

# **Kinematics of Machinery**

## **Chapter 1: Basics of Mechanisms**

- 1.1 Classification of Mechanisms
- 1.2 Basic Kinematic Concepts and Definitions
- 1.3 Degree of Freedom (Mobility)
- 1.4 Kutzbach Criterion
- 1.5 Grashoff's Law
- 1.6 Kinematic Inversions of Four-Bar Chain and Slider Crank Chains
- 1.7 Limit Positions
- 1.8 Mechanical Advantage
- 1.9 Transmission Angle
- 1.10 Description of Some Common Mechanisms
- 1.11 Quick Return Mechanisms, Straight Line Generators, Universal Joint

## **Chapter 2: Kinematics of Linkage Mechanisms**

- 2.1 Displacement, Velocity and Acceleration Analysis of Simple Mechanisms
- 2.2 Graphical Method – Velocity and Acceleration Polygons
- 2.3 Coincident Points – Coriolis Component of Acceleration
- 2.4 Velocity Analysis Using Instantaneous Centres
- 2.5 Kinematic Analysis of Simple Mechanisms
- 2.6 Introduction to Mechanism Synthesis

## **Chapter 3: Kinematics of Cam Mechanisms**

- 3.1 Classification of Cam and Followers
- 3.2 Terminology and Definitions
- 3.3 Displacement Diagrams
- 3.4 Derivatives of Follower Motion
- 3.5 Layout of Cam Profile
- 3.6 Specified Contour Cams
- 3.7 Circular Arc and Tangent Cams
- 3.8 Pressure Angle and Undercutting
- 3.9 Sizing of Cams

## **Chapter 4: Gears and Gear Trains**

- 4.1 Law of Toothed Gearing
- 4.2 Involute and Cycloidal Tooth Profiles
- 4.3 Spur Gearing Technologies and Definitions
- 4.4 Gear Tooth Actions
- 4.5 Interference and Undercutting
- 4.6 Gear Trains
- 4.7 Parallel Axis Gear Trains
- 4.8 Epicyclic Gear Trains

## **Chapter 5: Friction in Machine Elements**

- 5.1 Surface Contacts
- 5.2 Sliding and Rolling Friction
- 5.3 Friction Drives
- 5.4 Friction in Screw Threads
- 5.5 Bearings and Lubrication
- 5.6 Friction Clutches
- 5.7 Belt and Rope Drives
- 5.8 Friction in Brakes
- 5.9 Band and Block Brakes