

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VIII (NEW) EXAMINATION – WINTER 2020****Subject Code: 2180214****Date: 21/01/2021****Subject Name: Noise, Vibration & Harshness And Safety****Time: 02:00 PM TO 04:00 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT 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) Explain shortly for Human ear anatomy with mechanism of hearing. **04**
(c) Note down various vibratory systems into the vehicle, Also discuss the study principle of Roll, Pitch and Yaw for velocity and movement. **07**
- Q.2** (a) Classify Mechanical vibrations. Also discuss the Damped and Un-damped vibration. **03**
(b) Explain the terms: 1] Degree of freedom 2] Periodic motion 3] Time period 4] Simple Harmonic Motion **04**
(c) Discuss the harmful effects of vibration and noises from the vehicular body. Also explain its reduction and eliminating methods in detail. **07**
- Q.3** (a) Write a short note on psychological effects of noise on human. **03**
(b) List the factors affecting on Piston Slap noise? Also write the counter measures for it. **04**
(c) Explain Anechoic chamber with sketch for the measurement of vehicle noise. **07**
- Q.4** (a) Explain sound waves and its propagation? **03**
(b) What are the differences between Structure borne and air borne noise. **04**
(c) Explain Bearing noise, Cam system noise and Timing chain noise from the automotive. **07**
- Q.5** (a) List the various methods to minimize the Vibration and Noise in vehicle. **03**
(b) Explain in brief Mechanical type vibration exciter with the help of sketch. **04**
(c) Explain Squeak, Rattle and Buzz noise with its frequency range. Also discuss the noise generating points and reduction methods in vehicle. **07**
- Q.6** (a) List the various vibration analysis softwares in brief. **03**
(b) Brief about Passenger seats and steering wheel vibration with the sketch. **04**
(c) Discuss Vibrations and Noise in vehicle driveline system. Also write for the terms shuffle, clunk, driveline boom and axle whine. **07**
- Q.7** (a) List the various NVH-legislations applicable for vehicles across the India. **03**
(b) Explain "Pass-by Noise" method with the help of sketch. **04**
(c) Draw and Explain vibration transfer path from vehicle suspension system to the other included systems of vehicle. **07**

- Q.8** (a) What does it mean by “Churning effect” in automobile transmission systems and relate it with vibration phenomena. **03**
- (b) What do you understand about vibration exciters? How does it work? Explain working principle of Electrodynamics exciters. **04**
- (c) What does it mean by Air pumping noise? From where it is can be generated? What is the significance of tyre tread pattern on air-pumping noise? **07**

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