

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AE) (Sem.-6)
VEHICLE DYNAMICS
Subject Code : AE-308
Paper ID : [A0722]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

- 1. SECTION-A is COMPULSORY.**
- 2. Attempt any FOUR questions from SECTION-B.**
- 3. Attempt any TWO questions from SECTION-C.**

SECTION-A (10 × 2 = 20 Marks)

- Write short notes on :
 - Define two degree of freedom system.
 - Define magnification factor.
 - What is meant by free vibration?
 - What is tracline effort?
 - Explain oversteer.
 - Define transmissibility.
 - What is upsprung weight?
 - Define cornering force.
 - What is meant by stability of vehicle?
 - How is the wheel wobble caused?

SECTION-B (4 × 5 = 20 Marks)

- A vertical spring mass system has a mass of 0.5 kg and an initial deflection of 0.2 cm. Find the spring stiffness and the natural frequency of the system.
- Discuss the functions of vibration absorber.

4. The front axle of the car has pivot centres 1.1 m apart. The length of each steering arm is 150 mm while the track rod is of 1.0 m length. Calculate the wheelbase for perfect rolling of the car wheels when the inner wheel stub axle is at 55° to the rear centre line.
5. Holzer's method is a trial and error method used to find the natural frequency and mode shapes of multimass lumped parameter system for free and forced vibration ? Discuss.
6. Discuss the effect of camber and camber angle in a car.

SECTION-C **(2 × 10 = 20 Marks)**

7. The springs of an automobile trailer are compressed 0.1 m under its own weight. Find the critical speed when the trailer is passing over a road with a profile of sine wave whose amplitude is 80 mm and the wave length is 14 m. Find the amplitude of vibration at a speed of 60 km/hr.
8. A car whose wheel base is equal to five times the height of its centre of gravity above the ground, is moving on a horizontal road when brakes are applied. If the coefficient of limiting friction between car tyres and the road is 0.5, determine the percentage of weight transferred from the rear to the front axle, on braking.
9. Write a note on Dunkerby's lower bound method for determining fundamental frequency.