

AMMT06 KINEMATICS OF MACHINERY

UNIT-1 BASICS OF MECHANISMS

- 1.1 Classification of mechanisms- Basic kinematic concepts and definitions
- 1.2 Degree of freedom, Mobility- Kutzbach criterion, Gruebler's criterion
- 1.3 Grashof's Law- Kinematic inversions of four-bar chain and slider crank chains
- 1.4 Limit positions- Mechanical advantage- Transmission Angle
- 1.5 Description of some common mechanisms
- 1.6 Quick return mechanisms, Straight line generators, Universal Joint – rocker mechanisms.

UNIT-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 Velocity analysis using instantaneous centres- kinematic analysis of simple mechanisms
- 2.4 Coincident points- Coriolis component of Acceleration
- 2.5 Introduction to linkage synthesis problem.

UNIT-3 KINEMATICS OF CAM MECHANISMS

- 3.1 Classification of cams and followers- Terminology and definitions
- 3.2 Displacement diagrams- Uniform velocity, parabolic, simple harmonic and cycloidal motions
- 3.3 Derivatives of follower motions- Layout of plate cam profiles
- 3.4 Specified contour cams- Circular arc and tangent cams
- 3.5 Pressure angle and undercutting- sizing of cams.

UNIT-4 GEARS AND GEAR TRAINS

- 4.1 Law of toothed gearing- Involute and cycloidal tooth profiles
- 4.2 Spur Gear terminology and definitions- Gear tooth action- contact ratio
- 4.3 Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only].
- 4.4 Gear trains- Speed ratio, train value- Parallel axis gear trains- Epicyclic Gear Trains.

UNIT-5 FRICTION IN MACHINE ELEMENTS

- 5.1 Surface contacts- Sliding and Rolling friction- Friction drives
- 5.2 Friction in screw threads- Bearings and lubrication-
- 5.3 Friction clutches- Belt and rope drives- Friction in brakes- Band and Block brakes.

References Books:

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
4. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961
5. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi, 1988.