



SECOND SEMESTER 2019-2020

Course Handout Part II

Date: 06-01-2020

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : ECE F341 / EEE F341/ INSTR F341
Course Title : Analog Electronics
Credits : 4
Instructor-in-charge : Souvik Kundu
Other Instructor : Prashant Kumar Pattnaik
Tutorial Instructors : Souvik Kundu, Prashant Kumar Pattnaik, and Sumit Kumar Chatterjee
Lab Instructors : Souvik Kundu, Prashant Kumar Pattnaik, Chetan Kumar V, Joshna P, Mary, TBA

Scope and Objective of the Course

The aim of the course is to deal with various electronic techniques and building blocks used in analog signal processing applications. Discrete and Integrated electronic circuits will be studied. Experiments and projects using discrete IC modules will be carried out in the laboratory.

Course Outcomes

After learning the course, students will be able to

- Design analog electronic circuits using opamps and discrete components for linear and non-linear signal processing (real time) applications.
- Analyze a given analog integrated circuit and evaluate its performance.
- Convert analog to digital and digital to analog signal of desired accuracy and resolution using data converters
- Design voltage regulators and power supply using regulator ICs and sinusoidal and non-sinusoidal signal generators using opamaps and timer ICs

Textbooks:

1. TB1 L.K. Maheshwari, Analog Electronics, PHI, 2005
2. TB2 L.K. Maheshwari and M.M.S. Anand, Laboratory Experiments & PSPICE Simulation in Analog Electronics Experiments, PHI, 2005.

Reference books

1. R1. A.S. Sedra, K.C. Smith, Microelectronic Circuits, 5th Ed., Oxford, 2004.
2. R2. S. Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 3rd Ed. McGraw Hill.
3. R3. Ramakant A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4th Ed., 2015, Pearson.

Course Plan:



Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-2	Key concepts dealing with the basics of circuit theory and electronic devices are reviewed	Introduction & review of concepts	TB1 Ch 1
3-6	Introduce the basics of ideal and practical op-amps	Op-amp basics, concept of negative feedback and virtual short, Effect of real op-amp parameters on circuit performance	Class notes
7-9	Introduce the applications of ideal and practical op-amps in analog electronic systems	Linear applications of op-amps Special purpose Op-amp circuits	Class notes and TB1 Ch 2 and 3
10-15	This part discusses the important features and practical realization of active filters. Switched-capacitor filters are also included.	Active filters	Class notes and TB1 Ch 4
16-20	Applications of Op-amps in realization of nonlinear functions such as log and antilog amplifiers, multipliers, dividers are included. Precision circuits, comparators, Schmitt trigger, analog switches, sample-and-hold circuits, analog multipliers, etc. are also introduced.	Non-linear Op-amp circuits	Class notes and TB1 Ch 5
21-27	Sinusoidal and non-sinusoidal signal generators using op-amps and timer ICs are introduced. This part also introduces phase locked loop along with other integrated circuits.	Signal generators, 555 timer based circuits and Phase lock loop	Class notes and TB1 Ch 6
28-31	This part discusses the voltage regulators and also the design of power supply using regulator ICs.	Voltage Regulators	Class notes and TB1 Ch 7
32-36	IC power amplifiers and tuned amplifiers are discussed in this part.	IC Power Amplifiers and tuned amplifiers	Class notes TB1 Ch 8 and 9
37- 42	This part includes the study of analog-to-digital and digital-to-analog converters. The performance measures and design aspects of data converters will be covered in this part.	A/D and D/A Converters	Class notes and TB1 Ch 10,

Lab Experiments:



S.No	Experiment	Reference to Text
1	Common Emitter Amplifier	TB2 Exp 2
2	Basics Op-amp Configurations	TB2 Exp 6
3	Characterization of Op-amp	TB2 Exp 5
4	Study of Feed Back Amplifiers Using Op-amps	TB2 Exp 8
5	Instrumentation and Programmable Amplifier	TB2 Exp 7
6	Study of Active Filters Using Op-amps Low Pass, High Pass & Band Pass	TB2 Exp 9
7	Precision Circuits	TB2 Exp 12
8	Sinusoidal and Non-Sinusoidal Oscillators	TB2 Exp 15
9	Integrated Circuit Timer & Phase Locked Loop	TB2 Exp 16, Exp 17
10	IC Fixed and adjustable Voltage Regulators	TB2 Exp 19
11	Data Converters (DAC and ADC)	TB2 Exp 24 & 25

Evaluation Scheme:

Component	Duration	Weightage (%) and Marks	Date & Time	Nature of Component
Midsem	1:30 Hours	20% (60)	5/3 9.00 - 10.30AM	Closed Book
Quiz	--	16.66% (50)	To be announced in Class	Open book
Assignments	--	13.33% (40)	To be announced in Class	Open Book
Laboratory	--	20% (60)	Regular practicals and lab test notice will be announced on CMS	Demo / Regular Practical/ Lab Exam – Open book
Comprehensive	3 Hours	30% (90)	09/05 AN	Closed Book
TOTAL		100% (300)		

Chamber Consultation Hour: To be announced in Class

Notices: Notices, if any, concerning the course will be put up on CMS/ EEE Notice Board.

Make-up Policy: Make-up will be given on **genuine** grounds only. i) Prior application should be made for seeking the make-up examination. ii) Written and signed documentary evidence needs to be furnished by the Hostel Warden/ID confirming the reason for absence from scheduled examination. No make-up will be given for the quiz.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.



Dr. R. N. Ponnalagu
INSTRUCTOR-IN-CHARGE

