

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170209

Date:30-11-2024

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

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|------------|-----|--|-----------|
| Q.1 | (a) | What is the importance of aerodynamics in a vehicle? | 03 |
| | (b) | Write the typical drag coefficient for the given class of vehicles:
(i) Saloon car (ii) Buses and coaches (iii) Light van | 04 |
| | (c) | List out the aerodynamics forces and explain each in brief. | 07 |
| | | | |
| Q.2 | (a) | Describe an importance of aesthetics in automotive. | 03 |
| | (b) | Draw a diagram and show the relative air speed and pressure conditions over the upper profile of a moving car. | 04 |
| | (c) | Explain (i) concept sketching (ii) Full sized tape drawing (iii) Clay modeling. | 07 |
| | | OR | |
| | (c) | Give the types of wind tunnel and explain the wind tunnel testing with neat sketch. | 07 |
| | | | |
| Q.3 | (a) | Explain mechanics of air flow and pressure around vehicle. | 03 |
| | (b) | Define vehicle lift and compare negative lift with positive lift. | 04 |
| | (c) | Explain the effects of under floor to ground clearance on the surrounding air speed, pressure and aerodynamic lift with neat sketch. | 07 |
| | | OR | |
| Q.3 | (a) | Write short note on cab roof deflectors. | 03 |
| | (b) | Discuss the effect of rear panel slope angle on the afterbody drag. | 04 |
| | (c) | Draw the different car body style configurations and explain each in short. | 07 |
| | | | |
| Q.4 | (a) | Enlist On- road testing and measurement methods. | 03 |
| | (b) | Explain: (i) after flow wake (ii) Vortices. | 04 |
| | (c) | Explain any one method used for shape optimization of car. | 07 |
| | | OR | |
| Q.4 | (a) | Explain the working of odometer. | 03 |
| | (b) | Explain Tractor and trailer skirting. | 04 |
| | (c) | Write short note on cab to trailer body gap seals with neat sketch. | 07 |
| | | | |
| Q.5 | (a) | Define under body roughness. | 03 |
| | (b) | Explain boundary layer velocity profile. | 04 |
| | (c) | Write the principles of commercial vehicle aerodynamics. | 07 |
| | | OR | |
| Q.5 | (a) | Explain aero foil lift and drag. | 03 |
| | (b) | Draw a graph to show the flow body pressure distribution with and without cab roof deflector for a cab with trailer. | 04 |
| | (c) | Write a short note on Flow visualization scale model testing with neat sketch. | 07 |
