www.FirstRanker.com

www.FirstRanker.com



Roll No.						

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2011 Onwards) (Sem.-6) VEHICLE DYNAMICS Subject Code : BTAE-603 Paper ID : [A2382]

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) Give two examples each of the bad and the good effects of vibration.
- 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 is critical damping, and what is its importance?
- d) What is a mode shape? How it is computed?
- e) How many distinct natural frequencies can exist for an *n*-degree-of-freedom system?
- f) What do you mean by limiting and overturning speed?
- g) What do you mean by steady state and transient state in cornering?
- h) Define static and dynamic stiffness of a tire.
- i) What is steering ratio?
- j) What is tractive effort?

1 M - 7 1 2 1 9



SECTION-B

- 2. The natural frequency of a spring-mass system is found to be 2 Hz. When an additional mass of 1 kg is added to the original mass m, the natural frequency is reduced to 1 Hz. Find the spring constant k and the mass m.
- 3. Discuss the stability of a vehicle running on curved track.
- 4. Derive the expression for orthogonality property of mode shape.
- 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. Derive the equations of motion, using Newton's second law of motion, for the systems shown in figure below.



8. Explain the following :

Cornering ability, Handling, Directional stability, Roll over, Steering geometry error

- 9. a) Explain cornering equation with respect to bicycle model and derive the equation of steer angle.
 - b) Discuss the suspension effect due to chamber change on cornering.