

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019****Subject Code:2180209 /2180214****Date:13/05/2019****Subject Name:Noise, Vibration & Harshness And Safety****Time:10:30 AM TO 01:00 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) Write the definitions for Noise, vibration and Harshness. Also write down the relevance of it in Automotive discipline? **03**  
 (b) Explain the terms: 1] Degree of freedom 2]Time period 3]frequency 4]Amplitude **04**  
 (c) Explain with sketch principle of Roll, Pitch and yaw phenomena for velocity and moments. **07**

- Q.2** (a) Explain sound wave propagation? **03**  
 (b) Write a difference between Structure borne and air borne sound. **04**  
 (c) Explain the harmful effects of vibration and noises in the vehicular body as well as on occupants and also explain its eliminating and reduction methods **07**

**OR**

- (c) Discuss with sketch the anatomy of human ear and mechanism of hearing. **07**  
**Q.3** (a) Write a short note on psychological effect of noise on human. **03**  
 (b) Explain for Transmission whine& Rattle noise with its frequency range. **04**  
 (c) Automotive engine can have six degree of vibration: Justify, also Explain characteristics and sources of vibration from engine. **07**

**OR**

- Q.3** (a) Categorized the mechanical vibration and also discuss the Damped and Un-damped vibration in details. **03**  
 (b) Which are the factors affecting on Piston Slap noise? Also write counter measures for it. **04**  
 (c) Explain in details Bearing noise, Cam system noise and Timing chain noise from automotive vehicle. **07**  
**Q.4** (a) Write the various vibration and noise reduction methods. **03**  
 (b) Explain working principle of Vibration pickups. **04**  
 (c) What do you mean by Air pumping noise? From where it is being generated? How the Tread pattern has significance on air pumping noise. **07**

**OR**

- Q.4** (a) Write down for churning effect in automobile transmitter system and compare it shortly with vibration phenomena. **03**  
 (b) Explain with neat sketch vehicle “Pass-by Noise” method with different running conditions. **04**  
 (c) Draw and explain vibration transfer path from vehicle suspension system to the other included systems. **07**  
**Q.5** (a) Write down different vibration analysis softwares. **03**  
 (b) Explain working of Mechanical type vibration exciter with sketch. **04**  
 (c) Explain Squeak, Rattle and Buzz noise with its frequency range. Also explain their noise generating points and reduction in vehicle. **07**

**OR**

- Q.5** (a) List out the NVH-legislations applicable for vehicle in India. **03**  
 (b) With the sketch discuss seat and steering wheel vibrations. **04**  
 (c) Discuss Vibrations and Noise in driveline systems. Also write for term driveline boom, clunk, axle whine, and shuffle. **07**

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