7th Semester	RAU7D003	Noise, Vibration and Harshness	L-T-P 3-0-0	3 Credits

MODULE-1

INTRODUCTION TO NVH

Classifications of noise, Noise sources in vehicle,Sound level & subjective response to sound Frequency dependent human response to sound , Sound pressure dependent human response , Decibel scale, Relation among sound power, Sound intensity & sound pressure level, Octave band analysis.

MODULE II

SINGLE DEGREE OF FREEDOM SYSTEM

Importance & scope, Concepts & terms used, SHM, Vector and Complex method of representing vibration, Fourier series & harmonic analysis. (a) Damped free vibrations, Types of damping, Logarithmic decrement, Coulomb damping, and damping materials. (b) Forced Vibrations: Types of excitation, Forced excitation, Support excitation, Excitation due to unbalance in machines, Response due to above types of excitations, transmissibility, Force transmissibility & motion transmissibility, Vibration isolators, commercial isolation materials & shock mounts. (c) Forced vibrations of un-damped systems due to non-harmonic excitations

MODULE III

TWO DEGREE OF FREEDOM SYSTEM

Free un-damped vibrations – Principal modes and natural frequencies, Co-ordinate coupling and principal co-ordinates. (b) Forced vibrations (Undamped) – Harmonic excitation, Vibration, Dampers & absorbers, Dynamic vibration absorber – Tuned & Untuned type.

MODULE IV

VIBRATION MEASURING INSTRUMENTS

Instruments for measurement of displacement, velocity, acceleration & frequency of vibration, Sensors and Actuators, Introduction of X – Y plotter, Spectral analyzers, FFT analyzer.

MODULE V

RATING AND REGULATION OF SOUND AND NOISE

Noise - Effects, Rating &regulation Non auditory effects of noise on people, Auditory effects of noise, Noise standards & limits, Ambient emission noise standards in INDIA, Hazardous noise explosion, Day night noise level, Noise sources &control.

TEXT BOOK

1 Mechanical Vibration by G. K. Grover, Published by Nemchand & Brothers, Roorkee

REFERENCE BOOKS

1. Mechanical Vibration – Austin Church, Wiely Eastern.

2. Schaumm's Outline series in Mechanical Vibration by S. Graham Kelly

3. Mechanical Vibration by Dr. V. P. Singh, Published by S. Chand & Sons New Delhi.

4. Noise and vibration control by Leo L. Bernack, Tata Mc- Graw Hill Publication

5. Mechanical vibration & noise engineering by A.G.Ambekar prentice hall of INDIA

6. Kinematics, Dynamics and Design of Machinery by Waldron Willey India

7. Fundamentals of Vibrations By Balchandran Magrab CENGAGE LEARNING