

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3161920

Date: 01/06/2026

Subject Name: Automobile Engineering

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.**

- Q.1**
- (a)** Classify automobiles also discuss how these classifications influence vehicle design, performance, and application suitability. **03**
 - (b)** With neat sketch explain the general layout of an automobile chassis and what are the functional requirements of a vehicle body? **04**
 - (c)** Describe the ladder frame, X-frame chassis construction and compare their structural characteristics, load distribution, and suitability for different categories of vehicles. **07**
- Q.2**
- (a)** Explain the importance of aerodynamics in automobile body design and discuss terms drag, lift, and stability. **03**
 - (b)** Explain how different forces acting on a vehicle interact under real driving conditions. **04**
 - (c)** Derive and analyze the expression for rolling resistance and explain how parameters like tire pressure, road surface, and vehicle weight influence it. **07**
- OR**
- Q.2**
- (c)** Explain the following terms: Dynamic factor, weight transfer, tractive force, grade resistance **07**
- Q.3**
- (a)** With neat sketch explain construction and working of single plate, where are they used and why? **03**
 - (b)** Compare sliding mesh, constant mesh, and synchromesh gearboxes. **04**
 - (c)** Explain the construction and working of Hotchkiss and torque tube drives. discuss their role in transmitting power under varying alignment conditions. **07**

OR

Q.3

	(a) State function and objectives of suspension system.	03
	(b) Explain the construction and working of front axles. justify the selection of a suitable axle type for a heavy commercial vehicle.	04
	(c) Compare manual transmission, automatic transmission, and Continuously Variable Transmission (CVT) systems in terms of fuel efficiency, driver comfort, complexity, and suitability for urban and highway driving.	07
Q.4	(a) Classify different types of automobile wheels.	03
	(b) Discuss the constituents of tyre materials and describe the construction of a tyre.	04
	(c) Define the following terms : camber angle, caster angle, kingpin inclination, toe-in, toe-out, understeer, oversteer.	07
	OR	
Q.4	(a) Explain different types of tyre wear patterns.	03
	(b) Discuss important tyre properties which affects vehicle performance.	04
	(c) Explain the working principles of ABS (Anti-lock Braking System) and EBD (Electronic Brake force Distribution). list their advantages over conventional braking systems.	07
Q.5	(a) Explain the working principle of regenerative braking.	03
	(b) Classify different types of hybrid vehicles (series, parallel, series-parallel).	04
	(c) Discuss the working and effectiveness of seat belts and airbag systems. Evaluate their contribution to reducing injury severity during collisions	07
	OR	
Q.5	(a) Explain the layout and major components of an Electric Vehicle (EV).	03
	(b) Discuss different types of batteries used in EVs explain their performance in terms of energy density, lifecycle, safety, and charging characteristics.	04
	(c) Describe the working of fuel gauge of an automobile.	07
