Vehicle Dynamics 3 0 0 3

Description: Vehicle System- Forces and its effect.

Tires- its mechanics, models and resistance to motion.


Vehicle Dynamics testing Instrumentation, ISO Standards in testing.


Road Excitation and Characterization.

Models for vehicle ride and ride comfort.

Books


Automotive Engines & Systems 3 0 0 3

Course Contents:

Introduction and Overview – History of automobiles and an overview of a modern car.

Engines – Applications of IC engines, Types of engines and their working, Classification, Automotive engines their systems and requirements, Ideal engine cycles, Factors affecting thermodynamic efficiency, Actual engine cycles, Valves, timing and mechanisms, Mixture requirements in SI and CI engines, Mixture preparation systems for SI and CI engines, Ignition systems and combustion chambers, Combustion in SI and CI engines.


Steering System and Steering Dynamics – Mechanism, wheel alignment and steering dynamics.

Suspensions – Components and type of suspension, roll center analysis, tires and their role in handling and ride.

Brake Systems – Principles, Dynamics and Components, Anti-lock Brake System.

Text Books:


4. References:


**Structural and Component Design of Vehicles**  
4004

Review of the behaviour of thin walled beams – in bending and torsion, with examples from Vehicle structures. Load Cases and load factors in vehicle design

Analysis of Chassis, body shell analysis. Simple Structural Surface Method and the Finite element method. Safety against Crash


Steering: Layout, Design of steering systems.

Selection/Design of gearbox, clutch, drivelines, axles and its integration.

Introduction to engine component design

**Text Books:**


**References:**


**Mechatronic System Design**  
2034

Introduction to the field of mechatronics; Mechatronics systems; Mechatronics design approach; Modeling electromechanical system; Introduction to sensors, actuators and their characteristics; Introduction to micro-electromechanical-system, Physical system modeling and simulation; Micro-fabrication techniques; Smart instrumentation system; Mechatronics-based embedded system design; Smart product design. Case studies relevant to the field of Mechatronic systems and applications.

Mechatronic laboratory includes experiments related to exercises in microcontroller programming and interfacing sensors and actuators, drive control system, automation and
modular production system, robotic system, opto-mechatronics, photovoltaic system, mechatronic workstation and mechatronics design project (four weeks).

**Mathematical Preliminaries** – Review of Laplace transforms, Fourier transforms, linear algebra and ordinary differential equations.


References:


**Finite Element Analysis**


One dimensional Finite elements and the computational procedure.

Element Formulation: Interpolation function, simple 2D Elements and the isoparametric formulation.

Assembly Procedure, Solution and interpretation of results.

Case studies using all the popular elements.

Text books


References