Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170203 Date:08-05-2025

Subject Name:Vehicle Dynamics

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define lump mass, Sprung mass and unsprung mass.	**03**
	(b)	Draw and explain vehicle Fixed Coordinate system.	**04**
	(c)	Explain power limited acceleration and traction limited acceleration to achieve maximum performance of vehicle.	**07**
Q.2	**(a)**	Write a short note on aerodynamic drag.	**03**
	(b)	Explain pressure distribution around the vehicle.	**04**
	(c)	Explain wind tunnel test with neat sketch.	**07**
		OR	
	(c)	Derive the equation to calculate the dynamic axle load for the following condition a) When the vehicle on level ground b) When the vehicle on grads.	**07**
Q.3	**(a)**	Define active suspension.	**03**
	(b)	Define traction and cornering properties of tyre.	**04**
	(c)	Explain slip angle, inflation pressure and tread design.	**07**
		OR	
Q.3	**(a)**	Explain under steer, over steer and natural steer.	**03**
	(b)	Differentiate between Davis steering and Ackerman steering mechanism.	**04**
	(c)	Explain the pressure coefficient distribution around the vehicle in detail with neat sketch.	**07**
Q.4	**(a)**	Define (i) Camber (ii) Caster (iii) kingpin inclination	**03**
	(b)	For Stopping distance - SD and stopping time- t_s Derive equations for Stopping distance and stopping time.	**04**
	(c)	How can low speed maneuverability and high speed cornering improve by four wheel steering? Explain in details.	**07**
		OR	
Q.4	**(a)**	Differentiate between dependent and independent suspension system.	**03**
	(b)	Explain the meaning of the following tyre size code and calculate the tyre height for given tyre. P 220 / 65 R 17 95 H.	**04**
	(c)	Explain quasi static rollover of rigid vehicle showing all acting forces.	**07**
Q.5	**(a)**	Define ride and explain ride dynamic system.	**03**
	(b)	Explain three types of brake proportioning method in detail.	**04**
	(c)	Explain under steer and over steer.	**07**
		OR	
Q.5	**(a)**	Explain MacPherson Strut Suspension system.	**03**
	(b)	Explain aerodynamic lift.	**04**
	(c)	Explain the resisting forces acting on motorcycle body.	**07**

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