AE6602 VIBRATIONS AND ELEMENTS OF AEROELASTICITY

DETAILED SYLLABUS

UNIT I 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.

UNIT II 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.

UNIT III CONTINUOUS SYSTEMS

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

UNIT IV APPROXIMATE METHODS

Approximate methods - rayleigh's method - dunkerlay's method – rayleigh-ritz method, matrix iteration method.

UNIT V 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

TEXT 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.

REFERENCES

1. William Weaver, Stephen P. Timoshenko, Donovan H. Yound, Donovan H. Young. 'Vibration Problems in Engineering' – John Wiley and Sons, New York, 2001

2. Bisplinghoff R.L., Ashely H and Hogman R.L., "Aeroelasticity", Addision Wesley Publication, New Tork, 1983.

3. William W Seto, "Mechanical Vibrations" – McGraw Hill, Schaum Series.

4. TSE. F.S., Morse, I.F., Hinkle, R.T., "Mechanical Vibrations" – Prentice Hall, New York, 1984.

5. Den Hartog, "Mechanical Vibrations" Crastre Press, 2008.

OBJECTIVES

- To study the effect of time dependent forces on mechanical systems and to get the natural characteristics of system with more degree of freedom systems.
- To study the aeroelastic effects of aircraft wing.