

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: VEHICLE BODY ENGINEERING [AAE 451]

REVISED CREDIT SYSTEM (23/11/2016)

Time: 3 Hours

MAX. MARKS: 50

(03)

(02)

(04)

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.
- **1A.** Write the five basic loads experienced by chassis frame of vehicle. (02)
- **1B.** List the requirements of Vehicle body.
- **1C.** With a neat sketch, explain the different types of Bus body. **(05)**
- **2A.** Explain the significance of Air dam in vehicles.
- **2B.** Name the different vortex formed at rear end of the vehicle and explain why **(03)** these vortex is generated.
- 2C. A bus chassis, 6.3 m long, consist of two side members and number of cross (05) members. Each side members can be considered as beam, simply supported at two points A and B, 3.6 m apart, A being positioned 1.3 m from the front end of the frame and subjected to the following concentrated loads:

Engine Load of 3 KN, gearbox support 0.5 KN and body of W KN. The distances of these loads from the front end of the frame are 0.6m, 2.4m and 3.6 m respectively. if the reaction at A is 9.8 KN, determine,

- a) Magnitude of load W due to vehicle body,
- b) If the load on each axle is equal, find the location of engine load from front axle.
- **3A.** What is meant by Deck strip and free-standing Airfoil type spoilers? (02)
- **3B.** With help of neat sketch, explain the different types of boundary layer. **(04)**
- **3C.** List and explain the different types of Drag.

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- 4A.List the applications of Bluff bodies(02)4B.Write the difference between Streamlined body and Bluff body.(03)4C.Name the methods to analyze Aerodynamic Drag of vehicle and explain any one method.(05)
- **5A.** Write the necessity of corner vanes and rolled edge wind cheaters in commercial **(02)** vehicle.
- 5B. A vehicle weighs 1900 kg with a wheel base of 1600 mm. Its CG located at (08) height of 420 mm from the floor of the vehicle and 830 mm behind the Front axle. If the vehicle has a ground clearance of 18 mm and it is accelerated at 15 m/s² on level road. Derive an expression to calculate weight on each wheel of the vehicle and calculate load on each wheel when the vehicle is
 - a) Front wheel drive
 - b) Rear wheel drive
 - c) Four-wheel drive.
- **6A.** List the different sections or zones of wind tunnel. (02)
- 6B. Explain the construction and working of Hypersonic wind tunnel with neat sketch. (04)
- 6C. A heavy truck weighing 72500 lb rolls at a speed of 67 mph. the air temperature (04) of 55°F and the barometric pressure is 26.01 inches in Hg. The truck is 8-foot wide and 13.5-foot height, and has an aerodynamic drag coefficient of 0.65. the truck has a radial ply tires. Calculate the aerodynamic drag and the rolling resistance.