KUMARAGURU
college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Sixth Semester

AUTOMOBILE ENGINEERING

U18AUI6202**:** Vehicle Dynamics

COURSE OUTCOMES

CO1: Determine the forces acting on vehicle for the given conditions.

CO2: Inference the forces and moments developed at the vehicle tire.

CO3: Illustrate the concept and dynamics involved in suspension system of the vehicle.

CO4: Explain the lateral stability and cornering behavior of the vehicle.

CO5: Brief about properties of sound & noise measurement techniques.

CO6: Analyze the vehicle responses for longitudinal, lateral and vertical dynamics.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1. List out the forces acting on the vehicle accelerating uphill.	CO1	[K_2]
2. Sketch SAE Tire Axis Diagram	CO2	[K_2]
3. Define Ride comfort of a vehicle	CO3	[K_2]
4. Describe hydroplaning	CO2	[K_2]
5. A single degree of freedom having a mass of 250 N and stiffness of 100 N/m. calculate the natural frequency and critical damping coefficient.	CO1	[K_2]
6. Among critical damping and under damping, choose a damping system for Vehicle suspension system and justify your selection.	CO3	[K_3]
7. Define Slip Angle	CO4	[K_2]
8. Explain the causes of Rolling resistance in a tire.	CO2	[K_2]
9. Differentiate and constructive interference and destructive interference.	CO5	[K_2]
10. Justify the need for banking of roads	CO4	[K_3]

Answer FIVE Questions: -
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. Derive the expression for calculating the Maximum Tractive Force generated by	CO6	[K_3]

the vehicle front tires and make your inference on the advantage of front wheel drive and rear wheel drive.

| 12. | a) | Explain the selection of the braking force distribution with respect to d/g curve for a light commercial vehicle with an example | 8 | CO6 | [K₃] |
| | b) | Derive the expression to calculate the stopping distance of a Four wheeled vehicle. | 8 | CO1 | [K₃] |

13. Derive equation of motion simple Quarter car model and explain the parameters that affect the ride comfort and road holding ability.

      CO3 [K₃]

14. Using Under steer coefficient constant brief under steer, over steer and neutral steer

      CO4 [K₂]

15. With neat sketch explain the noise measurement techniques for Stationery vehicle and accelerating vehicle

      CO5 [K₂]

16. Explain the experimental procedure to calculate the height of center of gravity and deduce the expression for it.

      CO2 [K₃]

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