

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Vehicle Dynamics	MED 605	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I	3	3-0-0	3 Hours

Unit – I

Introduction to Vehicle Dynamics: Various kinds of vehicles; Motions; Mathematical modeling methods; Multibody system approach; Lagrangian formulations; Methods of investigations; Stability concepts. **(07 Hours)**

Unit – II

Mechanics of Pneumatic Tyres: Tyre construction; SAE recommended practice; Tyre forces and moments; Rolling resistance of tyres; Tractive effort and longitudinal slip; Cornering properties of tyres; Performance of tyre traction on dry and wet surfaces; Ride properties of tyres. **(06 Hours)**

Unit – III

Performance Characteristics of Road Vehicle: Equation of motion and maximum tractive effort; Aerodynamic forces and moments; Vehicle power plant and transmission characteristics; Prediction of vehicle performance; Operating fuel economy; Braking performance. **(08 Hours)**

Unit – IV

Handling and Stability Characteristics of Road Vehicles: Steering geometry; Steady state handling characteristics; Steady state response to steering input; Testing of handling characteristics; Transient response characteristics; Directional stability; Effects of tyre factors; Mass distribution and engine location on stability of handling. **(08 Hours)**

Unit – V

Vehicle Ride Characteristics: Human response to vibration; Vehicle ride models; Introduction to random vibration - 1) Road surface profile as a random function; 2) frequency response function; 3) Evaluation of vehicle vertical vibration in relation to ride comfort criteria; 4) Active and semi active systems; 5) Optimum design for ride comfort and road holding. **(09 Hours)**

Unit – VI

Tyres: Mechanics; Testing and modeling in detail. **(07 Hours)**

Recommended Books:

1. Theory of Ground Vehicles; Wong; J.Y.; John Wiley and Sons; NY; 1993.
2. Fundamentals of Vehicle Dynamics; Gillespie; T.D.; SAE Publication; Warrendal; USA; 1992.
3. Tyres; Suspension and Handling; Dixon; J.C.; SAE Publication; Warrendal; USA and Arnold Publication; London; 1997.