Course Code	Course Title	C	H	I	E	T
17U5MMC10	Mechanics	6	6	25	75	100

Learning Objectives

To acquire the knowledge of fundamental concepts of Statics and Dynamics and its applications.

Learning Outcomes

On satisfying the requirement of this course, students will
- Understand projectile motion in the earth's gravity & the basic equations describing it.
- Apply Newton's Laws of Motion and principle of conservation of momentum.
- Understand simple harmonic motion & the simple harmonic oscillator. Understand displacement, frequency, & period for simple harmonic motion. Apply these concepts, along with Newton's 2nd Law to simple mass-spring problems.
- Understand frictional forces. Apply Newton's 2nd Law to problems with objects moving in the presence of friction. Understand the basics of motion on an inclined plane.
- Apply theorems of mechanics and interpret their results.
- Analyse mechanics as a systematic tool for problem solving.

Unit I Projectiles

Path of the projectile – Motion of the projectile – Velocity of the projectile – Range on the inclined plane.

Unit II Collision of elastic bodies

Newton's experimental law – Principle of conservation of momentum – Direct impact of two smooth spheres – Loss of kinetic energy due to direct impact – Oblique impact – Loss of kinetic energy due to oblique impact.

Unit III Simple Harmonic Motions

Composition of the Simple Harmonic Motion of the same period and in the same straight line and in two perpendicular direction – Motion of the particle suspended by a spiral spring – Simple pendulum – Motion under the action of central forces – Velocities and acceleration in polar coordinates – Differential equation of central orbits – Pedal equation – Velocities in a central orbit.

Unit IV Forces acting at a point

Parallelogram of forces – Triangle of forces –Lami's theorem – Resultant of any number of coplanar forces acting at a point – Parallel forces and momentum –Varignon's theorem on moments.

Unit V Friction

Laws of friction – Equilibrium of a body on a range inclined plane under a force parallel to the plane – Equilibrium of a body on a rough inclined plane under any force – Problems.

Text books:

1. M.K. Venkatraman, Dynamics, 13thEdition 2009,Agasthiar Publications.
   Chapters: 6(6.1 – 6.16), 8(8.1 – 8.9), 10(10.1 – 10.13), 11(11.1 – 11.11).
2. M.K. Venkatraman, Statics, 13th Edition 2010, Agasthiar Publications.
   Chapters: 2(1 – 15), 3(1 – 12), 7(1 – 13).

Reference Books:

1. P. Duraipandian, LaxmiDuraipandian, Mechanics, 2005 Edition, S. Chand.
2. N. P. Bali, Dynamics, Golden series,2011, Firewall Media Publisher.