

Academic Year: (2022 / 2023)

Review date: 16-05-2022

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: CALVO RAMOS, JOSE ANTONIO

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Functions Derivation
Basic derivation theorems.
Multivariable functions
Introduction to differential equations.
Particle and Rigid Bodies Kinematics.
Particle and Rigid Bodies Dynamics.

OBJECTIVES

By the end of this subject, students will be able to have:

1. knowledge and understanding of linear differential equations which are applicable in mechanical vibration problems
2. knowledge and understanding of key aspects of mechanical vibrations fundamentals;
3. the ability to apply their knowledge and understanding to identify, formulate and solve problems of mechanical vibrations using established methods;
4. the ability to combine theory and practice to solve problems of mechanical vibrations;
5. an understanding of applicable techniques and methods in mechanical vibrations, and of their limitations;

DESCRIPTION OF CONTENTS: PROGRAMME

- 1.- Introduction to differential calculus
- 2.- Approach and resolution of systems of linear differential equations.
- 3.- Numerical methods of solving differential equations
- 4.- Single DOF systems:
 - 4.1.- Undamped. Free vibrations
 - 4.2.- Damped free vibrations.
 - 4.3.- Forced vibrations.
 - 4.4.- Transitory and permanent response.
 - 4.5.- Resonance Concept.
- 5.- Two DOF systems:
 - 5.2.- Undamped free vibrations.
 - 5.3.- Damped free vibrations.
 - 5.4.- Forced vibrations.
- 6.- Generalization to n DOF systems.

LEARNING ACTIVITIES AND METHODOLOGY

Master class
Classroom exercises
Laboratories exercises
Personal work.
Team Work

ASSESSMENT SYSTEM

Laboratory practices 10%

Weekly exercises 20%

Partial exam 30%

Final Exam 40%

It will be necessary to get a 4 out of 10 in the final exam to make an average with the continuous evaluation.

It will not be able to pass the subject in ordinary call if you do not attend the practices.

If the practices are suspended there will be a part of the final exam related to them

% end-of-term-examination: 40

% of continuous assessment (assignments, laboratory, practicals...): 60

BASIC BIBLIOGRAPHY

- R. Kent Nagle; E.B Saff Arthur and David Snider Fundamentals of differential equations, Pearson, 2012
- Alonso de Mena, Ana Isabel; Álvarez López, Jorge. ; Calzada Delgado, Juan Antonio. Ecuaciones diferenciales ordinarias, Delta Publicaciones , 2010
- Felipe Lafita Babio, Hilario Mata Cortés Vibraciones mecánicas en ingeniería, INTA, 1964
- José Carlos Bellido Guerrero Alberto Donoso Bello y Sebastián Lajara López Ecuaciones diferenciales ordinarias, Paraninfo , 2014
- S.S Rao and Fook Yap Fah Mechanical vibrations, Singapore : Pearson Education South Asia, 2011
- William T. Thomson Teoría de Vibraciones, Prentice / Hall, 1981