Seat No._____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170203 **Date: 15/11/2018**

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)**	What is Vehicle Axis System and Earth Fixed Axis System?	**03**
	(b)	Derive the equation to calculate the dynamic axle load when the vehicle on level ground under static condition.	**04**
	(c)	Explain vehicle fixed co-ordinate system with neat sketch.	**07**
Q.2	**(a)**	Explain lumped mass of vehicle.	**03**
	(b)	List the various shape of vehicles and give the value of aerodynamic drag coefficient for each shape of the vehicle.	**04**
	(c)	What is the difference between power limited acceleration and traction limited acceleration? Derive an expression of tractive effort with respect to limiting engine power.	**07**
		OR	
	(c)	Draw the figure showing pressure distribution along the center line of car and explain aerodynamic aids.	**07**
Q.3	**(a)**	Define: 1. Braking Factor 2. Braking Torque 3. Braking Efficiency	**03**
	(b)	Construction of bias & radial tyre with the help of sketch.	**04**
	(c)	Describe total braking force of front axle & rear axle with the graph and explain the necessity of brake proportioning.	**07**
		OR	
Q.3	**(a)**	Define: 1. Wheel lock up 2. Pedal force gain 3. Brake Proportionality	**03**
	(b)	Write a short note on aerodynamic drag.	**04**
	(c)	What is braking co-efficient? Explain the parameters which affect braking co-efficient.	**07**
Q.4	**(a)**	Explain under steer condition.	**03**
	(b)	Discuss in detail various factors affecting on tyre life.	**04**
	(c)	Derive an expression for lateral slip in tire for a simple model.	**07**
		OR	
Q.4	**(a)**	Differentiate Active, Semi active & Passive suspension system.	**03**
	(b)	Differentiate between davis steering system and ackerman steering system.	**04**
	(c)	Define ride and explain ride dynamic system.	**07**
Q.5	**(a)**	Draw and explain anti-dive suspension geometry.	**03**
	(b)	Explain steering geometry error. Explain the effect of geometry error on dynamics of vehicle.	**04**
	(c)	Give the detail of tire notation: 195/620 R16. Explain effect of high tire pressure, low tire pressure & tread rating on performance of vehicle.	**07**
		OR	
Q.5	**(a)**	What is the important of rollover? List types of roll over of the vehicle.	**03**
	(b)	Explain importance of trail in motorcycle.	**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**

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