Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2012 to 2017) (Sem.–6)

VEHICLE DYNAMICS

Subject Code : BTAE-603

M.Code : 71219

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

a) What do you mean by degree of freedom of a vehicle?

b) What is the difference between a discrete and a continuous system? Is it possible to solve any vibration problem as a discrete one?

c) What do you understand by modeling and simulation?

d) What is a mode shape? How it is computed?

e) Define transmissibility.

f) What is camber?

g) What do you mean by steady state and transient state in cornering?

h) Define static and dynamic stiffness of a tire.

i) What do you mean by over and under steer vehicle?

j) Discuss in brief cornering ability.

SECTION-B

2. Explain empirical and analytical methods for understanding of vehicle dynamics performance, along with its benefits and limitations.

3. Draw Tyre axis system along with forces and moments.

4. Write down the requirements of a vehicle suspension system.

5. Define Neutral Steer, Under steer & Over steer conditions and explain how these conditions affect the performance of the vehicle. Also discuss the parameters that can be varied to change the condition.

6. Derive Tractive force for traction limited acceleration.

SECTION-C

7. Find out the natural frequency and amplitude ratio in terms of 'm' and 'k' for the system shown below. Take $m_1 = m$; $m_2 = 2m$; $k_1 = k_2 = k_3 = k$.

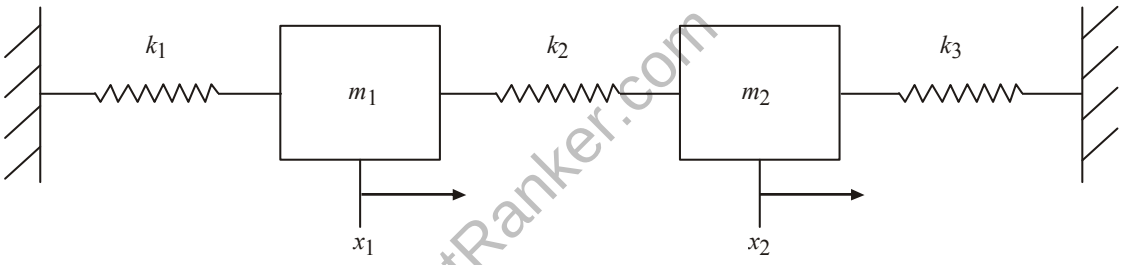

FIG.1

8. Derive an expression to find the normal reactions at the front and rear wheels considering the stability of a vehicle on a slope of θ, to the horizontal. Also discuss, the limiting value for θ, if it is increased gradually (i) either the vehicle is about to overturn (ii) the vehicle is about to slide down the slope.

9. Discuss the stability of vehicle on a slope and running on a curved track.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.