Roll No. ..... **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech (AE) (Sem.–6)
AUTOMOTIVE AERODYNAMICS
Subject Code : AE-316 (Elective-I)
Paper ID : [A0724]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY.**
2. **Attempt any FOUR questions from SECTION-B.**
3. **Attempt any TWO questions from SECTION-C.**

SECTION-A (10 × 2 = 20 Marks)

l. Write short notes on :

(a) Name the parameters on which aerodynamic drag of a vehicle depends?

(b) What important factors are considered while designing an efficient car ?

(c) Differentiate between laminar and turbulent boundary layer.

(d) What are the various forces and moments acting on a vehicle in motion ?

(e) What do you mean by specific fuel consumption of a vehicle ?

(f) What are the methods used to decrease drag of a car ?

(g) What are the sources of forces and moments acting on a moving vehicle ?

(h) What are the criteria used to assess vehicle wind noise ?

(i) What is the purpose of a vehicle wind tunnel ?

(j) What are various types of equipments and transducers used for measurements in vehicle wind tunnel ?

SECTION-B (4 × 5 = 20 Marks)

2. Explain the developments in the shape of cars starting from car from Camille Jenatzy in 1899 to the shapes of modern cars. Describe the features in terms of fuel efficiency, speed, luxuries etc.

3. Describe the motion of a vehicle resisted by Aerodynamic drag, rolling resistance and climbing resistance.

4. Discuss completely about detail optimization and shape optimization carried out as strategies for aerodynamic development of passenger cars.

5. Describe the effects of natural wind, wind forces due to steady side winds on aerodynamic stability of a vehicle.

6. Discuss the concept of hatch back, fast back and square back for shape optimization of cars.

SECTION-C (2 × 10 = 20 Marks)

7. With the help of neat diagram, explain the role of a wind tunnel. Describe the various construction elements and their working.

8. With the help of neat diagram, describe the phenomena of laminar and turbulent boundary layer, their separation and friction drag on a body in two-dimensional flow.

9. What are various types of drag acting on a vehicle. Explain the effect of each type and methods to calculate the magnitude of drags.