NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN PART-1			
Name of the programme and specialization	III Year B.Tech, EEE		
Course Title	INTEGRATED CIRCUITS LABORATORY		
Course Code	EELR13	No. of Credits	2
Course Code of pre-requisite subject(s)	MAIR32	EEPC10	EEPC17
Session	July 2018	Section	A
Name of the Faculty	Dr. G. Saravana Ilango	Department	Electrical and Electronics Engineering
Email	gsilango@nitt.edu	Telephone No.	0431-2503259
Pre-requisite Course	Knowledge on the electronic circuits, circuit theory and mathematics are essential.		
E-mail	gsilango@nitt.edu	Telephone No.	0431-2503259
Course Type	Core course		

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 desing 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 behaviour 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	M	H	H	M
	2	M	H	H	H
	3	H	L	H	H
	4	M	M	M	L
	5	NA	NA	NA	NA
	6	NA	NA	NA	M
	7	M	M	H	H
	8	M	M	M	M
	9	M	L	L	L
	10	M	L	L	M
	11	NA	NA	NA	NA
	12	H	H	H	H
	13	M	H	H	H
	14	M	L	H	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.	III week of July (16^{th} – 19^{th}) **1 hr**	Introduction to Linear Integrated Circuits	**Discussion in class**
2.	IV week of July (23^{th} – 26^{th})	Basic operation of op-amp	**Experimental analysis**
3.	V week of July & I week of August (30^{th} – 2^{nd})	Imperfections in op-amp	**Experimental analysis**
4.	II week of August (6^{th} – 9^{th})	Design of Low pass and high pass filter	**Experimental analysis**
5.	III week of August (13^{th} – 16^{th})	Precision rectifier	**Experimental analysis and it will be included in the mini-project**
6.	IV week of August (20^{th} – 23^{th})	Assessment - II	**Written/Oral viva on experiment – 1 to 4**
7.	V week of August (27^{th} – 30^{th})	Assessment - III	**Project demo by students (Simulation)**
8.	II and IV weeks of September (6^{th} – 17^{th})	Square and triangular wave generation	**Experimental analysis and it will be included in the mini-project**
9.	V week of September (20^{th} – 24^{th})	Timing circuits using timer IC555	**Experimental analysis and it will be included in the mini-project**
10.	V week of September & I week of October (27^{th} – 1^{st})	Digital to analog conversion using IC0808	**Experimental analysis and it will be included in the mini-project**

S. No.	Week	Topic	Mode of Delivery
11.	II week of October (4^{rth} – 8^{th})	Analog to digital conversion using IC0809	**Experimental analysis and it will be included in the mini-project**
12.	III week of October (11^{th} – 15^{th})	Assessment - III	**Project demo by students (Hardware)**
13.	IV week of October (18^{th} – 22^{nd})	Assessment - IV	**Written/Oral viva on experiment – 5 to 8**

COURSE ASSESSMENT METHODS

S. No.	Assessment	Type of assessment	Duration	% Weightage
1.	**Assessment I**	Evaluation of experiment and VIVA on every lab session	Nine sessions	**30%**
2.	**Assessment II**	Oral / written viva examination on experiment 1-4	One hour	**10%**
3.	**Assessment III**	Mini – project – group activity – simulation, hardware & Report	One session	**50%**
4.	**Assessment IV**	Oral / written viva examination on experiment 5-8	One hour	**10%**

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

1. Gayakwad R.A., 'Op-amps & Linear Integrated Circuits', Prentice Hall of India, New Delhi, 4^{th} 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, 3^{rd} Edition, 2002.
4. Sedra Smith, 'Microelectronic Circuits', Oxford University Press, 6^{th} Edition, 2009.
5. R P Jain, 'Modern Digital Electronics', Tata McGraw-Hill Education, 3^{rd} Edition, 2003

COURSE EXIT SURVEY

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

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc)

1. All the 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 I and / or II Cycle test(s) due to genuine reasons, student is permitted to attend the compensation assessment (CPA) with 20% weightage (20 marks).

ATTENDANCE POLICY

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% 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 _____