

Branch Name:	Mechanical Engineering
Semester/Year:	Semester VII / Forth Year
Subject Title:	Automobile Engineering
Subject Code:	1ET1010701
Pre-requisite:	Basic Knowledge of I.C.Engine.

Course Objectives:

1. The aim to introduce students to the vehicle structure and associated systems.
2. Fundamentals related to vehicle and its systems' layouts, basic design of vehicle body structure and selection of systems components are introduced.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to Automotive Systems :Vehicle body classification and specification: Body construction type, Location of engine and Drive system types and arrangement, specification of vehicles; Functional requirements of vehicle body, Body trim and fittings, Overview of various systems including safety features, steering system types, Tire construction and types.	05	10
2	Body Load Analysis: Vehicle Loads: Static load, Load due to Acceleration and Braking, Moments and Torque due to driving conditions, resistance to motion and aerodynamic load, Types of materials used in body construction, Analysis and Selection of body member sections, Body sub frame and under floor structure, car front and rear end structure, Vehicle Structure Analysis by Simple Structural Surface (SSS) Method: Saloon and simple van.	09	22
3	Transmission and Driveline systems: Constructional features and working of clutches, Gear Train: sliding mesh, constant mesh and synchromesh gear boxes with related components, Propeller and drive shaft, universal joints, Rear wheel drive arrangements, Rear axle final drive, the differential, rear axle, Simple problems in all mentioned topics, Automatic Transmission and CVT.	10	25
4	Suspension, Steering and Braking systems :Types of suspension systems, Functional requirements of suspension systems, Front suspension system and Steering: Types, Definitions for wheel orientation and its effect, Types and Constructional features of Front Suspension, , Steering layout, types of steering gears, steering linkages, steering mechanism, definitions and significance of camber, caster and king pin inclination, toe in and toe out on turn, measurement and adjustment of various steering system layouts, steering ratio, under steering	12	30

	and over steering, steering geometry; Rear suspension system: Types, Factors affecting design and selection; Performance Analysis of Suspension system: Mobility, kinematic / graphical analysis, Roll centre analysis, and force analysis. Brake system components and configurations, Fundamentals of braking: braking distance, braking efficiency, weight transfer, wheel skidding, Break proportioning and adhesion utilization, ABS and Electronic Braking system: Working principles, Features and advantages.		
5	Electrical and Electronics: Electrical and electronic components of vehicle, fundamentals of engine electrical, Lighting and Indicators: Features, Requirements and typical settings, Body electrical and electronic systems, Monitoring and Instrumentation.	04	8
6	Modern Vehicles: Introduction to electric vehicles & hybrid vehicles, Specification of Recent Cars.	02	5

Course Outcomes:

The student will be able to

1. Understand anatomy of the automobile in general and importance of each part.
2. Get the Knowledge of various parts like engine, transmission, clutch, brakes, the steering and the suspension systems operate.
3. Get the Knowledge of vehicle dynamics and electronic system of automotive.

List of Reference Books:

1. Singh, Kirpal. "Automobile Engineering, Vol.I& II." Standard Publication (2008).
2. Gupta, K. M. "Automobile Engineering Vol. I & II." Umesh Publications (2002).
3. Giri, N. K. Automobile technology. Khanna Publishers, 2011.
4. Crouse, William H., and William Harry Crouse. Automotive mechanics. Tata McGraw-Hill Education, 1982.
5. Narang, G. B. S. Automobile Engineering. Khanna Publishers, 2005.

List of Practical:

1. Study constructional features of vehicle body, various layouts, vehicle classifications and specifications.
2. Load analysis of two to three different classes of four wheelers.
3. Study vehicle Aerodynamics: Vehicle features and Loading.
4. Study components of transmission system.
5. Study constructional features and working of clutches and automatic transmission system.
6. Study different types of steering systems, constructional features and related configurations.
7. Study different types of braking systems, their constructional features and typical layout for hydraulic pneumatic and electronic brakes.
8. Study features, requirement and components of electrical and lighting system.
9. Study electronic systems of a vehicle along with different types of sensors, safety features and their integration.
10. Assignment.

E-Resources:

1. nptel.ac.in/courses/101101001/28