



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRICAL ENGINEERING PROGRAM

EE242 – LABORATORY OF ELECTRICAL MACHINES II

I. GENERAL INFORMATION

CODE	: EE242 – Laboratory of Electrical Machines II
SEMESTER	: 8
CREDITS	: 01
HOURS PER WEEK	: 03 (Laboratory)
PREREQUISITES	: EE241 – Laboratory of Electrical Machines I EE214 – Electrical Machines II
CONDITION	: Mandatory

II. COURSE DESCRIPTION

It is a subject of a practical nature and belongs to the area of professional training. Its purpose is to consolidate the theoretical knowledge, by practicing experimental verification of the electromechanical conversion processes in the rotating electric machines of alternating current and direct current. Also, demonstrate in a practical way the operating characteristics of these machines in steady state.

III. COURSE OUTCOMES

At the end of the course the student will:

- Identify, design and understand the functions of all the components of an electrical machine.
- Select correctly the electrical machine to be used according to the work it will do.
- Properly handle measuring and control tests, connecting and measuring them correctly.
- Tabulate the results in an orderly manner and make graphs and correctly interpret the results obtained, 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. SHRINK FOR ALTERNATE CURRENT ROTATING MACHINES

Obtaining star – connection of coils and measurement of starting parameters of an asynchronous motor. Modification of the star connection to double the number of poles of the machine and measurement of the same starting parameters. Modification of the star connection of double star connection and measurement of the same starting parameters.

2. THE ASYNCHRONOUS MACHINE

Vacuum test, blocked rotor test, test as a motor under load, test as a generator.

3. SYNCHRONOUS GENERATOR I.

Vacuum test, three-phase short circuit test, test under load at inductive zero power factor, test under resistive load.

4. SYNCHRONOUS GENERATOR II

Power versus delta characteristics, "V" characteristics of the synchronous generator, slip test and determination of parameters X_d and X_q .

5. SHUNT-COMPOUND GENERATOR

Characteristics of excitation, empty, under load, external, regulation (compound and shunt generator).

6. THE CONTINUOUS CURRENT SERIES MOTOR

Locked rotor test. Direct measurement of the characteristics of the motor under load.

V. METHODOLOGY

The course is developed in laboratory sessions. In these sessions, the teacher presents the laboratory guides. 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.

- Average of Laboratory experiences (L) is equal to the Final Grade.

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

VII. BIBLIOGRAPHY

- "Electrical Measurements and Measuring Instruments", S. Kamakshaiah, J. Amarnath. I. K International Pvt, 2011.
- "Design of Rotating Electrical Machines", Juha Pyrhonen, Tapani Jokinen. John Wiley & Sons, 2013.
- "Principle of Electrical Machines", V. K. Mehta, Rohit Mehta. S. Chand Limited, 2008.