Kinematics of Machines - Video course

s

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, Corioli's 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.

NP-TEL

NPTEL

http://nptel.ac.in

Mechanical Engineering

Coordinators:

Prof. Ashok K Mallik
Department of Mechanical EngineeringIIT Kanpur

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.