

Academic Year: (2021 / 2022)

Review date: 14-06-2021

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: USAOLA GARCIA, JULIO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None

OBJECTIVES

CB6 Possess and understand knowledge that provides a base or opportunity to be original in the development and / or application of ideas

CB7 The students must know how to apply the acquired knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study

CB9 The students must know how to communicate their conclusions and the knowledge and ultimate reasons that sustain them to specialized and non-specialized audiences in a clear and unambiguous way

CG1 Ability to learn new methods and technologies, based on the mastery of scientific subjects and specialized techniques of Clinical Engineering, as well as to adapt to new situations.

LEARNING RESULTS THAT THE STUDENT ACQUIRES

In overcoming this subject, students should be able to:

- Describe electrical installations and analysis of electrical machines, with special emphasis on aspects related to the design and maintenance of facilities in a clinical setting.
- Describe the processes of energy conversion that occur in electric circuits and machines.
- Describe the bases of maintenance and repair of electrical equipment in the hospital environment.
- Obtain information from the technical documentation of the electrical installation, interpreting the symbols and rules of representation on which it is based.
- Calculate characteristic parameters of single-phase and three-phase alternating current lines, identifying typical values.
- Characterize the operation of electric motors and transformers, identifying their field of application in the sanitary environment.
- Measure parameters in electrical installations, identifying the risks inherent in their operation and the associated protection systems.
- Mount electrical installations, verifying their operation.

DESCRIPTION OF CONTENTS: PROGRAMME**I. INTRODUCTION TO THE SUBJECT OF ELECTROTECHNICAL SYSTEMS IN CLINICAL ENGINEERING**

- I.1.- Installations present in sanitary buildings.
- I.2.- Functional Units of a Hospital.
- I.3.- Elements of Hospital Electrical Installations.

0. BASIC ELECTROTECHNICAL CONCEPTS

- 0.1.- Fundamentals of electricity.
- 0.2.- Elements of electrical circuits.
- 0.3.- Association of elements.
- 0.4.- Analysis of resistive circuits.
- 0.5.- Sinusoidal stationary regime.
- 0.6.- Balanced triphasic systems.
- 0.7.- Electric cables in B.T. applied to Clinical Systems
- 0.8.- Reactive energy compensation in Clinical Systems

1. ELECTRICAL MACHINES IN THE CLINICAL FIELD

- 1.1.- Fundamental concepts of electromagnetism.
- 1.2.- Transformers. Power and Insulation.
- 1.3.- Asynchronous machines.
- 1.4.- Synchronous machines.
- 1.5.- Generator Sets in Clinical Facilities

2. ELECTRICAL INSTALLATIONS IN THE CLINICAL FIELD

- 2.1.- Applicable regulations.
- 2.2.- Electrical switchgear in B.T. Application to Hospitals.
- 2.3.- Magnetothermic switches. Coordination of protections.
- 2.4.- Differential switches.
- 2.5.- Neutral grounding systems in the clinical setting.
- 2.6.- Electromedical equipment. Classification.
- 2.7.- Electrical requirements of premises for medical use.
- 2.8.- Intervention rooms.
- 2.9.- Networks of M.T. in hospitals.
- 2.10.- Uninterruptible Power Supply (UPS-UPS).

3. VERIFICATION AND OPERATION OF ELECTRICAL INSTALLATIONS IN THE CLINICAL FIELD

- 3.1.- Applicable regulations.
- 3.2.- Verification and operation of Intervention Rooms.
- 3.3.- Maintenance plans for intervention rooms.
- 3.4.- Control Procedures for Intervention Rooms.
- 3.5.- Operation and Maintenance of Uninterruptible Power Supplies.

LEARNING ACTIVITIES AND METHODOLOGY

TRAINING ACTIVITIES OF THE STUDY PLAN REFERRED TO MATTERS

- AF1 Theoretical class
- AF2 Practical classes
- AF3 Theoretical practical classes
- AF4 Laboratory practices
- AF5 Tutorials
- AF6 Group work
- AF7 Individual student work
- AF9 Face-to-face evaluation tests

AF1	15	15		100%	
AF3	7	7		100%	
AF5	3	0		0%	
AF7	65	0		0	
AF9	2	2		100%	
TOTAL MATERIA	90	24			26.66%

ASSESSMENT SYSTEM

Approved by course: 50% short evaluation exams per module + 50% of work directed during the course.

Approved in ordinary and extraordinary call: 100% exam (test + development cases)

% end-of-term-examination:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

BASIC BIBLIOGRAPHY

- AA.VV. Bloque Quirúrgico. Estándar y Recomendaciones, Ministerio de Sanidad.
- AA.VV. Estándares y Recomendaciones para el desarrollo de Unidades Funcionales., VV.EE..
- AA.VV. Directriz sobre Seguridad Eléctrica en Áreas de Uso Médico., SACYL: RD 842/2002. Reglamento Electrotécnico de Baja Tensión..
- Fraile Mora, Jesús Máquinas Eléctricas, Colección Escuelas. Servicio de Publicaciones. CICCIP, 1995

- José Carlos Toledano Gasca y José Luis Sanz Serrano Instalaciones Eléctricas de Enlace y Centros de Transformación, Paraninfo , 2003
- Ras, Enrique Transformadores de potencia, de medida y de protección, Marcombo, 1994
- Usaola García, Julio y Moreno López del Saa, M^a Ángeles Circuitos eléctricos. Problemas y ejercicios resueltos, Pearson Educación , 2002