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

Total No. of Questions : 09

B.Tech. (AE) (2011 Onwards) (Sem.–6)

AUTOMOTIVE AERODYNAMICS

Subject Code : BTAE-604

Paper ID : [A2383]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

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

(b) What is the effect of flow separation on a vehicle?

(c) Explain the term 'pressure drag' of a vehicle.

(d) Under what condition of yawing moment, a vehicle becomes aerodynamically unstable.

(e) What is a thermal boundary layer?

(f) Write the relation between top speed, aerodynamic drag and engine power output of a vehicle.

(g) How does drag coefficient affect body shapes?

(h) What are the effects of aerodynamic lift coefficient?

(i) What is meant by boat tailing?

(j) What do you understand by gap configuration?

SECTION-B

2. Draw a neat sketch of a wind tunnel and explain the functions of various parts.

3. With the help of suitable diagrams and examples, describe external flow and internal flow for a body. Apply Bernoulli's equation to find pressure coefficient in terms of velocity and plot Cp vs x/1 for a vehicle shaped body on upper and lower side.

4. 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.

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

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

SECTION-C

7. Discuss the effects of forces and moments on the vehicle and how it is calculated.

8. Write a note on dirt accumulation on the vehicle.

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.