	L	L	M	M
	9	H	H	H	H
	10	H	H	H	H
	11	L	L	L	M
	12	M	M	L	M

COURSE PLAN – PART II

COURSE OVERVIEW

A linear integrated circuit (linear IC) is a solid-state analog device characterized by a theoretically infinite number of possible operating states. The linear integrated circuits gained a tremendous growth in most of the application because of the significant advantages like low power consumption, possibility for high-speed communication, flexibility, low cost, miniaturization of hardware has led to greater processing standards & higher memory capacities with lesser area & more access speed. Hence it is vital to know about the basic operation of linear integrated circuits.

Thus, the remarkable development and application of integrated circuits in rising technology motivates to frame this course as core course for electrical engineering students. The course is designed such that the initial experiments are to understand the basic operation and imperfections in op-amp ICs. The subsequent experiments are to design and implement various applications of op-amp. Thus, on the completion of the course, the students will be able to design and implement several real time applications using op-amp. This course also aims to apply the mathematical skills to a number of practical applications.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week	Topic	Mode of Delivery
1.	I week	Laboratory basics	Demonstration of lab equipment usage, familiarization etc
2.	II week	Basic operations of op-amp	**Experimental analysis**
3.	III week	Imperfections in op-amp	**Experimental analysis**
4.	IV week	Precision rectifiers	**Experimental analysis**

S. No.	Week	Topic	Mode of Delivery
5.	V week	Square and triangular wave generation	**Experimental analysis**
6.	VI week	Design of Low pass and high pass filter	**Experimental analysis**
7.	**VII week**	Timing circuits using timer IC555	**Experimental analysis**
8.	VIII week	Miniprojects; briefing	**Planning, designing and executing mini-project**
9.	IX week	Miniproject	**Planning, designing and executing mini-project**
10.	X week	Mini Project	**Mini – project - Circuit design, simulations**
11.	XI week	Assessment - II	**Mini – project - testing in breadboard- Final PCB, report**
12.	XII week	Assessment - III	**Oral / Written Viva Examination on all Experiments**

COURSE ASSESSMENT METHODS

S. No.	Assessment	Type of assessment	Duration	% Weightage
1.	**Assessment I**	Evaluation of experiment in every lab session	Regular lab sessions (continuous)	**50%**
2.	**Assessment II**	Mini – project – Circuit design, simulation results- Hardware output in breadboard- Final PCB- Report	Progress review and evaluation	**20%**
3.	**Assessment III**	Oral / written viva examination on all experiments	One session	**30%**

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Gayakwad R.A., 'Op-amps & Linear Integrated Circuits', Prentice Hall of India, New Delhi, 4th Edition, 2009.
2. Roy Choudhury and Shail Jain, 'Linear Integrated Circuits', 4th Edition, New Age International Publishers, 2010.
3. Sergio Franco,' Design with Operational Amplifiers and Analog Integrated Circuits', Tata McGraw Hill, 3rd Edition, 2002.
4. Sedra Smith, 'Microelectronic Circuits', Oxford University Press, 6th Edition, 2009.
5. R P Jain, 'Modern Digital Electronics', Tata McGraw-Hill Education, 3rd Edition, 2003

COURSE EXIT SURVEY

Feedback from the students during class committee meetings
Anonymous feedback through questionnaire

COURSE POLICY

MODE OF CORRESPONDENCE (email/ phone etc)

1. Students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail.
2. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday and Friday with prior intimation for any clarifications.

COMPENSATION ASSESSMENT POLICY

1. If any student is not able to attend a lab session due to genuine reasons, student is permitted to attend the compensation session.

ATTENDANCE POLICY

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students having shortage of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC HONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

FOR APPROVAL

Course Faculty _____ CC-Chairperson _____ HOD _____

(CHAGAMANI)