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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Seventh Semester

AE16704 – VEHICLE DYNAMICS

(Automobile Engineering)

(Regulation 2016)

Time: Three Hours

Maximum : 100 Marks

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

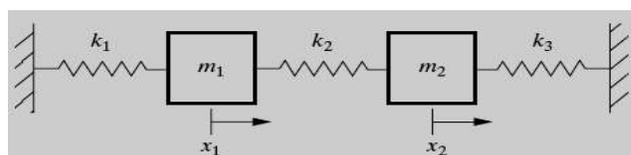
	CO	RBT
1. Differentiate modeling and simulation.	1	AP
2. What is magnification factor?	1	U
3. What is meant by slip angle?	2	U
4. Discuss about tire vibration.	2	U
5. What are the different sources of vibration?	3	U
6. Define skyhook damping.	3	U
7. Discuss about aerodynamic forces.	4	U
8. What is meant by longitudinal slip ratio?	4	U
9. Justify - understeer is preferred over oversteer vehicle.	5	AP
10. What is meant by steady state in cornering?	5	U

PART B - (5 X16 = 80 Marks)

11. (a) Explain the single degree of freedom with free and forced vibration. Draw the transmissibility ratio with frequency ratio for different values of damping factor for the vehicle. **(16) 1 AP**

(OR)

- (b) Find out the natural frequency and amplitude ratio in terms of ‘m’ and ‘k’ for the system as shown in Fig 1. Take $m_1 = m$; $m_2 = 2m$; $k_1=k_2=k_3=k$.



(16) 1 AP

Fig 1

12. (a) Derive an expression for the relationship of tractive effort and longitudinal slip of tires. (16) 2 AP

(OR)

- (b) Briefly explain the various parameters affecting the rolling resistance of a tire. (16) 2 AP

13. (a) Explain the full, half and quarter car model for active automotive suspension. (16) 3 AP

(OR)

- (b) Explain the working of air suspension system with neat sketch and their properties. (16) 3 AP

14. (a) Compute the equations for reaction forces, maximum acceleration and tractive effort of front wheel drive vehicle. (16) 4 AP

(OR)

- (b) Discuss about Anti-lock Braking System and compare with traction control system. (16) 4 AP

15. (a) Derive the expression for limiting speed and over turning speed of the vehicle running on a banked road. (16) 5 AN

(OR)

- (b) A car of total weight 20 kN runs at 70 km/hr round a curve so that its C.G. moves in a circle of 80 m radius with its wheel axes at an angle of 10° to the horizontal. The C.G. of the car is 1 m above the ground and is midway between the axes. The wheel track is 1 m. Determine the normal reactions on each wheel taking in to account the centrifugal effect. (16) 5 AN