Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APR / MAY 2019

SUBJECT: VEHICLE BODY DYNAMICS [AAE 5202]

REVISED CREDIT SYSTEM
(26/04/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Name the arbitrary forces acting on vehicle under dynamic condition on up-hill. **(02)**

1B. Derive an expression to find the reaction force on each wheel of truck trailer accelerating on a level road. **(08)**

2A. List and explain the different types of drags experienced by vehicle under dynamic condition. **(04)**

2B. A truck has a wheel base of 4.2 m and weight 67,000 N, 75% being of the rear axle. Its center of gravity is 1.1 m above the ground. If the brakes produce a deceleration of 3 m/s^2, **(06)**

i. Find the weight transferred from the rear to the front axle.

ii. Assume brake torques at all wheels to be equal and wheels to be of the same size, what is the braking effort at each wheel?

iii. What is the minimum value of adhesion to permit the above deceleration without skidding?

3A. Enumerate the Pressure difference above and below the moving car with a sketch and graph. **(04)**

3B. Explicate the effect of following vehicles parameters on drag: **(06)**

i. Windshield angle

ii. Front end design

iii. Rear end inclination

4A. Discuss the necessity and requirement of different markings on Tire. **(03)**

4B. Compare the contact pressure distributions under rolling tire and non-rolling tire with a suitable sketch. **(03)**

4C. Discuss the static and dynamic parameters which affects the cornering properties of a tire. **(04)**

5A. Categorize the various levels of active qualities in suspension of a vehicle. **(03)**

5B. Sketch the free body diagram of full car model and list the forces and moments acting on it. **(03)**

5C. Explain the working and significance of Traction control system in vehicle with respect to dynamics. **(04)**