Dynamics of Machinery

Course Code:	28512
Credits:	3
Course Type:	Theoretical
Prerequisites:	Dynamics
Corequisite:	-
Course Length:	51 hours

Outline:

1- Kinematics of mechanisms

Definition of mechanisms and machines; lower-pair and higher-pair connectors; planar linkages; spatial linkages; four-bar linkage; slider-crank mechanism; six-bar chains; kinematic chains; floating members; kinematic inversion; degrees of freedom; transmission, deviation, and pressure angles; cams and followers; cams profiles; gear trains; planetary gear trains; instantaneous centers; center of curvatures; the Euler-Savary equation; the inflection circle; equivalent linkages.

2- Camd and followers

Kinematics and design of cams

3- Flywheels

Introduction, Coefficients of speed and torque fluctuations

4- Gear and Gera trains,

Introduction to involute gears, kinematics, contact ratio, interference and backlash, analysis of gear trains: ordinary, compound, planetary, differential

5- Balancing

Balancing of reciprocal mechanisms, static vs. dynamic balancing, balancing of internal combustion engines

6- Dynamics of mechanisms

Impressed forces including gravity; reaction forces including friction; static force analysis; kinetic energy; inertia forces and inertia torques; gyroscopic effects; dynamic force analysis.



References:

[1] P.E. Nikravesh, "Computer-Aided Analysis of Mechanical Systems", Prentice Hall, Inc., 1988.

[2] R.L. Norton, "Design of Machinery", McGraw-Hill, Inc., 1992.

[3] J.E. Shigley and J.J. Uicker, "Theory of Machines and Mechanisms", McGraw-Hill, Inc., 1995.

[4] D.H. Myszka, "Machines and Mechanisms", Pearson Education, Inc., 2005.