

Savitribai Phule Pune University
B E (Mechanical) Semester II (2012 Course)
(402049 D) AUTOMOBILE ENGINEERING (Elective III Open Elective)

Code	Subject	Teaching Scheme (Weekly Load in Hrs)			Examination Scheme (Marks)					
		Lect	Tut	Prac	Theory		TW	PR	OR	Total
402049D	Automobile Engineering				In Sem	End Sem				
		4	--	--	30 (1 Hr)	70 (2 1/2 Hrs)	--	--	--	100

Pre-requisites: I. C. Engine, Thermodynamics, Theory of machine & Mechanism
Basic Electrical & Electronics, Machine Design.

Course Objectives:

- ❖ To understand basics of Automobile Engineering & various Automotives system.
- ❖ To understand vehicle layout, vehicle specifications & important of automobile.
- ❖ To make the student conversant with drive train & transmission.
- ❖ To make the student conversant with Suspension, Steering, Brakes systems & Tyre Wheel assembly.
- ❖ To make the student conversant with Vehicle Maintenance & Garage Practice.
- ❖ To understand the various Automobile Electrical System, Vehicle performance & their safety.

Course Outcomes: After completion of the course student would be able to handle technical & management problems in automotive industries. The student would be able to diagnosis the faults of automobile vehicles. Ability to understand various transmission systems, Suspension, brakes, Vehicle Performance, Vehicle Safety.

1. Introduction to Automobile Engineering 8 Hrs

Automobile history and development, current scenario in Indian auto/ ancillary industries, Role of the automobile industry in national growth, Classification, types of chassis layout with reference to power plant locations and drive, Vehicle frames, Various types of frames.

Constructional details, Unitised frame body construction, Loads acting on vehicle frame, details of chassis material.

2. Drive Train & Transmission 8 Hrs

Classification of clutches, Single plate & with dual flywheel effect, Multi plate, Cone, diaphragm spring, Centrifugal, Clutch materials, Clutch plate, Electromagnetic, vacuum operated, Necessity of gear box, Manual gear box-Constant mesh, Sliding mesh, Synchromesh, Epicyclic, fluid flywheel, Torque convertor, Continuous variable transmission, Electronic transmission control, overdrive, Propeller Shaft, Universal Joint, Differential and final drive, hotchkiss drive, torque tube drive.

3. Front & Rear Axle, Steering System, Wheel & Tyres 10 Hrs

Axle: Purpose and requirement of front & rear axle, live and dead axles types & arrangement, types of loads acting on rear axles, full floating, three quarter floating and semi floating rear axles.

Steering System: Steering mechanism, steering geometry, cornering force, slip angle, scrub radius, steering characteristic, steering linkages & gearbox, power steering, collapsible steering, reversibility of steering, four wheel steering.

Wheel and Tyres: Wheel construction, alloy wheel, wheel alignment and balancing, type of tyres, tyre construction, tyre materials, factors affecting tyre life.

4. Suspension & Brakes System

8 Hrs

Sprung and unsprung mass, types of suspension linkages, types of suspension springs- leaf, coil, air springs, hydro gas, rubber suspension, interconnected suspension, self leveling suspension (active suspension), damping and shock absorbers

Types of brake systems - drum, disc, operation-mechanical, hydraulic, air brakes, servo and power braking, hand brake, ABS.

5. Vehicle Performance, Safety & Modern Trends

8 Hrs

Vehicle performance parameters, road resistance, traction and tractive effort, power requirement for propulsion, road performance curves(Numerical treatment expected), Stability of vehicles, roll over safety regulations, Vehicle safety- active, passive safety, air bags, seat belt, Vehicle interior and ergonomics, comfort, NVH in automobiles, electrical car layout, hybrid vehicles, Solar operated vehicle, measuring instruments for wear, speed, acceleration, vibration, noise.

6. Electrical System & Vehicle maintenance and Garage Practice

10 Hrs

Batteries: Principles and construction of lead-acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on battery condition, charging methods.

Lighting System & Accessories: Insulated & earth return systems, positive & negative earth systems, electrical fuel pump, speedometer, fuel, oil & temperature gauges, horn, wiper system, trafficator, sensors and actuators, electronic control unit, traction control devices.

Schedule maintenance chart of a vehicle, maintenance, overhauling & servicing of chassis, clutch, gear box, propeller shaft, differential, axles, steering system, wheels, tyres, suspension, brakes system, electrical system.

Reference Books:

1. K. Newton and W. Seeds, T.K. Garrett, "Motor Vehicle", 13th Edition, Elsevier publications.
2. Hans Hermann Braess, Ulrich Seiffen, "Handbook of Automotive Engineering", SAE Publications.
3. William H. Crouse., "Automotive Mechanics", Tata McGraw Hill Publishing House.
4. Joseph Heitner, "Automotive Mechanics", C.B.S Publishers And Distributors.
5. SAE Manuals and Standards.
6. Automobile Mechanics -.N. K. Giri
7. Automobile Electrical Equipment -P. S. Kohali, Tata McGraw Hill Publishing House.
8. Narang G. B. S , " Automobile Engineering", S. Chand and Company Ltd.
9. Dr.Kirpal Singh, "Automobile Engineering", Volume 1, Standard Publishers distributors.
10. Automobile Mechanics, "Crouse/Anglin",TATA Mcgraw-Hill.
11. Automobile Engineering, "R.B.Gupta", Satya Prakashan.
