Mechanical Vibrations

Academic Year: (2020 / 2021) **Review date: 09-12-2020**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: RUBIO HERRERO, PATRICIA

Type: Electives ECTS Credits : 3.0

Year : 4 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mathematics and mechanics

OBJECTIVES

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

1. The knowledge and understanding of the mechanical vibrations.
2. The ability to apply their knowledge and understanding to identify, formulate and solve problems of vibrations using established methods.
3. The ability to design and perform experiments on vibrations, analyse the data and draw conclusions.
4. The technical and laboratory skills in mechanical vibrations.
5. The ability to combine theory and practice to solve problems of mechanical vibrations.
6. The understanding of methods and techniques applicable in mechanical vibrations.
7. The competence to function effectively both individually and as a team.

DESCRIPTION OF CONTENTS: PROGRAMME

1. 1DOF systems
   - 1.1 Introduction to SDOF systems
   - 1.2 Free vibrations undumped in SDOF systems
   - 1.3 Free vibrations dumped in SDOF systems
   - 1.4 Forced vibrations in SDOF systems
2. N DOF systems
   - 2.1 Introduction to 2DOF systems
   - 2.2 Introduction to NDOF systems
   - 2.3 Free vibrations in NDOF systems
   - 2.4 Forced vibrations in NDOF systems
   - 2.5 Modal Analysis
3. Vibration Isolation
   - 3.1 Vibration control
   - 3.2 Isolation
   - 3.3 Absorbers
4. Vibration Mesurement Techniques
   - 4.1 Measurement devices,. Exciters.
   - 4.2 Response measurement
   - 4.3 Signal analysis
   - 4.4 Dynamic testing
   - 4.5 Experimental modal analysis
   - 4.6 Machine condition monitoring and diagnosis

LEARNING ACTIVITIES AND METHODOLOGY

Magistral lectures, exercises in classroom and laboratory.

ASSESSMENT SYSTEM

Ordinary call:

Final exam : 60%
Exercises, work in class, lab work: 40%

The asistance to the lab classes in mandatory

For passing the course, at least 2.5 over 6 will be needed (ordinary call).

Extraordinary call:

The general UC3M exams normative is followed

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

BASIC BIBLIOGRAPHY

- RAO, S.S. Mechanical vibrations, Addison-Wesley, 1990
- SHABANA, A.A.. "Theory of Vibration". , Springer , 1991