4ME55: AUTOMOBILE ENGINEERING
CREDITS - 4 (LTP: 3, 0, 1)

Course Objective:

To understand the basic structure of an Automobile, its systems and to develop methodologies which facilitate the application of the subject to practical problems for safety and stability.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				
				Theory		Practical		Total Marks
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction to Automobile & Automobile Performance:** 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, stability of a vehicle taking a turn. **Modern Vehicles:** Construction and operational features of four wheelers available in Indian market, introduction to electric vehicles & hybrid vehicles. Future Vehicles**.** **Chassis, Frame & Body:** 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.	6
2	**Transmission System:** **Clutch:** Necessity and requirements of clutch, constructional features and working of different types of clutch, calculation of surface area and number of driving and driven plates, fluid coupling. **Gear Box:** Functions and need of gear box, gears & gear ratios, types manual of gear boxes, automatic transmission, epicyclic gearing, torque converter, free wheel clutch, semi/fully automatic transmission, continuously variable transmission(CVT). **Propeller Shaft, Differential and Rear axle:** Propeller shafts and their types, hotchkiss drive, torque tube drive, whirling of propeller shaft. Principle of the differential, limited slip differential, rear axle **Wheels & Tyres :** Types of wheels, wheel dimensions, type of tyres, tread design, tyre section, designations, wear	11

Unit No.	Topics	Teaching Hours
3	**Steering System:** 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.	7
4	**Suspension System:** Principle, type of suspension system, conventional and independent front and rear axle, spring, rubber and air suspensions, automatic/hydro suspension system, shock absorbers.	5
5	**Brakes:** Principle, braking distance, braking efficiency ,weight transfer, wheel skidding, principle and working of various types of brakes, power assisted brakes, power operated brakes, anti-lock brake systems (ABS), diagnosis of faults , adjustment and maintenance of brakes.	7
6	**Battery, Lighting System , Accessories and Safety System :** **Battery:** 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. **Lighting system:** 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	6
	Total	**42**

List of References:

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

Course Outcomes (COs):

After learning the course the students should be able to:

1. Understand the construction details of different types of vehicle and functions of various systems. Modern Vehicles
2. Understand the construction of transmission systems.
3. Analyze basic calculation of Steering.
4. Understand the construction of Suspension systems.
5. Analyze weight transfer by Braking and reaction coming on each wheel.
6. Understand Battery, Lighting, Accessories and Safety System