PAU6I101 VEHICLE DYNAMICS (3-0-1)

MODULE I INTRODUCTION
Fundamental of vibration, Mechanical vibrating systems. Modelling and Simulation - Model of an automobile - Single, two, multi degrees of freedom systems - Free, forced and damped vibrations. Magnification factor - Transmissibility – Vibration absorber.

MODULE II Multi Degree of Freedom Systems:
Closed coupled system - Eigen value problems - Far coupled Systems -Orthogonality of mode shapes – Modal analysis - Forced vibration by matrix inversion. Approximate methods for fundamental frequency - Dunkerley's lower bound - Rayleigh's upper bound - Hozler method for close coupled systems and branched systems.

MODULE III SUSPENSION AND TYRES
Requirements, sprung 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.

MODULE IV VEHICLE HANDLING AND STABILITY
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.

TEXT BOOKS
1. Giri N.K – Automotive Mechanics, Khanna Publishers, 2002.
2. Rao J.S and Gupta. K "Theory and Practice of Mechanical Vibrations", Wiley Eastern Ltd., New Delhi -2, 2002.

REFERENCE BOOKS
1. Heldt.P.M -"Automotive Chassis"- Chilton Co., New York- 1992
2. Ellis.J.R - "Vehicle Dynamics"- Business Books Ltd., London- 1991
3. Giles.J.G.Steering - "Suspension and Tyres", Illiffe Books Ltd., London- 1998
4. Ham B, Pacejka - Tyre and Vehicle Dynamics - SAE Publication - 2002.
5. Gillespie T.D, "Fundamentals of Vehicle Dynamics", SAE USA 1992

VEHICLE DYNAMICS LABORATORY

List of experiments(Any six)
1. Overhauling of independent suspension system.
2 Overhauling of recirculating ball type steering.
3. Overhauling of Rack and pinion steering gear box.
4. Overhauling of Hydraulic brake.
5. Numerical simulation of steering geometry optimization.
6. Numerical simulation of susprnsion's dimension optimization.
7.To study the torsional vibration of single rotor system.
8.To study the free vibration of two rotor system and determine it's natural frequency.