

# Kinematics of Machines - Video course

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## Note on the model curriculum prepared by AICTE

Five of the seven topics listed under the heading Kinematics of Machine belongs to dynamics. These are:

- i. Breaks and dynamometers
- ii. Inertia force analysis
- iii. Governors
- iv. Gyroscope
- v. Balancing

On the other hand, the model curriculum of Dynamics of Machines includes the following topic:

- a. Kinematics of Gears and Gear trains

It is decided that the topics on dynamics listed above (i to v) will be covered in the course on Dynamics of Machines whereas the topic (a) above will be covered in Kinematics of Machines course.

## Detailed Course Content with modules for video lectures

### Module 1 (3 hr)

Kinematics and Dynamics, Mechanisms and Machines, Plane and Space Mechanisms, Kinematic Pairs, Kinematic Chains, Kinematic Diagrams, Kinematic Inversion

Four Link Planar Mechanisms and their Inversions

### Module 2 (3 hr)

Mobility and range of movement - Kutzbach and Grubler's criterion, Number Synthesis, Grashof's criterion

### Module 3 (2 hr)

Displacement analysis of plane mechanisms- graphical and analytical methods

### Module 4 (3 hr)

Plane motion of a rigid body, Instantaneous Centre (IC) of Velocity, Velocity analysis using IC

### Module 5 (3 hr)

Velocity and Acceleration Diagrams, Velocity and Acceleration Images, Coriolis component of acceleration.

### Module 6 (2 hr)

Dimensional synthesis of mechanism; motion, path and function generation, precision point approach, Chebyshev spacing

### Module 7 (3 hr)

Three position synthesis, graphical approach for four link mechanisms.

### Module 8 (2 hr)

Advanced synthesis solutions, branch and order defects

### Module 9 (3 hr)

Analytical methods, straight line mechanisms

### Module 10 (2 hr)

Special Mechanisms - Indicator Diagram Mechanisms, Steering Mechanism, Hookes Joint

### Module 11 (3 hr)

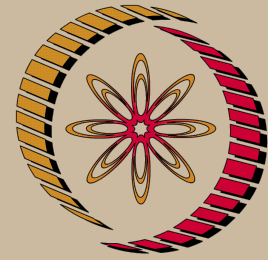
Cams - classification of cams and followers, nomenclature, description and analysis of follower motion, pressure angle.

### Module 12 (4 hr)

Determine of basic dimensions and synthesis of cam profiles, graphical and analytical methods, cams with specified contours.

### Module 13 (3 hr)

Gears - terminology, fundamental law of gearing, involute profile.



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# Mechanical Engineering

## Coordinators:

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**Module 14** (3 hr)

Interference and undercutting, minimum number of teeth, contact ratio, bevel helical, spiral and worm gears

**Module 15** (3 hr)

Gear Trains – simple, compound and epicyclic gear trains; sliding gear boxes and synchronous gear boxes.

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