NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Department of Instrumentation and Control Engineering

Course Plan

COURSE OUTLINE			
Course Title	**ANALOG SIGNAL PROCESSING LABORATORY**		
Course Code	ICLR13	**No. of Credits**	2
Department	ICE	**Faculty**	Ms. S. Vaishnavi
Pre-requisites Course Code	None		
Course Coordinator	Ms. S. Vaishnavi		
Course Faculty E-mail	vaishnavi@nitt.edu	**Telephone No.**	----
Course Type	Essential Laboratory Requirement (ELR)		

COURSE OVERVIEW

Real word looks for system-level design skills in both analog and digital domains. The main focus of this lab is analog system design. It will cover the design and test of practical circuits based on op-amps and other ICs.

COURSE OBJECTIVES

This lab course enables the students to study, design and implement various practical circuits. It also imparts a sound knowledge about the applications of Op-amp. The objective is to provide practice in experiment test bench to learn the design and testing of various circuits.

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
At the end of the course student will be able to	
1. Analyze characteristics of various ICs.	**1, 2, 3, 7**
2. Understand the design and testing concepts of various practical circuits.	**1, 2, 3, 7**

COURSE TEACHING AND LEARNING ACTIVITIES		
Sl. No	**Week**	**Lab Experiments**
1	I	Design and test the performance of various op-amp configurations: (i) Inverting configuration (ii) Non – inverting configuration (iii) Differential configuration
2	II	Filter design using various methodologies for different set of specifications: (i) Design a second order active Low pass filter for given specifications (ii) Design a second order active High pass filter for given specifications (iii) Design a Bandpass filter for given specifications
3	III	Sensor linearization and bridge linearization using op-amps: (i) Linearizing a single element varying bridge (ii) Linearizing a two element varying bridge (iii) Linearizing the bridge output using op-amp
4	IV	Design of waveform generators using op-amp: (i) Design an Astable Multivibrator for required frequency using Ic 741 (ii) Design a Triangular waveform generator using Ic 741
5	V	Design a Weinbrigde Oscillator for the given specification and test its operation
6	VI	Design a Phase Locked Loop and test its characteristics
7	VII	Design a voltage regulator using an Op-amp
8	VIII	Analog to digital converter
9	IX	Digital to analog converter
10	X	Regenerative feedback circuit design - Schmitt trigger and multivibrator

COURSE ASSESSMENT METHODS

Sl. No	Mode of Assessment	Week	Duration	% Weightage
1.	Pre-lab preparation (05) Conduct of experiment (05) Output verification (10) Record (20)	----	----	**40%**
2.	Internal Test (Objective)	11th week	One hour	**20%**
3.	Viva	Every lab session	----	**10%**
4.	End semester practical	April 4th week	Two hours	**30%**
			TOTAL	**100%**

COURSE POLICY

1. Students should have basic understanding about the experiment and come prepared for every lab session.
2. Students should submit their record every subsequent lab session for correction in the prescribed format.
3. The minimum attendance requirement is 80% (i.e) 08 lab sessions = 80%. Students having attendance below 80% will not be permitted to appear for internal test and end semester practical examination.
4. In case if the student is absent/On-duty or any other reason, they have to provide necessary information immediately to the faculty In-Charge.
5. Students who are absent for internal test and end semester practical examination can opt to do supplimentary examination.
6. Students who have failed in supplimentary examination can opt to do formative assessment during summer/winter vacation.
7. Relative grading will be followed for awarding grade.

ESSENTIAL READINGS

Reference Books:

1. *Sergio Franco, Design with Operational amplifiers and Analog Integrated Circuits, 4th edition, Mc-Graw Hill Inc. 2014.*
2. *Wai-Kai-Chen, The Circuits and Filters Handbook, CRC press, 2nd edition, 2003.*
3. *Arie F. Arbel, Analog Signal Processing and Instrumentaion, Cambridge University, press 1980.*

FOR SENATE'S CONSIDERATION

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____