

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – SUMMER 2021****Subject Code:2180214****Date:04/08/2021****Subject Name:Noise, Vibration & Harshness And Safety****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define Noise, vibration and Harshness. **03**  
 (b) Note down various vibratory systems into the vehicle, Also discuss the study **04**  
 (c) Write a detailed note on Human ear anatomy and mechanism of hearing. **07**

- Q.2** (a) Write a short note on psychological effects of noise on human. **03**  
 (b) Explain: 1] Degree of freedom 2] Periodic motion 3] Voice and Noise. **04**  
 (c) Justify: Automotive vehicle engine can be considered for six degree **07**  
 freedom along with the sources of vibration from the engine.

**OR**

- (c) Discuss the harmful effects of vibration and noises to the vehicular body. **07**  
 Also explain it's eliminating methods in detail.
- Q.3** (a) Classify Mechanical vibration. Also discuss the free and forced vibration. **03**  
 (b) Explain Piston Slap noise? Also write the counter measures of it. **04**  
 (c) Explain with neat sketch Anechoic chamber for the vehicle noise evaluation. **07**

**OR**

- Q.3** (a) How a sound wave propagates? Explain. **03**  
 (b) Discuss the Mechanical type vibration exciter with neat sketch. **04**  
 (c) Explain vibration transfer path from the vehicle suspension system to the **07**  
 other integrated systems of vehicle.
- Q.4** (a) List the various methods to minimize the Vibration from the vehicle. **03**  
 (b) What is the difference between Structure borne and air borne noise. **04**  
 (c) Explain low frequency noise from the vehicle with its frequency range. Also **07**  
 discuss the noise generating points and reduction methods.

**OR**

- Q.4** (a) List the various vibration analysis softwares. **03**  
 (b) Discuss the Passenger seats and steering wheel vibration. **04**  
 (c) Discuss Vibrations and Noise in vehicle driveline system. Also write for the **07**  
 terms shuffle, clunk, driveline boom and axle whine.
- Q.5** (a) Explain "Pass-by Noise" method and its importance. **03**  
 (b) List the various NVH-legislations available for vehicle in India. **04**  
 (c) Explain Bearing noise, Cam system noise and Timing chain noise from the **07**  
 automotive.

**OR**

- Q.5** (a) Explain "Churning effect" in automobile gears with vibration phenomena. **03**  
 (b) What do you understand about vibration exciters? How does it work? **04**  
 Explain working principle of Electrodynamics exciters.  
 (c) Explain Air pumping noise? Where it can perceive? What is the significance **07**  
 of tyre tread pattern on air-pumping noise?

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