AMAEE22 VIBRATIONS AND ELEMENTS OF AEROELASTICITY

UNIT-1 BASIC NOTIONS

1.1 Simple harmonic motion- Terminologies- Newton's Law
1.2 D' Alembert's principle- Energy Methods

UNIT-2 SINGLE DEGREE OF FREEDOM SYSTEMS

2.1 Free vibrations- Damped vibrations
2.2 Forced Vibrations, with and without damping
2.3 Support excitation- Vibration measuring instruments.

UNIT-3 MULTI DEGREES OF FREEDOM SYSTEMS

3.1 Two degrees of freedom systems
3.2 Static and Dynamic couplings vibration absorber Principal co- ordinates,
3.3 Principal modes and orthogonal condition- Eigen value problems.
3.4 Hamilton's principle- Lagrangean equation and application
3.5 Vibration of elastic bodies Vibration of strings
3.6 Longitudinal, Lateral and Torsional vibrations.

UNIT-4 APPROXIMATE METHODS

4.1 Rayleigh's and Holzer Methods to find natural frequencies.

UNIT-5 ELEMENTS OF AEROELASTICITY

5.1 Concepts- Coupling
5.2 Aero elastic instabilities and their prevention
5.3 Basic ideas on wing divergence, loss and reversal of aileron control
5.4 Flutter and its prevention.

Reference Books:

1. Bisplinghoff R.L., Ashley H and Hoffman R.L., "Aeroelasticity" – Addision Wesley Publication, New York, 1983.
2. Tse. F.S., Morse, I.F., Hinkle, R.T., "Mechanical Vibrations", – Prentice Hall, New York, 1984.
3. Scanlan R.H. & Rosenbaum R., "Introduction to the study of Aircraft Vibration & Flutter", John Wiley and Sons. New York, 1982.