Register Number:……..

KUMARAGURU
college of technology
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B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

AUTOMOBILE ENGINEERING

U18AUI6202: Vehicle Dynamics

COURSE OUTCOMES

CO1: Identify the forces acting on vehicle for the given conditions and draw free body diagram.

CO2: Infer and explain the phenomena of the forces that acts on the vehicle.

CO3: Determine the reaction forces induced in the vehicle.

CO4: Develop mathematical model of the vehicle system and elements.

CO5: Provide solution by developing model and solving it.

CO6: Justify the vehicle response for the forces and moments that acts on the vehicle.

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

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	A vehicle with wheel base of 1400 cm and weight of 1200 Kg, having center of gravity at 800 cm from front axle, calculate the weight distribution of the vehicle with respect to front and rear axle.	CO5	[K_3]
2.	Draw SAE Vehicle Axis diagram and list out the moments occurring in the vehicle.	CO1	[K_2]
3.	Sketch the Free body Diagram of a vehicle accelerating downhill.	CO2	[K_3]
4.	Brief the importance of cornering force developed in a tire.	CO2	[K_2]
5.	Mention the need for Aquaplaning in tires.	CO3	[K_1]
6.	Define Degrees of Freedom.	CO4	[K_1]
7.	Explain the cause of failure during occurrence of resonance in vibration.	CO4	[K_2]
8.	List out the main requirements of suspension system.	CO5	[K_2]
9.	Distinguish between noise and music.	CO2	[K_2]
10.	Relate the velocity of the sound with respect to solid, liquid and air medium.	CO2	[K_2]

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

11.	a)	Draw Free Body Diagram of Vehicle Braking on Straight Road and Derive the Expression For the maximum Braking force that a tire could generate.	10	CO4	[K_3]
	b)	With respect to d/g Ratio comment on the possibility of front wheels to be locked and illustrate the vehicle motion with respect to the conditions mentioned.	6	CO6	[K_3]
12.	a)	Illustrate the occurrence of the rolling Resistance with respect to hysteresis loss.	8	CO2	[K_2]
	b)	With neat sketch explain the rolling resistance occurrence with respect to the Pressure distribution at the contact patch and describe its effect with respect to Over inflation, under inflation conditions.	8	CO2	[K_2]
13.		Draw a half car model and derive the equation of motion as per D Alembert's Principle and explain with necessary free body diagrams.	16	CO4	[K_3]
14.		Illustrate the steady state handling characteristics of a vehicle and sketch the Speed vs Steer angle to differentiate under steer, neutral steer and over steer.	16	CO4	[K_2]
15.		Explain the procedure for calculating the height of center of gravity with neat sketch and derive its equation.	16	CO5	[K_2]
16.	a)	Brief about amplitude, frequency, wavelength and speed properties of sound with required diagram.	10	CO2	[K_2]
	b)	Illustrate constructive interference and destructive Interference of the sound waves.	6	CO2	[K_2]

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