Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Vibration Engineering	MED 504	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
II	3	3-0-0	3 Hours

Unit – I

Background: Basic review of vibration engineering; Terminology and degree of freedom systems; 1 D and 2D Systems; Example of 2DOF systems; Free and Forced vibration; Undamped and damp-free vibration of 2DOF systems; Co-ordinate coupling. Principle co-ordinates Application such as double pendulum etc.; Dynamic vibration absorbers- turned & unturned types. Vibration dampers; Vibration isolation; Transmissibility; Vibration isolators. **(07 Hours)**

Unit – II

Multi Degree of Freedom Systems: Methods of determination of natural frequencies of many DOF Systems-Rayleigh's Method; Holzer Method; Iteration Method. **(06 Hours)**

Unit – III

Vibration Continuous Systems: Free & Forced Vibrations of prismatic bars; Torsional vibration of circular shafts; Free lateral vibrations of prismatic bar with different end conditions; Effect of axial force on lateral vibration of bars; Vibration of strings-wave equation vibration of beams with variable cross-section. **(08 Hours)**

Unit – IV

Non-Linear Vibrations: Introduction to above types of Vibration; Classification of different types of non linearties; Phase-plan method; For single DOF oscillators. Mathew's eqn. Doffing eqn. Jump phenomenon; Self excited and parametrically excited vibration. **(07 Hours)**

Unit – V

Random Vibrations: Introduction to above types of vibration; Random process; stationary; Ergoetic random process; Frequency response functions for single; DOF system under random excitation; Mean square value; Spectral Density; White noise and band-limited white noise. **(09 Hours)**

Unit – VI

Basics of Noise: Noise characteristics; sources of noise; Noise level measurement techniques; Noise testing and measurement; Mechanism of noise generation; Noise control methodologies; Noise control measures; Environmental noise management. **(08 Hours)**

Recommended Books:

1. Vibration problems in engineering; H. Timoshenko & D. H. Young East West Edition; 1967.
2. Theory of vibration & application; W. T. Thompson; PHI Pvt Ltd; New Delhi; 1979.
3. Mechanical Vibration Analysis; F Shrinivasan; Tata McGraw Hill; New Delhi; 1982.
4. Mechanical Vibrations: Theory & practice; Shrikant Bhave; Pearson 2010.
5. Noise; pollution & control: S. P. Singal; Narosa Publishing House; New Delhi; 2005.