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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

INSTRUCTIONS 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.
4. Assume any missing data suitably.

SECTION A**1. Write briefly :**

- i) What are major historical developments in the field of automotive aerodynamics?
- ii) What are engine cooling requirements?
- iii) What is meant by a bluff body?
- iv) What is boat tailing?
- v) What is meant by drag coefficient?
- vi) What is the effect of side winds on vehicle dynamics?
- vii) Draw and explain the concept of wind shield angle.
- viii) Explain the origin of forces and moments on a vehicle.
- ix) Can we use wind tunnels for analyzing performance of submarines? Explain.
- x) What is meant by full scale wind tunnel?

SECTION B

2. Is there any difference between fluid mechanics and fluid dynamics? Explain by taking a suitable example.
3. Sketch and explain the construction of flow field around a car.
4. Is there any difference between hatch back, fast back and square back? Explain by using sketches.
5. Explain the methods of drag reduction in commercial vehicles.
6. Explain the principle and working of wind tunnels used for studying automotive aerodynamics.

SECTION C

7. A heavy truck weighing 72500 lb rolls along 170 in Denver at a speed of 67 mph. The air temperature is 55°F and the barometric pressure is 26.01 in Hg. The truck is 8' wide by 13.5' high and has an aerodynamic drag coefficient of 0.65. The truck has radial ply tires. Calculate the aerodynamic drag, the rolling resistance (as per SAE equations) and the road load horsepower at these conditions.
8. What are the effects of gap configuration and effects of fasteners on shape optimization of cars?
9. Describe the measurement techniques and equipments used in wind tunnels for automotive aerodynamics.