Machine Theory

Academic Year: (2021 / 2022) **Review date: 04-06-2021**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: CASTEJON SISAMON, CRISTINA

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mechanics of Machines

OBJECTIVES

By the end of this subject, students will be able to have:
1.- a systematic understanding of the key aspects and concepts of mechanism and machine science (MMS).
2.- coherent knowledge of MMS including some at the forefront of the branch in mechanical engineering.
3.- the ability to apply their knowledge and understanding to identify, formulate and solve machine theory problems using established methods.
4.- the ability to choose and apply relevant analytical and modeling methods in MMS.
5.- the ability to apply their knowledge to develop and carry out mechanical designs that fulfil specific requirements.
6.- an understanding of the different methods of analysis of machines and/or their components and the ability to use them.
7.- the ability to combine theory and practice to solve problems of machine science.
8.- the understanding of methods and techniques applicable in the machines and their limitations.
9.- Function effectively both individually and as a team .

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Fundamental mechanisms and passive resistances. Bearings.
2.- Cams.
3.- Spur gears.
3.1.- Gears fundamental and nomenclature.
3.2.- Spur gears cutting.
3.3.- Spur gears assembling.
4.- Gear trains.
4.1.- Ordinary gear trains and simple planetary gear trains.
4.2.- Complex planetary gear trains.
5.- Machine regulation: Flywheels. Balancing.
6.- Shocks and percussions in kinematic pairs.
7.- Analytical mechanics applied to mechanisms.
7.1.- Analytical methods applied to mechanisms.
7.1.- Analytical mechanics applied to mechanisms.
8.- Helical cylindrical gears, bevel and hypoid gears.
8.1.- Helical cylindrical gears. Bevel gears.
8.2.- Hypoid gears and force analysis for gears.
9.- Spatial mechanisms.

LEARNING ACTIVITIES AND METHODOLOGY

Room, lab & computer sessions. Assignment.

ASSESSMENT SYSTEM

SE1 FINAL EXAM. In which the knowledge, skills and abilities acquired throughout the course will be valued globally.
SE2 CONTINUOUS EVALUATION. It will assess the exercises, practices and tests throughout the course.

The subject will be evaluated using the following criteria:

First total evaluation ("ordinary call"):

- SE2: 40% (10% labs + 30% exercises and tests)
- SE1: 60%

Second total evaluation ("extraordinary call"):

Option A:
- SE2: 40% (10% labs + 30% exercises and tests)
- SE1: 60%

Option B:
SE1 100%

note: Only If Practices marks obtains 5/10 or more then the final calification is generated.

To calculate the continuous evaluation it is necessary to obtain a minimum mark of 4 over 10 in the exam (both in the ordinary and extraordinary).

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- A. Simon; A. Bataller; J. Cabrera et al. FUNDAMENTALS OF MACHINE THEORY AND MECHANISM, Springer, 2016, ISBN 978-3-319-31968-1
- J.C. García-Prada, C. Castejón, H. Rubio. Problemas Resueltos de Teoría de Máquinas y Mecanismos., Thomson. 2007., 2007.
- MABIE-REINHOLTZ MECANISMOS Y DINAMICA DE MAQUINARIA, LIMUSA, 1999. 978-968-18-4567-4

ADDITIONAL BIBLIOGRAPHY

- Erdman, A.G. & Sandor, G.N. Diseño de Mecanismos. Análisis y Síntesis., Prentice Hall, 1998..
- Litvin, F.L. & Fuentes, A. Gear Geometry and Applied Theory., Cambridge Universitary Press, 2004..