Seat No.: Enrolment No._____

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 explian 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	
	(c)	What is braking coefficient? Explain the parameters which affect braking coefficients	**07**
Q.3	**(a)**	Give the name of major elements of tyre and their suitable materials.	**03**
	(b)	Discus 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)**	Expalin 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: Under steer gradient. Neutral steer. Under steer. Over steer. Characteristic speed and Critical speed	**07**
		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**

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