



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRICAL ENGINEERING PROGRAM

EE243 – LABORATORY OF ELECTRICAL MACHINES III

I. GENERAL INFORMATION

CODE	: EE243 – Laboratory of Electrical Machines III
SEMESTER	: 9
CREDITS	: 01
HOURS PER WEEK	: 03 (Theory – Laboratory)
PREREQUISITES	: EE225 – Electrical Machines III
CONDITION	: Mandatory

II. COURSE DESCRIPTION

The course includes the study of the operation of rotary electric machines in stable and transient state, the latter of the Synchronous Generator; which were studied theoretically in the previous course, pre-requisite of Electrical Machines III. The student will learn to know the principle of operation and / or operation of the amplidine, the transients in the synchronous generator, as well as the behavior of the generalized machine through transformations, using the measuring instruments properly and also compare the experimental results with the theory. All this in the framework of integration with a work team, which will be useful in their future professional life.

III. COURSE OUTCOMES

At the end of the course the student will:

- Check by means of experimental tests on a rotating machine, the laws of electromagnetism of a magnetic circuit.
- Adapt to teamwork, when the tasks that each member must perform are distributed within their work group.
- Properly manipulate laboratory equipment (measuring instruments and electrical machines).
- Classify the readings obtained from the measuring instruments (digital multimeters, clamp meters, analogue ammeters, etc.).
- Use and organize the data obtained for the preparation of your final reports.
- Present a final report organized and well-structured for each experience with its own conclusions.
- Use computer tools for data processing.
- Refer to the bibliographic sources consulted.

IV. LEARNING UNITS

1. TRANSFORMATIONS

The SCOTT Three Phase Transformer / Voltage Transformations / Current Transformations / Transformation Verification C1 / Transformation Verification C2

2. THE AMPLIDINE

The Amplidine connection panel / Obtaining rotational inductances / Load characteristic / Amplidine as a power amplifier.

3. THE SYNCHRONOUS GENERATOR

Scheme of the Brown Boveri Group / The SCHARGE engine / Operation under Inductive Load / Operation under Resistive Load / Transients in operation.

4. FREE EXPERIENCE

Transient Processes in the Amplidine / Experimental Study of the Start and Brake of the Asynchronous Motor 3φ / Transient Short Circuit 3φ of the Synchronous Generator.

V. LABORATORIES AND PRACTICAL EXPERIENCES

- Laboratory 1: Voltage and Current Transformations
- Laboratory 2: Amplidine or Transversal Field Generator
- Laboratory 3: The Synchronous Generator in transitory state
- Laboratory 4: Free Experience

VI. METHODOLOGY

In these first 3 laboratory sessions, the student with his team or work group implements the connections of the appropriate circuit, under the tutelage of the instructor teacher, within an appropriate space that is the electricity laboratory, performs the operation and / or operation of the rotary electric machine and experiences its behavior by reading the measuring instruments, which will be properly calibrated both with the guidance of the teacher in charge of the course and the laboratory staff. The fourth session will be a free experience of the student's choice with their group, they must previously submit a previous report at the time of starting the experience.

VII. EVALUATION FORMULA

- Average of Four Practices (P).

$$FA = \frac{P1 + P2 + P3 + P4}{4}$$

VIII. BIBLIOGRAPHY

- BUCHHOLD HAPPOLDT. POWER STATIONS AND ELECTRICAL NETWORKS.
- CASTELLFRANCHI. ELECTRICAL INSTALLATIONS.
- JEROME MEISEL. ELECTROMECHANICAL ENERGY CONVERSION.