

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- VII EXAMINATION – SUMMER 2026

Subject Code:3170203

Date:20-05-2026

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.

		Marks
Q.1	(a) Define following terminologies: 1) Lumped mass 2) Vehicle slip 3) Brake proportioning	03
	(b) Explain the effect of dynamic axle load on performance of vehicle.	04
	(c) Explain vehicle fixed co-ordinate system with neat sketch.	07
Q.2	(a) Explain Pressure distribution around the vehicle	03
	(b) Illustrate about roll center analysis.	04
	(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. c) Vehicle is in low speed acceleration	07
	OR	
	(c) What is vehicle rollover? Explain the mechanics involved in rollover of a vehicle under static condition.	07
Q.3	(a) What is breaking coefficient?	03
	(b) Discuss in details various factors affecting on tyre life.	04
	(c) Classify types of suspension systems along with pro and cones of each.	07
	OR	
Q.3	(a) Construction of Bias & Radial tyre with the help of neat sketch.	03
	(b) Explain the meaning of the following tyre size code and calculate the tyre height for given tyre. P 215 / 60 R 15 96 H.	04
	(c) Explain Quasi-static rollover of a rigid vehicle.	07
Q.4	(a) Explain Anti squat suspension geometry.	03
	(b) Draw kinematic models for double A-arm suspension mechanism and McPherson suspension mechanism.	04
	(c) Explain under steer and over steer.	07
	OR	
Q.4	(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: How four wheels steering improve low speed and high speed turning?	07
Q.5	(a) Explain height of motorcycles center of gravity.	03
	(b) Explain aerodynamic lift.	04

- (c) Explain various resistances to motion of a vehicle and explain their effect on performance of a vehicle. **07**

OR

- Q.5** (a) Define Lift Force, Sprung mass and unsprung mass. **03**
(b) Explain MacPherson Strut Suspension system. **04**
(c) Explain Wheelbase, Fork offset, Trail & Wheel flop for motorcycle. **07**
