Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2022-2023

Course Handout Part II

Date: 16-01-2023

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**
Instructor-in-Charge	: Prasant Kumar Pattnaik
Other Instructor	: Amit Kumar Panda
Tutorial Instructors	: Prasant Kumar Pattnaik, Amit Kumar Panda, Rajesh Kumar Tripathy and Ponnalagu R.N
Lab Instructors	: Prasant Kumar Pattnaik, Rajesh Kumar Tripathy and BVVSN Prabhakar Rao Research Scholars: Chaluvadi V Nagabhaskar, Vanamathi S, Nischita K, Subhrajyoti Bose, Sohel Siraj

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 opamps and 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.
- Analyse 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 supplies 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
3-10	Introduce the basics of ideal and practical op-amps	Op-amp Basics	Class notes & TB1 Ch 2
11-14	Introduce the applications of ideal and practical op-amps in analog electronic systems	Special purpose Op-amp circuits	Class notes and TB1 Ch 3
15-21	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
22-27	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
28-31	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 & Phase lock loop	Class notes and TB1 Ch 6
32-35	This part discusses the voltage regulators and also the design of power supply using regulator ICs.	Voltage Regulators	Class notes and TB1 Ch 7
36-40	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.	Data Converters-D/A, A/D Converters	Class notes and TB1 Ch10

Lab Experiments:

S.No	Experiment	Reference to Text
1	Common Emitter Amplifier	TB2 Exp 2
2	Basic Configuration of Opamp-I	TB2 Exp 5
3	Basic Configuration of Opamp-II	TB2 Exp 5
4	Characterization of Op-amp	TB2 Exp 6
5	Study of Feed Back Amplifiers Using Opamps	TB2 Exp 8
6	Instrumentation and Programmable Amplifier	TB2 Exp 7
7	Study of Active Filters Using Opamps	TB2 Exp 9
8	Precision Circuit	TB2 Exp 12
9	Sinusoidal and Non-Sinusoidal Oscillators	TB2 Exp 15
10	Integrated Circuit Timer and Phase Locked Loop	TB2 Exp 16, Exp 17

Evaluation Scheme:

Component	Duration	Weightage (%)/ Marks	Date & Time	Nature of Component
Midsem	90 minutes	30 % (60)	13/03 4.00 - 5.30PM	Closed book
Quizzes	To be announced	10 % (20)	To be announced	Open book
Laboratory – Regular lab evaluation	Lab hours	15 % (30)	Lab hours	Lab experiments /Open book
Laboratory Exam (Quiz/Assignment/Expt)	To be announced	10 % (20)	To be announced	Lab experiments /Open book
Comprehensive exam	180 minutes	35 % (70)	09/05 AN	Closed Book
TOTAL		100 % (200)		

Chamber Consultation Hour: To be announced in class

Notices: Notices concerning the course will be put up on the CMS

Make-up Policy: Make-up will be given on genuine grounds only. No makeup for quizzes/ assignments.

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

Prof. Prasant Kumar Pattnaik
INSTRUCTOR-IN-CHARGE