

SYLLABUS

- Unit I.** Simple harmonic motion energy of a SHO., Compound pendulum, Torsional pendulum, Electrical Oscillations, Transverse Vibrations of a mass on a string. Composition of two perpendicular S.H.M. of same period and of period in ratio 1:2. Decay of free Vibrations due to damping. Differential equation of motion, types of damping. Determination of damping co-efficient, Logarithmic decrement, relaxation time and Q-Factor. Electromagnetic damping (Electrical oscillator).
- Unit II.** Differential equation for forced, mechanical and electrical oscillators, Transient and steady state behaviour, Displacement and velocity variation with driving force frequency, variation of phase with frequency resonance, Power supplied to an oscillator and its variation with frequency. Q. value and band width, Q. value as an amplification factor.
- Unit III.** Stiffness coupled oscillators, Normal co-ordinates and normal modes of vibration, Inductance coupling of electrical oscillators. Types of waves, wave equation (transverse) and its solution characteristic of impedance of a string. Impedance matching, Reflection and Transmission of waves at boundary. Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length, Energy of vibrating string, Wave and group velocity.
- Unit IV.** Physical interpretation of Maxwell's equations, E.M. waves and wave equation in a medium having finite permeability and permittivity but with conductivity = 0. Poynting vector, Impedance of a dielectric to EM waves. EM waves in a conducting medium and Skin depth. EM wave velocity in a conductor and anomalous dispersion. Response of a conducting medium to EM waves. Reflection and transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence. Reflection of EM waves from the surface of a conductor at normal incidence.
- Unit V.** Spread over the entire syllabus of units 1 to IV as above