Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170203 Date:19/01/2021

Subject Name:Vehicle Dynamics

Time:10:30 AM TO 12:30 PM Total Marks: 56

Instructions:

1. **Attempt any FOUR questions out of EIGHT 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)**	Write a short note on aerodynamic drag.	**03**
	(b)	Explain pressure distribution around the vehicle.	**04**
	(c)	Define brake factor in case of drum brake system. Draw forces acting on brake shoes and explain self servo effect.	**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**
Q.4	**(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.5	**(a)**	Explain Difference between dependent and independent suspension system.	**03**
	(b)	Draw and explain anti dive suspension geometry	**04**
	(c)	Explain Active suspension and Roll centre analysis.	**07**
Q.6	**(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 un sprung mass.	**07**
Q.7	**(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**

Q.8	**(a)**	What is the important of rollover? List types of rollover of the vehicle.	**03**
	(b)	What is quasi static rollover of a suspended vehicle? Draw and explain roll reaction on vehicle.	**04**
	(c)	Explain Wheelbase, Fork offset, Trail & Wheel flop for motorcycle.	**07**

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