5th Semester	RAE5D006	Vibrations and Elements of Aeroelasticity	L-T-P 3-0-0	3 CREDITS

COURSE OUTCOMES

1. Understand the basics of vibrations and simple harmonic motion.
2. Differentiate types of vibrations according to dampness and particle motion.
3. Clearly understand the need of a multi degree of freedom particle and its characteristics.
4. Solve Rayleigh and Holzer method to find natural frequency of an object.
5. Understand the formation of Aileron reversal, flutter and wing divergence

Module-1 Single Degree of Freedom Systems

Introduction to simple harmonic motion, D"Alembert"s principle, free vibrations – damped vibrations – forced vibrations, with and without damping – support excitation – transmissibility - vibration measuring instruments.

Module-2 Multi Degrees of Freedom Systems

Two degrees of freedom systems - static and dynamic couplings - vibration absorber- principal co- ordinates - principal modes and orthogonal conditions - eigen value problems - Hamilton"s principle - Lagrangean equations and application.

Module-3 Continuous Systems

Vibration of elastic bodies - vibration of strings – longitudinal, lateral and torsional vibrations

Module-4 Approximate Methods

Approximate methods – Rayleigh's method - Dunkerlay"s method – Rayleigh-Ritz method, matrix method.

Module-5 Elements of Aeroelasticity

Vibration due to coupling of bending and torsion - aeroelastic problems - collars triangle – wing divergence - aileron control reversal – flutter – buffeting. – elements of servo elasticity

Books:

1. Leonard Meirovitch, "Elements of Vibration Analysis". McGraw Hill International Edition,2007
2. Grover. G.K., "Mechanical Vibrations", 7th Edition, Nem Chand Brothers, Roorkee, India, 2003
3. Thomson W T, "Theory of Vibration with Application" - CBS Publishers, 1990.