

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 117AL01

Date: 03-12-2025

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.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	Marks
Q.1 (a) Define the vehicle fixed and earth fixed coordinate systems.	03
(b) Describe suspension dynamics in brief.	04
(c) Discuss suspension kinematics and its role in vehicle dynamics.	07
Q.2 (a) Explain the concept of brake factor.	03
(b) Discuss Tyre construction and load rating in brief.	04
(c) Describe the lumped mass model used in vehicle dynamics.	07
OR	
(c) Describe transient rollover and its simulation.	07
Q.3 (a) Discuss in brief the effect of crosswind sensitivity on vehicle stability.	03
(b) Discuss rollover mitigation techniques in brief.	04
(c) Derive the equations for power-limited and traction-limited acceleration.	07
OR	
(a) Explain the significance of SAE aerodynamic axis system.	03
(b) Discuss in brief the total road loads and their components.	04
(c) Calculate energy absorbed during braking for a given vehicle mass and speed.	07
Q.4 (a) Explain effect of air pressure on the Tyre stiffness.	03
(b) Explain in brief the steady-state cornering at high speed.	04
(c) Describe the forces and moments acting on a steering system.	07
OR	
(a) Explain measurement of rolling resistance.	03
(b) Discuss the role of suspension in vehicle handling and comfort.	04
(c) Explain four-wheel steering and its advantages.	07
Q.5 (a) Explain Tyre conicity.	03

- (b)** Illustrate the concept of ply steer and its effect on vehicle handling. **04**
- (c)** Explain the pressure distribution around a vehicle and its aerodynamic implications. **07**

OR

- (a)** What is aligning moment in Tyres? **03**
- (b)** Discuss Tyre tractive properties in brief. **04**
- (c)** Explain aerodynamic aids and their role in vehicle design. **07**
