

**I Year I Semester**  
**Code: 17CC132**

**L P C**  
**4 0 3**

**MECHANICAL VIBRATIONS**  
**(Elective-I)**

**UNIT I:**

Single degree of Freedom systems: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, Vibration isolation and transmissibility, Vibrometers, velocity meters & accelerometers.

**UNIT II:**

Response to Non Periodic Excitations: unit Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

**UNIT III:**

Multi degree freedom systems: Principal modes – undraped and damped free and forced vibrations, undraped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – rotor systems and geared systems; Discrete-Time systems.

**UNIT IV:**

Numerical Methods: Rayliegh’s, Stodola’s, Matrix iteration, Rayleigh-Ritz Method and Holzer’s methods

**UNIT V:**

Application of concepts: Free vibration of strings – longitudinal oscillations of bars-transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

**TEXT BOOKS:**

1. Elements of Vibration Analysis by Meirovitch.
2. Mechanical Vibrations by G.K. Groover.

**REFERENCE BOOKS:**

1. Vibrations by W.T. Thomson
2. Mechanical Vibrations – Schaum series.
3. Vibration problems in Engineering by S.P. Timoshenko.
4. Mechanical Viabrations – V.Ram Murthy