STRUCTURAL DYNAMICS

Module I:

Oscillatory motion; harmonic motion, periodic motion, vibration terminology,Free vibration; equations of motion-natural frequency, energy method, principle of virtual work, viscously damped free vibration, Coulomb damping, Harmonically excited vibration; forced harmonic vibration, energy dissipated by damping, equivalent viscous damping, structural damping, vibration measuring instruments

Module II:

Transient vibration; impulse excitation, arbitrary excitation, Laplace transform formulation, response spectrum, Introduction to multi degree of freedom systems; normal mode vibration, forced harmonic vibration, vibration absorber, vibration damper.

Module III:

Properties of vibrating systems, flexibility matrix, stiffness matrix, stiffness to beam elements, eigen values and eigen vectors, modal matrix, modal damping in forced vibration, normal mode summation, normal mode vibration of continuous beams, vibrating string, longitudinal vibration of rods, torsional vibration of rods, Euler equation for beam, effect of rotary inertia and shear deformation.

Module IV:

Random vibrations, random phenomena, time averaging and expected value, frequency response function.

Books:

W.T.Thomson, "Theory of Vibration with Applications" (2) R.W. Clough & J.Penzien, " Dynamics of Structures", McGraw Hill