

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2024****Subject Code: 3170209****Date: 22-05-2024****Subject Name: Automotive Aerodynamics and Aesthetics****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

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| Q.1 | (a) Discuss on history and need of vehicle aerodynamics. | 03 |
| | (b) Explain stagnation position and air streamlines of a moving car. | 04 |
| | (c) Explain flow separation and flow reattachment with suitable diagram. | 07 |
| Q.2 | | |
| | (a) Explain after flow wake. | 03 |
| | (b) What is lift coefficient? Explain positive lift and negative lift. | 04 |
| | (c) Compare the aerodynamic of tear drop shape body with bobtailed body with neat sketch. | 07 |
| OR | | |
| | (c) Explain establishment of trailing vortices with a pictorial view of aerofoil shaped car. | 07 |
| Q.3 | | |
| | (a) List out the various methods used to control the aerodynamic lift in a car. | 03 |
| | (b) Explain effects of rear end upward taper on drag coefficient in a car. | 04 |
| | (c) Explain the effects of underfloor to ground clearance on the surrounding air speed, pressure and lift with figure. | 07 |
| OR | | |
| Q.3 | (a) Explain cabriolet car. | 03 |
| | (b) Explain various shape optimization of cars for after body drag. | 04 |
| | (c) Explain air mass distribution around a car body with various nose profiles. | 07 |
| Q.4 | | |
| | (a) Discuss effect of trailer load position on a vehicle's drag resistance. | 03 |
| | (b) Compare trailer flow body pressure distribution with and without cab roof deflector. | 04 |
| | (c) Explain effect of sharp and rounding leading edges in coaches with figure. | 07 |
| OR | | |
| Q.4 | (a) What is the difference between aerodynamics of car and articulated truck? | 03 |
| | (b) Describe the effect of corner vanes. | 04 |
| | (c) Explain influence of cab to trailer body height upon the drag coefficient. | 07 |
| Q.5 | | |
| | (a) What is digital aesthetic design? | 03 |
| | (b) Discuss technical criteria for aesthetic design of exterior and interior. | 04 |
| | (c) Explain wind tunnel testing with neat sketch. | 07 |
| OR | | |
| Q.5 | (a) Explain various types of wind tunnels with its features. | 03 |
| | (b) Describe on road drag measurement using Coast down tests. | 04 |
| | (c) Discuss aerodynamic vehicle development with the importance of the aesthetic aspects. | 07 |
