



# NATIONAL UNIVERSITY OF ENGINEERING

## COLLEGE OF MECHANICAL ENGINEERING

### NAVAL ENGINEERING PROGRAM

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## MV323 – VESSEL ELECTRICAL SYSTEM

### I. GENERAL INFORMATION

CODE	: MV232 Vessel Electrical System
SEMESTER	: 7
CREDITS	: 03
HOURS PER WEEK	: 04
PREREQUISITES	: ML202
CONDITION	: Mandatory

### II. SUMMARY

The course covers the following topics:

- Electrical requirements of classification societies.
- Generation and electrical transformation of the vessel.
- Electric balance of loads of the vessel.
- Distribution and calculation of electrical wiring.
- Security systems, security, alarms, lights and navigation equipment.

### III. COMPETENCES

The student:

1. Knows and interprets the ABS Construction Regulations, regarding ship electrical installations.
2. Interprets the electrical generation and distribution diagram of the vessel.
3. Recognizes which are the components of the Electrical System.
4. Identifies the generator set of the vessel and defines its features according to the specialist manufacturer's catalog.
5. Calculates the balance of loads of the electrical system of the vessel.
6. Recognizes which are the different control and protection devices of the electrical system.
7. Calculates the conductors of the Electrical Wiring System of the vessel.
8. Identifies what are and which are the safety, alarms and navigation aids equipment of the vessel.

### IV. LERNING UNITS

- 1. INSTALLATION REGULATIONS (4 HOURS)**  
Requirements of Classification Societies: Regulation ABS: Electrical installations.
- 2. ELECTRICAL DISTRIBUTION (4 HOURS)**  
Distribution diagrams 440 and 220 volts. Distribution boards.
- 3. GENERATION AND TRANSFORMATION (4 HOURS)**  
Generator sets: features, selection according to catalogs, technical specifications.
- 4. ELECTRICAL BALANCE (4 HOURS)**  
Balance of loads, generation capacity by maximum demand and by starting power.
- 5. ELECTRIC POWER (4 HOURS)**  
Protection of electrical circuits against overloads and short circuits.
- 6. FIRST MONOGRAPH (8 HOURS)**  
Instructions for the first monograph. Presentation and exhibition of the first monograph.
- 7. ELECTRICAL DEVICES (8 HOURS)**  
Reverse Power Relays, Differential circuit breakers. Motor Protectors, starters, thermomagnetic switches, IP protection of devices, direct start, star-delta starter, soft start.
- 8. CABLES OF NAVAL USE (4)**  
Types, features, factory tests, sizing.
- 9. BATTERIES OF NAVAL USE (4 HOURS)**  
Types, features, factory tests, sizing.
- 10. NAVIGATION EQUIPMENT (4 HOURS)**  
Navigation lights, navigation aids.
- 11. SECOND MONOGRAPH (8 HOURS)**  
Instructions for the second monograph. Presentation and exhibition of the second monograph.

## **V. METHODOLOGY**

It consists of the following:

- Presentation and explanation of the didactic material made by the teacher.
- Analysis of the information in an interactive form by the teacher and the students.
- Solving sample problems, carried out step by step by the teacher.
- Solution of the questions posed by students.

- Presentation and support by the students, of the monographic works based on what was learned in the course.

## **VI. EVALUATION FORMULA**

Evaluation system "D"

Monograph 1 and monograph 2

Calculation of the final average:  $FA = (\text{Monograph 1} + \text{Monograph 2})/2$

## **VII. BIBLIOGRAPHY**

Reglamento de la Sociedad Clasificadora: American Bureau of Shipping.

Industrial Power System Power Handbook – Donal Beeman

Marine Engineering - Harrington

Manual de Instalación de Grupos Electrónicos (CATERPILLAR)

Marine Engineering Selection Guide (CATERPILLAR)

Catálogo de componentes eléctricos (TELEMECANIQUE)

Catálogo de Componentes Eléctricos (ABB)

Catálogo de Motores Eléctricos (ABB)