Mechanics of Machines

Course Code: ME-315	Credit Hrs: 2-0

Text and Reference Books:

1. David H. Myszka,Machines and Mechanisms.

2. Thomas Bevan,The Theory of Machines.

3. John J.Uicker, Gordon R. Pennock, Joseph E. Shigley,Theory of Machines and Mechanisms.

4. Robert Ferrier McKay, The Theory of Machines

5. J. A. Collins, Mechanical Design of Machine Elements and Machines, J. Wiley

6. W. B. Green, Theory of Machine

7. R. L. Norton, Design of Machinery

Course outline:

• Introduction to Mechanisms: Machine & Mechanisms, Mechanism Terminology, Kinematic

Diagram, Kinematic Inversion, Four Bar Mechanism, Slider Crank Mechanism, Techniques of

Mechanism Analysis

• 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 (ThreeDimensional) 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, ComplexNumber 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 the Acceleration 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

Assessments:

Quizzes, Mid Term/One hour tests (OHTs), Term Project, Final Exam