Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170209 Date:08-12-2023

Subject Name: Automotive Aerodynamics and Aesthetics

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 Aerodynamics and explain the importance of it in automotive.	**03**
	(b)	Draw and explain SAE aerodynamic axis system.	**04**
	(c)	Explain External and Internal air flow through a moving vehicle with detail.	**07**
Q.2	**(a)**	Explain relative air speed and pressure conditions over the upper profile of a moving car.	**03**
	(b)	What is boundary layer? Explain (i) Lamina boundary layer (ii) Turbulent boundary layer.	**04**
	(c)	Derive the formula for calculating the opposing resistance of a body passing though air.	**07**
		OR	
	(c)	Discuss the influence of skin friction, surface finish and a venturi on boundary layer velocity profile.	**07**
Q.3	**(a)**	Draw the various shapes of solid and write the drag coefficient of each.	**03**
	(b)	Describe various types of drag and lift control devices used in a car.	**04**
	(c)	Draw the pictorial view of car having an ideal aero foil shape and discuss trailing vortex drag in detail.	**07**
		OR	
Q.3	**(a)**	Define Aerodynamic Drag and list out the various types of drag.	**03**
	(b)	Explain the various types of car body configuration for afterbody drag.	**04**
	(c)	Explain effects of underbody front and rear air dams relative to the lift and drag coefficient	**07**
Q.4	**(a)**	Give the technical criteria for aesthetic design of exterior and interior.	**03**
	(b)	Describe digital aesthetic design in brief.	**04**
	(c)	Write a short note on wind tunnel testing.	**07**
		OR	
Q.4	**(a)**	What is coast down test?	**03**
	(b)	Explain on-road measurement of the wind noise in short.	**04**
	(c)	Explain the sequence of automobile aesthetic body styling process.	**07**
Q.5	**(a)**	Briefly explain adjustable cab roof deflector.	**03**
	(b)	Explain Yaw angle with velocity diagram.	**04**
	(c)	Describe the various types of cab to trailer body gap seals with neat sketch.	**07**
		OR	
Q.5	**(a)**	What is the effect of various load position upon drag coefficient in truck?	**03**
	(b)	Write a short note on corner vanes.	**04**
	(c)	Explain the effects of different cab to trailer body heights with both sharp and round upper windscreen leading edges with neat sketch.	**07**

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