

ME452: AUTOMOBILE ENGINEERING
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To understand the basic structure of Automobiles, their systems and to develop methodologies which facilitate the application of the subject to practical problems for safety, economy and stability.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				Total Marks
L	T	P		Theory		Practical		
			ESE	CE	ESE	CE		
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>Introduction to Automobile & Automobile Performance:</u> Development of automobile, classification of automobiles, main parts of automobiles, vehicle assemblies, specifying an automobile, resistance to the motion of the vehicle, power required for propulsion of the vehicle, power required for acceleration, effect of different drives like front wheel/rear wheel/for wheel drive, stability of a vehicle on a slope, dynamics of a vehicle running on banked track.</p> <p><u>Chassis, Frame & Body:</u> Types of frames, engine location, Comparison of front and rear mounting of engine. Rear, front and four wheel drives, their relative merits, types of chassis, types of bodies & their construction.</p>	05
2	<p><u>Transmission System:Clutch:</u> Necessity and requirements of clutch, review of constructional features and working of different types of clutch, calculation of surface area and number of driving and driven plates, fluid coupling.</p> <p><u>Gear Box:</u> Functions and need of gear box, gears & gear ratios, types of manual gear boxes, automatic transmission, epicyclic gearing, torque converter, free wheel clutch, semi/fully automatic transmission, continuously variable transmission (CVT).</p> <p><u>Propeller Shaft, Differential and Rear axle:</u> Propeller shafts and their types, hotchkiss drive, torque tube drive, whirling of propeller shaft. Principle of the differential, limited slip differential, rear axle</p> <p><u>Wheels & Tyres :</u> Types of wheels, wheel dimensions, types of tyres, tread design, tyre section, designations, wear</p>	12

Unit No.	Topics	Teaching Hours
3	<u>Steering System:</u> Steering layout, types of steering gears, steering linkages, steering mechanism, definitions and significance of camber, caster, king pin inclination, toe in and toe out on turn, measurement and adjustment of various steering system layouts, steering ratio, under steering and over steering, power assisted steering, steering geometry, checking wheel alignment and steering geometry, computerized wheel alignment equipment.	06
4	<u>Suspension System:</u> Principle, type of suspension system, conventional and independent front and rear axle, spring, rubber and air suspensions, automatic/hydro suspension system, shock absorbers.	04
5	<u>Brakes:</u> Principle, braking distance, braking efficiency, weight transfer, wheel skidding, principle and working of various types of brakes, power assisted brakes, and power operated brakes, anti-lock brake systems (ABS), diagnosis of faults, adjustment and maintenance of brakes.	06
6	<u>Battery, Lighting System , Accessories and Safety System : Battery:</u> Construction, working, methods of rating, faults, charging methods, test, generator and cranking motor with drive purpose, construction, faults and diagnosis, voltage and current regulator, purpose, typical circuit, layout, working principle, voltage setting. <u>Lighting system:</u> Wiring system, head lights, aiming of head lights, indicating lights. Accessories like direction indicators, hazard flashes, horn, speedometer, tachometer, wind screen wiper, wind screen washer, central locking system, power windows, and vehicle tracking system. Safety provisions in an Automobile.	06
7	<u>Modern Vehicles:</u> Construction and operational features of four wheelers available, introduction to electric vehicles & hybrid vehicles. Future Vehicles.	04
TOTAL		42

List of References:

1. "Automobile Engineering" Vol- I & II by Dr. Kirpal Singh, Standard Pub. & Dist.
2. "Automobile Engineering" Vol- I & II by Dr. K.M.Gupta, Umesh Pub.
3. "Automobile Engineering" by R.B.Gupta, Satya Prakashan
4. "Automobile Technology" by Dr. N.K.Giri, Khanna Pub.
5. "Automotive Mechanics" by W.Crouse, Tata Mc Graw Hill
6. "Automobile Engineering" by G.B.S.Narang, Khanna Pub

Course Outcomes (COs):

After learning the course the students should be able to:

1. Explain the construction and functional details of automobile.
2. Illustrate the construction and functional details of transmission systems.
3. Analyze the Steering system.
4. Illustrate the construction of Suspension systems.
5. Analyze the braking system.
6. Illustrate Battery, Lighting, Accessories and Safety System
7. Illustrate the Modern automobile