Dynamics of Machines - Video course

Module 1 (3 hrs)
Dynamics of Rigid Bodies in Plane Motion; Dynamic Force Analysis of Machines.
Module 2 (2 hrs)
Spheric Motion of Symmetrical Bodies and Gyroscopic Effects in Machines.
Module 3 (4 hrs)
Dynamics of Rotating Bodies; Unbalance Effects and Balancing of Inertia Forces; Field Balancing and Balancing Machines.
Module 4 (2 hrs)
Dynamics of Reciprocating Machines with Single Slider; Unbalance in Single Cylinder Engine Mechanisms.
Module 5 (3 hrs)
Unbalance in Multicylinder Engines -In-line, V-twin and Radial Engines; Balancing Techniques.

Module 6 (2 hrs)
Turning Moment Diagram for Engines and Speed Fluctuation; Power Smoothening
by Flywheels.

Module 7 (3 hrs)
Speed Control By Governors; Dynamics of Governor Mechanisms.

Module 8 (3 hrs)
Vibration of Mechanical Systems; Types of Vibration; Lumped Parameter Models; Linearization of System Elements; Degrees of Freedom; Types of Restoration and Dissipation Mechanisms; Types of Excitation.

Module 9 (3 hrs)
Free Undamped Vibration of Single Degree of Freedom Systems; Determination of Natural Frequency)"; Equivalent Inertia and Stiffness; Energy Method; Phase Plane Representation.

Module 10 (3 hrs)
Free Vibration with "iscous Damping; Critical Damping and Apcriodic Motion; Logarithmic Decrement; Systems with Coulomb Damping.

Module 11 (5 hrs)
Forced Vibration with Harmonic Excitation; Undamped Systems and resonance; Viscously Damped Systems; Frequency Response Characteristics and Phase Lag; Systems with Base Excitation; Transmissibility and Vibration Isolation; Whirling of Shafts and Critical Speed.

Module 12 (5 hrs)
Vibration of Two and Multidegree of Freedom Systems; Concept of Normal Mode; Free Vibration Problems and Determination of Natural Frequencies; Forced, Vibration Analysis; Vibration Absorbers; Approximate Methods -Dunkerley's Method and Holzer Method.

Module 13 (5 hrs)
Free Vibration of Elastic Bodies; Longitudinal Vibration of Bars;

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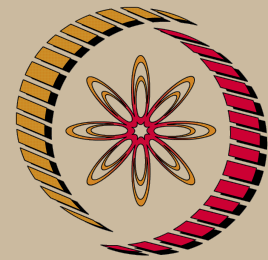
Mechanical Engineering

Coordinators:

Prof. Amitabha Ghosh
Department of Mechanical EngineeringIIT Kanpur

Transverse Vibration of Beams; Torsional Vibration of Shaft;
Approximate Methods - Rayleigh's Method and Rayleigh-Ritz Method.

Module 14 (2 hrs)
Instruments for Dynamic Measurements