Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20156

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018

Sixth Semester

Automobile Engineering

AT 6604 — VEHICLE DYNAMICS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Toe and Camber Angle.
2. With neat sketch mark the forces and moments acting on a vehicle.
3. List the different types of wheels.
4. Mention the basic functions of pneumatic tyre.
5. Sketch the quarter car model for suspension.
6. What is an air suspension system?
7. List the different types of resistance force to vehicle and write its basic equation.
8. With a neat sketch show the resistance to vehicle drag/vehicle motion.
9. Neatly sketch Ackermann Steering Angle.
10. What is a transient state?

PART B — (5 × 13 = 65 marks)

11. (a) The curb weights of a continental 4 door sedan without passengers or cargo are 1050.91 kg on the front axle and 600.91 kg on the rear. The wheelbase, L, ix 109 Inches. Determine the force/aft position of the center of gravity for the vehicle.

Or

(b) With a neat sketch explain rack and pinion type steering system.

12. (a) With a neat sketch explain the Bias Ply Tires. Also mention its merits and demerits compared with radial ply tryes.

Or

(b) Neatly sketch two degree and three degree of freedom model used in vehicle dynamics.

13. (a) Describe the general problems that will occur in an automobile without suspension with suitable sketches.

Or

(b) Determine the front and rear suspension rates for a 5.0 L Mustang given that the tire spring rate is 209.91 N/mm. The front suspension rate is 25 N/mm and the rear is 17.52 N/mm. Also estimate the natural frequencies of the two suspensions when the front tires are loaded to 167.67 N/mm and the rear tires are at 127.9 N/mm each.

14. (a) Drive an expression for load transfer due to acceleration without considering suspension

Or

(b) With a neat sketches explain the Different Distributions of Brake Forces.

15. (a) Discuss about high speed cornering and the effect of suspension on cornering.

Or

(b) What is Testing of Handling Characteristics? List the different testing. Explain the Constant Radius Test with neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) Consider a light truck weighing 1652.72 kg, performing a full stop from 97.2 kmph on a level surface with a brake application that develops a steady brake force of 909.09 kg. Determine the deceleration, stopping distance, time to stop, energy dissipated and the brake horse power at initial application and averaged over the stop. Neglect aerodynamic and rolling resistance forces.

Or

(b) With a neat sketch explain the terminologies in SAE tire axis system.

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