

Academic Year: (2019 / 2020)

Review date: 17-09-2019

Department assigned to the subject: Department of Mechanical Engineering

Coordinating teacher: MENESES ALONSO, JESUS

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Physics I
 Calculus I
 Calculus II
 Linear algebra

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

1. Understanding of mathematical and physical principles related to the mechanics (kinematics and dynamics) of rigid bodies.
2. Troubleshooting kinematics and dynamics of rigid bodies in inertial and non-inertial reference systems.
3. Analyze the basic kinematic and dynamic of planar mechanisms.
4. Applying the principles of dynamics for the solution of practical problems in engineering

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Mechanics. Static. Kinematics of the point. Systems of Units
 - 1.1. Mechanics
 - 1.2. Basics
 - 1.3. The particle and rigid body
 - 1.4. Static
 - 1.5. Point Kinematics
 - 1.6. Speed Concept
 - 1.7. Acceleration Concept
 - 1.8. System Units
2. Kinematics of rigid bodies
 - 2.1. Orthonormal basis of a scalar dependent
 - 2.2. Movement of the Rigid Solid
 - 2.3. Instantaneous axis of rotation
 - 2.4. Intrinsic component of acceleration
 - 2.5. Acceleration of Rigid Solid
 - 2.6. Movement Absolute, Relative and Drag
 - 2.7. Speed relative motion
 - 2.8. Acceleration in relative motion
 - 2.9. Euler Angles
3. Dynamics of rigid
 - 3.1. Newton's Laws
 - 3.2. No Inertial Reference Systems
 - 3.3. Inertia Forces
 - 3.4. Momentum
 - 3.5. Angular momentum
 - 3.6. Theorem of angular momentum
 - 3.7. Motion of a rigid body with a fixed point
 - 3.8. Gyroscopic motion
 - 3.9. Motion of a rigid body with a fixed axis
 - 3.10. Equation of Motion
 - 3.11. Calculation of reactions
 - 3.12. Balancing of shafts

4. Energy and Power
 - 4.1. Work and power
 - 4.2. Kinetic energy. Theorem of the prime movers
 - 4.3. Potential energy
 - 4.4. Energy Conservation
 - 4.5. Friction Forces
 - 4.6. Mechanical Performance
5. Mechanisms Plans
 - 5.1. Introduction
 - 5.2. Component parts of a mechanism
 - 5.3. Mobility mechanisms
 - 5.4. Four-bar linkage
 - 5.5. Determining the relative CIR
6. Kinematics of Mechanisms Plans
 - 6.1. Determination of rates members of a mechanism
 - 6.2. Determination of members of an acceleration mechanism
 - 6.3. Value of accelerations and velocities of points of kinematic pairs
 - 6.4. Cinema speed
 - 6.5. Cinema accelerations.
7. Dynamics of Mechanisms Plans
 - 7.1. Introduction
 - 7.2. Kinetic analysis of mechanisms-static flat
 - 7.3. Static Analysis
 - 7.4. Analysis Efforts Inertia
 - 7.5. Full Dynamic Analysis

LEARNING ACTIVITIES AND METHODOLOGY

Master class, classroom exercises and / or laboratories and work.

ASSESSMENT SYSTEM

The subject will be evaluated according to the following criteria:

- ¿ Continuous evaluation of the first part of the subject (EC1): Up to 1,5 points
- ¿ Continuous evaluation of the second part of the subject (EC2): Up to 1,5 points
- ¿ Laboratories (P): Up to 1 point

Ordinary final call

Ordinary Final Exam, with two parts: Up to 6 points

¿ Final exam of the first part of the subject (EF1): Up to 3 points

¿ Final exam of the second part of the subject (EF2): Up to 3 points

Total: Up to 10 points

To pass it is necessary to obtain a minimum of 3,5 points out of 10 in the total final exam

% end-of-term-examination: 60

% of continuous assessment (assignments, laboratory, practicals...): 40

BASIC BIBLIOGRAPHY

- Erdman, A., Mechanism design . Vol I : Analysis and synthesis, Prentice Hall, New Jersey, 2001
- Hibbeler, R.C., Engineering Mechanics. Dynamics, Prentice Hall, Singapore, 2010
- J.C. García-Prada, C. Castejón, H. Rubio, J. Meneses Problemas resueltos de Teoría de Máquinas y Mecanismos 2ed, Thomson-Paraninfo, , 2014
- M. Artés Mecánica, Universidad Nacional de Educación a Distancia, 2003
- Norton, R.L, Design of machinery, McGraw-Hill, New York, 2012
- Uicker, J., Theory of machines and mechanisms, Oxford University Press, New York, 2010

ADDITIONAL BIBLIOGRAPHY

- A. Lamadrid, A. Corral Cinemática y dinámica de máquinas, E.T.S.I.I. Madrid, 1969.