6th Semester	RAU6C001	Vehicle Dynamics	L-T-P 3-0-0	3 Credits

MODULE - I **(08Hours)**

Fundamental of Vibration, Mechanical Vibration Systems. Model of an automobile - single, two, multi degrees of freedom systems - free, forced and damped vibrations. Magnification factor, Base Excitation-transmissibility – vibration absorber, Modelling and Simulation.

MODULE – II **(12Hours)**

Hypothetical Vehicle Control loop, fundamental approach, vehicle co-ordinates, motion variables. Forces – dynamic axle loads, static loads on level ground, aerodynamic forces on body, hitch forces – problems

Power Limited Acceleration, Static loads on level ground, aerodynamic forces on body, fundamental expressions, constant retardation, wind resistance, power, braking forces, brakes: disc and drum, front, rear and four-wheel braking, road friction rolling resistance, problems.

MODULE – III **(08Hours)**

Load distribution, calculation of acceleration, tractive effort and reactions for different drives, stability of a vehicle on a curved track, slope and a banked road. Oversteer under steer, steady state cornering, effect of braking, driving torques on steering, effect of camber, transient effects in cornering.

MODULE – IV **(08Hours)**

Requirements, Spring mass frequency, wheel hop, wheel wobble, wheel shimmy, choice of damper characteristics and suspension spring rate, calculation of effective spring rate, vehicle suspension in fore and aft direction, roll axis and vehicle under the action of side forces. Tyre – requirements, types, testing, dynamics, ride characteristics, power consumed by a tyre.

Books:

1. Hans B Pacejka, Tire and Vehicle Dynamics,3rd Edition, Elsevier Ltd., 2012.
2. Amitosh D, Vehicle Dynamics, Galgotia Book Ltd., 2010.
3. Rao V Dukkipati, Road Vehicle Dynamics, Springer 2008.
4. Werner And Karl, Ground Vehicle Dynamics, Springer Berlin Heidelberg, 2008.
5. Giri N.K – Automotive Mechanics, Khanna Publishers, 2002.
6. Rao J.S and Gupta. K "Theory and Practice of Mechanical Vibrations", Wiley Eastern Ltd., New Delhi -2, 2002.
7. Ellis.J.R - "Vehicle Dynamics"- Business Books Ltd., London- 1991.
8. Giles.J.G.Steering - "Suspension And Tyres", Illiffe Books Ltd., London- 1998.
9. Design of Machine Elements by C. S. Sharma and K. Purohit, PHI.

Course Name: Vehicle Dynamics

Course Link: https://nptel.ac.in/courses/107/106/107106080/

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