Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2024-25

Course Handout PART II

Date: 06/01/2025

In addition to part I (General Handout for all courses appended to the timetable), this portion gives further specific details regarding the course.

Course No. **: ECE F244 / EEE F244 / INSTR F244**
Course Title **: Microelectronic Circuits**
Instructor-in-charge **: NIRANJAN RAJ**

Team of Instructors
(i) For Lecture : Niranjan Raj, Syed Ershad Ahmed, and Pritesh Kumar Yadav
(ii) For Tutorial : Niranjan Raj, Syed Ershad Ahmed, Pritesh Kumar Yadav, Parikshit Sahatiya, and Surya Shankar Dan

Scope and objective of the course:
The objective of this course is to develop an ability to analyze and design integrated electronic circuits. The course aims at a thorough understanding of electronic circuits & building blocks necessary for effective realizations of integrated circuits. The course also includes the practical component under ECE/EEE/INSTR F246. It includes

1. Understand device modeling, two-port network models, amplifier characterization
2. Understand the necessary techniques to set DC bias and Q-point for different amplifiers.
3. Understand the analysis of different single/ multi-stage amplifiers and their characterization
4. Practice EDA tools in the design of amplifiers.

Text Book: Adel. S. Sedra, Kenneth C Smith, "Microelectronic Circuits," Oxford University Press, Fifth Edition, 2004.

Reference books:
1. Behzad Razavi, "Design of Analog CMOS Integrated Circuits," TATA McGraw Hill, 2001.
2. Richard. C. Jaeger, "Microelectronic Circuit Design," Tata McGraw-Hill Companies Inc., International Edition.
3. R. Jacob. Baker, Harry.W.Li, David.Boyce, "CMOS Circuit Design Layout and Simulation," IEEE Press Series on Microelectronic Systems, PHI.

Course Plan:

S.No.	Topic	No. of Lectures	Ref. From the Text Book (Article)	Learning Objective
1.	Introduction to Amplifiers	2	Text chapter-1 1.4, 1.5,1.6	Characteristic of Amplifiers
2	Models of MOSFET, Physics of MOSFET	2	Text Ch 4- 4.1 – 4.3	MOS device physics
3.	Integrated circuit MOSFET Amplifier circuits and Frequency response	6	Text Ch 4- 4.5, 4.6, 4.7, 4.8, 4.9	IC MOSFET Amplifier design

4.	Integrated circuit BJT Amplifiers, frequency response, and BJT models	3	Text Ch 5-5.5, 5.6, 5.7, 5.8, 5.9	Discrete and IC BJT Amplifier Design (To be discussed in Flip mode using recorded videos)
5.	Differential amplifiers	7	Text Ch7- 7.1-7.7	Design of differential amplifiers
6.	Passive and active current mirrors.	4	Text Ch.6	Design of IC bias circuits
7.	Feedback	7	Text Ch.8	Concept of feedback, feedback amplifier design
8.	Operational Amplifiers	6	Text Ch. 9	Design and characterization of an integrated circuit OP-AMP
9.	Stability & frequency compensation in OP-AMP, Noise	4	Text Ch-8.8-8.11	Techniques for stability of op-amp in feedback mode.
10.	An overview of integrated electronic systems	1		Building of electronic systems
		Total=42		

Evaluation Scheme:

S. No.	Components	Duration	Weightage	Marks	Date & time	Nature of Component
1	Quizzes	To be announced	30 %	60	------	Closed book
2	Mid-Semester Exam	90 min	30 %	60	05/03 2.00 - 03.30PM	Open Book
3	Comprehensive Exam	180 min	40 %	80	07/05FN	Closed book**

**** Though the comprehensive exam is a closed book, one A4 (both sides) formula sheet will be provided for the entire duration of the comprehensive exam. Only formulas in the sheet are included. Circuits and any form of figures or images are not included.**

Chamber Consultation Hour: To be announced in the class

Make-up Policy: Requests for makeup examination will be considered ONLY for extremely serious cases where:

- Parents of the concerned student have to request the course IC in a signed document for the makeup of their son/daughter.
- Written & signed documentary evidence needs to be furnished by the hostel warden and medical doctors confirming the reason for absence from the scheduled examination.

Notices: All notices for the course will be announced in class and displayed on the ERP simultaneously.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester, and any mode of academic dishonesty will not be acceptable.

Instructor-in-charge
ECE F244 / EEE F244 / INSTR F244