

# PCME4204 **KINEMATICS & DYNAMICS OF MACHINES** (3-1-0)

## **Module - I (13Lectures)**

1. Mechanisms : Basic Kinematic concepts and definitions, Mechanism, Link, Kinematic Pair, Classification of kinematic pairs, Degrees of freedom, Kinematic chain, Binary Ternary and Quaternary joints and links, Degrees of freedom for plane mechanism, Gruebler's criterion, Inversion of mechanism, Four bar chains and their inversions, Single slider crank chain, Double slider crank chain and their inversion.
2. Kinematic Analysis : Determination of velocity using graphical and analytical techniques, Instantaneous centre method, Relative velocity method, Kennedy theorem, Velocity in four bar mechanism, Slider crank mechanism, Rubbing velocity at a Pin-joint. Acceleration Diagram for a slider - crank mechanism, Corioli's component of acceleration and its application.

## **Module - III (14 Lectures)**

3. Inertia forces in reciprocating Parts : Velocity and acceleration of piston by analytical method, Angular velocity and angular acceleration of connecting rod by analytical method and by graphical method, Piston effort, force acting along the connecting rod, Crank effort, Turning moment on crank - shaft.
4. Dynamically equivalent system, compound Pendulum, correction couple. Turning moment diagrams for different types of engines, Fluctuation of energy and fluctuation of speed.
5. Friction of a screw and nut, Square threaded screw, V-threaded screw, Pivot and collar friction, friction circle, Friction axis, Friction clutches, Transmission of power by single plate, mutiplate and cone clutches.

## **Module - III (13Lectures)**

6. Brakes & Dynamometers : Classification of brakes, Analysis of simple block, Band and internal expanding shoe brake, Braking of a vehicle. Absorption and transmission dynamometers, Prony brake, Rope brake, Band brake dynamometer, Belt transmission dynamometer, Torsion dynamometer.
7. Gear Trains : Simple Train, Compound train, Reverted train, Epicyclic train and their applications.
8. Belt, rope and chain drives, Initial tension, Effect of centrifugal tension on power transmission, Maximum power transmission capacity, Belt creep and slip.

### **Text Books**

1. Theory of Machines by Thomas Bevan, CBS Publications
2. Theory of Machines by S.S.Rattan, Tata MacGraw Hill

### **Reference**

1. Kinematics and Dynamics of Machinery by Charles E. Wilson and J.Peter Saddler, Pearson Ed.
2. Theory of Machines and Mechanisms (India Ed.) by John J. Uicker Jr., Gordon R. Pennock & Joseph E. Shigley, Oxford University Press
3. Theory of Machines and Mechanisms by P.L.Ballaney, Khanna Publishers.
4. Mechanism and Machine Theory by J.S.Rao and R.V.Dukipatti, New Age International.
5. Theory of Mechanisms & Machines by C.S.Sharma & K.Purohit, Prentice Hall of India.
6. Theory of Machines by R.S.Khurmi and J.K.Gupta, S.Chand Publication.
7. Theory of Machines by Shah Jadwani, Dhanpat Rai.
8. A Textbook of Theory of Machines by R. K. Bansal, Laxmi Publication.
9. Theory of Machines by Abdulla Shariff, Dhanpat Rai Publishers.
- 10.Theory of Machines by Sadhu Singh, Pearson Education.