

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2170203

Date: 02/11/2017

Subject Name: Vehicle Dynamics

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) Explain Lumped mass of Vehicle. **03**
 (b) Draw and explain vehicle Fixed Coordinate system. **04**
 (c) Draw and Explain various Aerodynamic Forces and Moments acting on the vehicle. **07**
- Q.2** (a) Explain Pressure distribution around the vehicle **03**
 (b) List the various shape of vehicles and give the value of Aerodynamic Drag coefficient for each shape of vehicle. **04**
 (c) Explain empirical and analytical methods for understanding of vehicle dynamics performance, along with its benefits and limitations. **07**
- OR**
- Q.3** (c) What is braking coefficient? Explain the parameters which affect braking coefficients **07**
 (a) Give the name of major elements of tyre and their suitable materials. **03**
 (b) Discuss in details various factors affecting on tyre life. **04**
 (c) Explain Camber thrust. Write a short note on Cornering force produced by a vehicle tire. **07**
- OR**
- Q.3** (a) Construction of Bias & Radial tyre with the help of neat sketch. **03**
 (b) Define ride and explain ride dynamic system. **04**
 (c) Draw clear sketch of Tyre axis system and explain the details. **07**
- Q.4** (a) Explain Difference between dependent and independent suspensystem **03**
 (b) Draw and explain antdive suspension geometry **04**
 (c) Explain Active suspension and Roll centre analysis. **07**
- OR**
- Q.4** (a) Explain Anti squat suspension geometry. **03**
 (b) Explain MacPherson Strut Suspension system. **04**
 (c) Draw quarter car model of vehicle representing passive suspension system. Obtain the mathematical model for the same in steady state vibration for sprung and unsprung mass. **07**
- Q.5** (a) Differentiate between Davis steering and Ackerman steering mechanism. **03**
 (b) Define steering geometry error. Explain the effect of geometry error on dynamics of vehicle. **04**
 (c) Explain the following turning response properties: **07**
 Under steer gradient.
 Neutral steer.
 Under steer.
 Over steer.
 Characteristic speed and Critical speed
- OR**
- Q.5** (a) What is the important of rollover? List types of rollover of the vehicle. **03**
 (b) What is quasistatic rollover of a suspended vehicle? Draw and explain rollreaction on vehicle. **04**
 (c) Explain various resistances to motion of a vehicle and explain their effect on performance of a vehicle. **07**
