Seat No.: _____ *Enrolment No._____*

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 : i) Pitching ii) Rolling iii) Bouncing iv) Roll Center v) Roll center axis vi) Yawing vii) Wheel shimmy	**07**
	(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**

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