



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3170211

SUBJECT NAME: Automotive Noise Vibration and Harshness

B.E 7th SEMESTER

Type of Course: - Professional Core

Pre-requisite:-

Rationale: The course aims to impart basic skills of force analysis, understanding of automobile systems, and design of automobile components.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	2	4	70	30	30	20	150

CONTENT:-

Sr. No.	Course Content	Total Hours
1	Fundamentals of Noise and Vibration Theory of Sound—Predictions and Measurement, Sound Sources, Sound Propagation in the Atmosphere, Sound Radiation from Structures and Their Response to Sound, General Introduction to Vibration, Vibration of Simple Discrete and Continuous Systems, Random Vibration, Response of Systems to Shock, Passive Damping	10
2	Effects of Noise, Blast, Vibration, and Shock on People General Introduction to Noise and Vibration Effects on People and Hearing Conservation, Sleep Disturbance due to Transportation Noise Exposure, Noise-Induced Annoyance, Effects of Infrasound, Low-Frequency Noise, and Ultrasound on People, Auditory Hazards of Impulse and Impact Noise, Effects of Intense Noise on People and Hearing Loss, Effects of Vibration on People, Effects of Mechanical Shock on People, Rating Measures, Descriptors, Criteria, and Procedures for Determining Human Response to Noise.	11
3	Noise and Vibration Transducers, Analysis Equipment, Signal Processing, and Measuring Techniques General Introduction to Noise and Vibration Transducers, Measuring Equipment, Measurements, Signal Acquisition, and Processing, Sound Level Meters, Noise Dosimeters, Equipment for Data Acquisition, Noise and Vibration Measurements, Determination of Sound Power Level and Emission Sound Pressure Level, Sound Intensity Measurements, Signal Processing in Time and Frequency Domain, Digitalisation of Signals, Signal-to-Noise Ratio, Sampling as a Mapping, Nyquist-Shannon Sampling Theorem, Antialiasing Filter, Sound and Vibration Measuring Chain, Signal Analysis Based on Fourier Transform, Time and Frequency Domain, Fourier Series for Periodic Functions, Fourier Transform of the Continuous-Time Functions, Noise and Vibration Data Analysis	12
4	Transportation Noise and Vibration—Sources, Prediction Introduction to Transportation Noise and Vibration Sources, Internal Combustion Engine Noise Prediction and Control—Diesel and Gasoline Engines, Exhaust and Intake Noise and Acoustical Design of Mufflers and Silencers, Tire/Road Noise, Aerodynamic Sound Sources in Vehicles, Transmission and Gearbox Noise and Vibration Prediction, Brake Noise, Introduction to Interior Transportation Noise and Vibration Sources, Automobile, Bus, and Truck Interior Noise and Vibration Prediction	12



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3170211

Reference Books:

1. Handbook of Noise and Vibration Control, Malcolm J Crocker, Wiley
2. Engineering Noise Control: Theory and Practice, David A.Bies and Colin H.Hansen, Spon Press.
3. Harris' Shock and Vibration Handbook, Allan G. Piersol, Thomas L. Paez, McGraw-Hill.
4. Vehicle Refinement: Controlling Noise and Vibration in Road Vehicles, Matthew Harrison, and Elsevier Butterworth-Heinemann on behalf of SAE international.
5. Vehicle Noise and Vibration Refinement, Xu Wang, CRC press.

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	10
Comprehension	10
Application	35
Analysis	35
Evaluate	05
Create	05

Course Outcome:

After learning the course the students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Summarize basics of noise and vibration.	10
CO-2	Interpret the effect of noise, blast, vibration and shock on human beings.	10
CO-3	Examine and analyse the sources of noise and vibration in vehicles.	40
CO-4	Measure and interpret noise and vibration generated from different sources.	40

List of Experiments:

Experiments should cover all topics discussed in subject content. Like

1. Study of noise and vibration measuring instruments.
2. Experiments related to noise and vibration signal acquisition and analysis.
3. Experiments for vibration and noise source predictions,
4. Experiments related to signal processing of noise and vibration data from different sources.

Major Equipment:

1. Computational facility.
2. Noise and vibration measurement instruments.

List of Open Source Software/learning website:

1. <http://nptel.ac.in>