NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING

TELECOMMUNICATIONS ENGINEERING PROGRAM

IT144 – LABORATORY OF ANALOG CIRCUITS

I. GENERAL INFORMATION

CODE	**:**	IT144 – Laboratory of Analog Circuits
SEMESTER	**:**	7
CREDITS	**:**	01
HOURS PER WEEK	**:**	02 (Laboratory)
PREREQUISITES	**:**	EE131 – Laboratory of Electrical Circuits I
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

This subject is of a practical nature and belongs to the area of professional training. It is intended to provide the student with a solid preparation in the handling of laboratory instruments, use and implementation of manuals and catalogs of components, construction, computer simulation and analysis of rectifier circuits, filters, single stage and multistage amplifiers and sources regulated, linear integrated circuits.

III. COURSE OUTCOMES

At the end of the course the student will:

- Select correctly the equipment and instruments to be used according to the experience to be developed.
- Properly handle measuring and control instruments, configuring and connecting them correctly.
- Build analog circuits to verify their proper functioning with the measuring and control instruments.
- Measure the parameters of a signal, accurately and verify the consistency of the values obtained.
- Tidy up the results in an orderly manner and make graphs showing diode and transistor curves; as well as amplifier frequency responses.
- Use MATLAB AND PSICE for data processing and visualization.
- Interpret the results correctly, generalize and formulate conclusions.
- Compare the experimental results with the theoretical ones verifying the validity of the analog circuits built in the experiences.
- Prepare clear technical reports detailing the process developed, interpreting results and formulating conclusions.

IV. LEARNING UNITS

1. CIRCUITS WITH DIODES

Trimmer circuit, battery charger, and fixator / Half-wave and full-wave rectifier circuits with intermediate tap transformer without and with filtering capacitor. / Full wave rectifier circuits with diode bridge without and with filtering capacitor, with L-C filter and with C-L-C filter; as well as a tripling voltage circuit with diodes.

2. AMPLIFIER. POLARIZATION AND GAIN

Common emitter amplifier and common base with BJT bipolar transistor: polarization, alternating operation, configuration and limitations; computer simulation, implementation and verification of their behavior with measuring and control instruments. / Analyze, simulate on a computer, experimentally implement and verify the polarization, gain and frequency response of a common emitting amplifier with FET transistor.

3. MULTI-PHASE AMPLIFIER

Build, simulate on computer, and experimentally verify the gain and frequency response with theoretical and computer simulated data.

4. IC REGULATED SOURCES AND CURRENT DRIVERS

Analyzes, simulates on a computer, implements and experimentally verifies the basic series regulator circuit and the series regulator circuit with operational amplifier with theoretical and simulated computer data.

5. COMPLEMENTARY SIMETRY POWER AMPLIFIER

Implements, simulates on computer, and experimentally verify their behavior with theoretical and simulated data on computer.

6. DIFFERENTIAL AMPLIFIER

Implements, simulates on computer, and experimentally verify their behavior with theoretical and simulated data on computer.

7. OPERATIONAL AMPLIFIER

Inverter amplifier / non-inverting amplifier / amplifier follower emitter / V / I converter / amplifier for bridge type signal.

V. METHODOLOGY

The course takes place in laboratory sessions of electronic circuits. In all the sessions, the teacher presents the laboratory guides. Before the laboratory, the student uses SPICE simulation software to develop and analyze their guide. At the end of the laboratory the student team must submit a technical report. In all sessions the active participation of the student is promoted.

VI. EVALUATION FORMULA

The learning will be evaluated through the "D" system.
The final average is equal to the laboratory average, (six laboratory reports are graded, and the one with the lowest grade is eliminated)

$$FA = \frac{L1 + L2 + L3 + L4 + L5}{5}$$

VII. BIBLIOGRAPHY

- HAMBLEY, Allan Electronics Editorial Prentice Hall
- UNI - College of Electrical and Electronics Engineering, Laboratory Guides.