| Course Title: | Course Code: | Credit Hrs: |
|---|---|---|
| Mechanics of Machines | ME-310 | 3+0 |

**Textbook:**

- David H. Myszka,Machines and Mechanisms.

**Reference Books:**

- Thomas Bevan,The Theory of Machines.
- John J.Uicker, Gordon R. Pennock, Joseph E. Shigley,Theory of Machines and Mechanisms.
- Robert Ferrier McKay, The Theory of Machines
- J.A. Collins, Mechanical Design of Machine Elements and Machines, J. Wiley
- W. B. Green, Theory of Machine
- R. L. Norton, Design of Machinery

**Course Objective:** Mechanics of Machines focuses on analyzing the behavior and dynamics of mechanical systems, emphasizing the principles governing their motion, forces, and energy transformations.

**Course outline:**

- Introduction to Mechanisms: Machine & Mechanisms, Mechanism Terminology, Kinematic Diagram, Kinematic Inversion, Four Bar Mechanism, Slider Crank Mechanism, Techniques of MechanismAnalysis
- Vector, Position and Displacement Analysis: Motion, Vectors, Analytical Vector
- Methods Applied to the Displacement Analysis of Planar Linkages, Graphical Analysis, Complex-Number Methods Applied to the Displacement Analysis of Linkages, Spatial (Three-Dimensional) Linkages, Computer-Implemented Numerical Methods of Position Analysis
- Velocity Analysis of Mechanisms. Average Speed in Mechanize Mechanism, Velocity of a Point in Mechanize Mechanism, Angular Velocity in Mechanize Mechanism, Motion of a Rigid Body about a Fixed Axis (Without Translation), Moving Coordinate Systems and Relative Velocity, Application of Analytical Vector and Matrix Methods to Linkages, Four-Bar Linkage, Complex-Number Methods Applied to Velocity Analysis.
- Acceleration Analysis of Mechanisms. Planar Motion, Spatial Motion, Relative Acceleration, Analysis of a Four-Bar Linkage by Analytical Vector Methods, Acceleration Analysis, Position Analysis, The Acceleration Polygon, Graphical Analysis of the Four-Bar Linkage, An Analytical Solution Based on theAcceleration Polygon,

Graphical Analysis of Sliding Contact Linkages, Trial Solution Method Applied to Linkage Acceleration Analysis, Spatial Linkages, Acceleration Analysis of an RSSR.

- Design & Development: Mechanism Design: Time Ratio, Timing Charts, Design of Slider Crank Mechanism, Design of Crank Shaper Mechanism, Mechanism to Move a Link Between Two Positions. Cams: Types of Cams & Followers, Follower Motion Schemes, Graphical Disk Cam Profile Design, Pressure Angle, Design Limitations. Governors: Types of Governors, Centrifugal Governors, Porter Governors, Parallel Governors, Spring Loaded Governors Gears: Toothed Gearing, Gear Trains

| **Description** | **Percentage Weightage (%)** |
|---|---|
| Assignments | 05-10% |
| Quizzes | 10-15% |
| Mid Semester Exams | 30-40% |
| End Semester **ASSESSMENTS** Exam | 40-50% |