

Approval: 10th Senate Meeting

Course Name: Microelectronics Circuits Design Practicum (MCDP)
Course Number: EE 312 P
Credit: 0-0-3-2
Prerequisites: *IC 161 , EE 311 or Instructors consent*
Students intended for: UG
Elective or Core: Core for 3rd yr. Electrical Engineering
Semester: Odd

Preamble:

The objective of Microelectronics circuits design (MCDP) practicum is to develop an understanding of electronic devices and circuits through laboratory assignments. Through MCDP practicum course, the B.Tech students will acquire a basic knowledge of solid state electronics including diodes, MOSFET, BJT, and operational amplifier and develop the ability to analyze and design analog electronic circuits using discrete components.

Course Syllabus

1. Diode characteristics and diode circuits

[12]

p-n junction, ideal diode, terminal characteristics of junction diodes, operation in the reverse breakdown region, Zener diodes, Diode rectifier circuits, Limiting and clamping circuits, Special diode types.

After exposure of this practicum, students should be able to compare the experimental data to the theoretical curve of the diodes. The students will use appropriate laboratory equipment to plot the I-V characteristics of the diodes. The students will also construct rectifier and filtering circuits using diodes and capacitors.

2. BJT I-V characteristics and Amplifier

[12]

Device structure and physical operation, I-V characteristics of BJT DC circuits, Application of the BJT in amplifier design, Small-signal operation and models, Basic BJT amplifier configurations and biasing the BJT amplifier circuits

As part of laboratory assignments, the students will obtain and analyse the I-V characteristic of the BJTs. Students will also design and implement single-stage BJT amplifiers and observe amplitude and frequency response.

3. MOSFET Characteristics and Amplifiers

[12]

Device structure and physical operation, I-V characteristics of MOSFET, Small-signal operation and models, Basic MOSFET amplifiers, Biasing in MOSFET amplifiers

At the end of this practicum, the students will construct the circuit to explore the current-voltage characteristics of MOSFET. The students will also design MOSFET amplifier

4. Non-ideal operational amplifier and op-amp circuits

[6]

Operational amplifiers and amplifier circuits, op-amp inverting and non-inverting configuration, Difference amplifiers, Integrator and differentiator circuits

In this practicum, the students will evaluate characteristics of the non-ideal operational amplifiers. Students will analyse two most popular configurations of op-amp circuits (inverting and non-inverting amplifiers), predict the results, and observe the gain and frequency response.

Course Lectures:

The laboratory practicum learning will be supplemented by total of 3 hours of lectures on the different topics of the course spread over the semester.

Mini-project

The students will also carry out a mini-project after discussion with the instructor. The aim of this project will be to understand, solve and implement solutions to real world problems.

Text Book

1. Adel S. Sedra and Kenneth C. Smith, Microelectronics Circuits, 6th Edition