

Seat No.: _____
No. _____

Enrolment

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 711106N

Date: 05-12-2014

Subject Name: Vehicle Dynamics

Time: 10:30 am - 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 different types of automobile suspension system with suitable diagram. **07**
(b) Explain Hotchkiss drive and Torque tube drives with neat sketch. **07**
- Q.2** (a) Define the following terms/effects : **07**
i) Pitching ii) Rolling iii) Bouncing iv) Roll Center v) Roll center axis
vi) Yawing vii) Wheel shimmy
(b) Explain the design consideration for suspension design. **07**
- OR**
- (b) Enlist wheel alignment angles. Explain their effect on dynamics of vehicle. **07**
- Q.3** (a) Differentiate Ackerman and Davis steering mechanism. Derive and explain the fundamental condition for true rolling of vehicle. **07**
(b) Explain the condition for neutral steer, under steer and over steer for vehicle while turning. **07**
- OR**
- Q.3** (a) Explain : Under steer, Over steer and Steering geometry errors. **07**
(b) Explain gyroscopic effect in a vehicle and also enlist the factors responsible for the overturning of a vehicle. **07**
- Q.4** (a) Draw and explain full car and quarter car suspension model. **07**
(b) Draw vehicle ride model and Explain various excitation sources for vehicle ride. **07**
- OR**
- Q.4** (a) Enlist different modes of ride performance. Define each term and how it can be improved by active control system? **07**
(b) Explain various external forces acting on vehicle with neat sketch of dynamic axle loading. **07**
- Q.5** (a) Explain various resistances to motion of a vehicle. How do they effect engine power? **07**
(b) Draw model of a car vibration with single and two degree of freedom and derive the equation of motion for the same. **07**
- OR**
- Q.5** (a) Explain the various factors affecting rolling resistance of the tire. **07**
(b) Draw free body diagram of a four wheeler while taking a turn and also Derive the reaction forces at wheels while taking a turn. **07**
