

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Mechanical Engineering (I.C.Engine & Automobile)

Subject Name Vehicle Dynamics

Sr.No	Course content
1.	Suspension system - requirements, types, air suspension, rubber suspension, Shock absorbers; compensated suspension systems; design of leaf spring; coil spring and torsion bar; types of drives-Hotchkiss and torque tube; wheel alignments; wheel wobble; wheel shimmy; pitching; bouncing and rolling; roll centre and roll axis; anti-roll bar; road holding.
2.	Handling Characteristics: Steering geometry; Fundamental condition for true Rolling; Akerman's Steering Gear; Davis Steering gear; Steady state Handling; Neutral steer; Under steer and over steer; Steady state response; Yaw velocity; Lateral Acceleration; Curvature response & directional stability; jack-knifing in articulated vehicle; loading of automobile chassis due to road irregularities; comfort criteria; load transferred while braking and cornering; equivalent weight of vehicle.
3.	Ride Characteristics: Human response to vibrations; Single degree & Two degree freedom; Free & Forced vibrations; Vehicle Ride Model; Quarter car suspension model; Half car suspension model; Full car suspension model; Two degree freedom model for sprung & unsprung mass; Two degree freedom model for pitch & bounce; Vibrations due to road roughness and engine unbalance; Transmissibility of engine mounting; Motion of vehicle on undulating road.
4.	Stability of Vehicles: Load distribution, calculation of tractive effort and reactions for different drives, stability of a vehicle on a slope, on a curve and a banked road.

Reference Books:

1. Theory of Ground Vehicles - J. Y. Wong - John Wiley & Sons, NY
2. Steering, Suspension & Tyres – J. G. Giles, Iete Books Ltd., London
3. Mechanics of Road Vehicles – W. Steed, Iete Books Ltd. London
4. Automotive Chassis – P. M. Heldt, Chilton Co. NK
5. Gillespie.T.D., "Fundamental of vehicle dynamic society of Automotive Engineers ", USA, 1992.
6. Vehicle dynamics and control by Rajesh Rajamani , Springer publication
7. Vehicle Dynamics : Theory and Application by Reza N Jazar, Springer publication.