NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONIC ENGINEERING

ELECTRONICS ENGINEERING PROGRAM

EE443 – LABORATORY OF ELECTRONICS III

I. GENERAL INFORMATION

CODE	**:**	EE443 – Laboratory of electronics III
SEMESTER	**:**	8
CREDITS	**:**	01
HOURS PER WEEK	**:**	03 (Laboratory)
PREREQUISITES	**:**	EE442 – Laboratory of electronics II
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

The course trains the student in the application of experimental techniques in the handling of radio frequency communications circuits. The parameters of the selective network transformers are measured and deduced. The input and output characteristics of the bipolar transistor (BJT) and the field effect transistor (JFET) are checked. Design and check the operation of sinusoidal oscillators, mixers and modulators used in radio frequency. Specialized software is used for the simulation of the mentioned circuits.

III. COURSE OUTCOMES

At the end of the course the student will:

- Properly manage the digital multimeter, function generator, digital oscilloscope and regulated power supply by configuring and connecting them correctly.
- Identify the relevant variables of a selective network transformer, determine its lap ratio, loss resistance and frequency response.
- Measure the variables of the electronic communications circuit accurately and verify the coherence of the values obtained.
- Tabulate the results in an orderly manner and make graphs that show the relationships and dependencies between the variables.
- Interpret the results correctly, generalize and formulate conclusions.

IV. LEARNING UNITS

1. **TUNED CIRCUITS AND TRANSFORMERS OF SELECTIVE NETWORKS**
   Measurement of the parameters of an AM selective network transformer.
2. **EXPONENTIAL CHARACTERISTICS OF THE BIPOLAR TRANSISTOR**
   Measurement of the harmonic content of the collector current of the bipolar transistor.
3. **SQUARE CHARACTERISTICS OF THE TRANSISTOR FIELD EFFECT**

Measurement of the harmonic content of the drain current of the field effect transistor.

4. **THE OSCILLATOR COLPITTS**
   Design and testing of the Colpitts oscillator.

5. **THE MIXER WITH DIFFERENTIAL PAR**
   Frequency measurement of the sum and difference frequencies. Frequency response. Measurement of spurious frequencies.

6. **THE TUNED AMPLIFIER**
   Design and verification of the amplifier neutralized and with AGC. Frequency response.

7. **MINI PROJECT**
   Present and expose an integrating project.

V. METHODOLOGY

The teaching methodology of the course is based on:

- Practical exercise resolution classes.
- Qualified laboratory practices for the reinforcement of theoretical concepts.

In the laboratory sessions it is about exercising the concepts presented in the theory classes of the Electronic Circuits III (EE423) course, so they begin in the third week of the academic semester.

At the end of the course the student must prepare and present an integrating work or project. In all sessions the active participation of the student is promoted.

VI. EVALUATION FORMULA

During the semester 06 laboratory qualified practices, 05 of them are averaged, the one with the lowest grade is eliminated.

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

VII. BIBLIOGRAPHY

- CLARKE HESS, "COMMUNICATION CIRCUITS: ANALYSIS AND DESIGN" Addison-Wesley Publishing Company Inc. Edition of 1971.

- KRAUSS-BOSTIAN-RAAB, "SOLID STATE IN RADIOCOMMUNICATION ENGINEERING". John Wiley & Sons Inc. (Edition 1980)

- SMITH, "MODERN COMMUNICATION CIRCUITS". McGraw-Hill, Inc. New York, NY, USA (1986 Edition)