NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL ENGINEERING PROGRAM

EE132 – LABORATORY OF ELECTRICAL CIRCUITS II

I. GENERAL INFORMATION

CODE	: EE132 Laboratory of Electrical Circuits II
SEMESTER	: 6
CREDITS	: 1
HOURS PER WEEK	: 2 (Laboratory)
PREREQUISITES	: EE112 Analysis of Electrical Circuits II, EE131 Laboratory of Electrical Circuits I
CONDITION	: Mandatory

II. COURSE INTRODUCTION

Scalar and complex relationships in linear electric circuits. Power and power factor in single-phase and three-phase circuits. Resonance in linear electric circuits. Measurement of energy. Displacement of sinusoidal waves in RC circuits. Determination of the sequence of phases in a three-phase system. Measurement of active power in balanced and unbalanced three-phase circuits. Measurement of the inductance in a coupled circuit. Correction of the power factor in single-phase circuits.

III. COURSE OUTCOMES

Students, at the end of the course, using measuring instruments and appropriate equipment, will structure AC circuits selecting the appropriate components. They will also prepare a technical report explaining structured electrical circuits, as well as its operation supporting the results obtained.

IV. LEANING UNITS

1. **CLIMATE AND COMPLEX RELATIONS IN LINEAR ELECTRICAL CIRCUITS.**
   Experimentally deduce the variability of current and voltage drops through the R-L-C elements by applying a sinusoidal voltage.

2. **BALANCED THREE-PHASE CIRCUITS.**
   Analyze and evaluate in an experimental way the measurement of voltage, current, active power and power factor in three-phase balanced circuits.

3. **MEASUREMENT OF ENERGY AND POWER IN ELECTRICAL MONOFASIC CIRCUITS OF ALTERNATE CURRENT.**
   Evaluate and analyze the measurement of power and power in a single phase AC circuit.

4. SINUSOIDAL WAVES DISASSEMBLY IN R-C CIRCUITS

Determine the phase angle between the voltage and current in an R-C circuit using an oscilloscope, by methods of wave and Lissajous overlap.

5. RESONANCE IN LINEAR ELECTRICAL CIRCUITS.

Evaluate and analyze experimentally the resonance characteristics in linear electric circuits.

6. MEASUREMENT OF MUTUAL INDUCTANCE IN A COUPLED CIRCUIT.

Analyze and evaluate the magnetic coupling that exists in a coupled circuit. Determine the magnetic coupling coefficient "K" and the mutual induction coefficient "M" in alternating measure.

7. UNIFIBLE THREE-PHASE CIRCUITS.

Analyze and evaluate in an experimental way the measurement of voltage, current, active power and power factor in unbalanced three-phase circuits.

8. MEASUREMENT OF MEDIUM AND EFFECTIVE VALUES IN MONOPHASIC AND THREE-PHASE CIRCUITS.

Evaluate and analyze experimentally the average and effective values in a single phase circuit with half wave rectifier and full wave and a three phase circuit with half wave rectifier.

V. LABORATORIES AND PRACTICAL EXPERIENCES

The course is developed in 8 sessions of laboratory, in each session a brief summary of the theoretical basis of the experience to realize the form of arming the circuit and the form to realize the experimental tests is presented.

VI. METHODOLOGY

A basic theory of Experiences topics will be presented before each Laboratory, requiring students to submit previous reports related to the Laboratory topic. The participation of students in each Experience should be encouraged and encouraged. Through the tests and previous reports motivate the students to read the subject of the experience.

VII. EVALUATION FORMULA

The system of evaluation that is used is the system D. Average of the Notes of the eight Experiences realized during the cycle.
Final Grade: FG

$$FG = \sum Laboratories / 8$$

VIII. BIBLIOGRAPHY

[1] ELEODORO AGREDA: "Laboratory Manual of Electrical Circuits II"
[2] ROBERT BOYLESTAD: "Introductory Analysis of Electrical Circuits"
[3] RICHARD C. DORF: "Electrical Circuits (Introduction to Analysis and Design"
[4] DAVID JOHNSON: "Basic Analysis of Electrical Circuits"
[5] NILSSON: "Analysis of Electrical Circuits"
[6] KERCHNER AND CORCORAN: "Alternating current electric circuits"
[7] HAYT KEMMERLY: "Circuit Analysis in Engineering"
[8] O. MORALES, F. LOPEZ: "Electrical Circuits I and II"
[9] SCOTT: "Line Circuits" Volumes I and II