

B.E Semester: VII

Mechanical Engineering

Subject Name: Automobile Engineering

A. Course Objective

- To develop a solution oriented approach by in depth knowledge of Automobile Engineering.
- To address the underlying concepts, methods and application of automotive technology.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
		Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME701	Automobile Engineering	3	0	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus

1. Vehicle Performance:

Forces acting on vehicle in motion, Transmission efficiency, Factors affecting it. Rolling resistance, Grade resistance, and tractive force with uniform speed and with acceleration of vehicle, Traction characteristic. Dynamic factor, weight transfer due to various resistances acting on a vehicle in motion. Stability of a vehicle in motion around the curve.

2. Chassis Frame & Body:

Types of frames engine location. Comparison of front and rear mounting of engine. Arrangement of clutch assembly, gearbox, propeller shaft with universal joints. Front and rear differentials, rear, front and four wheel drives, their relative merits, types of chassis pre requirements of body, types of bodies & their construction.

3. Transmission System:

Clutch: Constructional features of clutch used in two wheelers, three wheelers, components of each type, their functions, force acting on them. Calculation of surface area and number of driving and driven plates. Nature of wear and tear each components, effect of misalignment and mis adjustment of components. Trouble shooting charts.

Gear Box: Sliding, constant mesh and synchro mesh, type gear box transfer case of four wheel drive vehicle. Automatic gear transmission fluid coupling torque converter, over speed drive and its working.

Propeller Shaft: Universal joints, slip joint, constant velocity joint, whirling of propeller shaft, Hotchkiss & Torque tube Drives.

Final Drive and Rear Axle: Types of front drive, differential conventional and non-slip type, pinion adjustment. Diagnosis of faults, types of rear axle.

4. Axle, Suspension and Steering System:

Front Axle: Types, Construction, Components and their functions.

Suspension System: Principle, type of suspension system, conventional and independent front and rear axle. Spring, rubber and air suspensions, automatic/Hydro suspension system.

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, wheel alignment, and diagnosis of fault.

5. Brakes:

Principles and types of various brakes, power assisted brakes, braking distance, braking efficiency weight transfer, self engineering effect and braking torque capacity. Faults, their diagnosis, adjustment and maintenance.

6. Wheels & Tyres :

Types of wheels, types of tyres, tyre construction, constituents of tyre, tyre tread pattern, tyre pressure and

wear, tyre properties tyre size, tyre maintenance.

7. Electrical Systems :

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.

Lamps, Lighting and other circuits: Electrical necessities such as fuel gauge, temperature gauge, wiper, speedometer.

8. Study of Modern Vehicle:

Construction and operational features of four wheelers available in Indian market.

9. Garages & Servicing and Trouble Shooting:

Garaging & its types, equipments for garages, tools in a service station, services carried out in garages and service station. Necessity and types of servicing, cleaning. Engine decoking automobile overhauling, car battery services, trouble shooting and remedy.

10. Air Pollution and Control:

Pollutants from gasoline engines, evaporation losses, crank case blow by, exhaust emission and effect of operating variables and electronic fuel injection, gasoline engine emission control methods such as engine design modification, treatment of exhaust gas and fuel modification, blow by control package, evaporative loss control device, catalytic converter, control of NO_x and total emission control package, diesel engine emission and control. Standards for emission of pollutants from motor vehicles, National ambient air quality standards, Euro norms, Methods of issuing PUC certificate

11. Automobile Law:

Motor vehicle act, Registration of motor vehicles, driving license, control of traffic, Insurance against third party, claims for compensation.

12. Silencer - Mufflers types:

Baffle type, wave cancellation type, resonance type, absorber type, combined resonance and absorber type. Their construction and capacity to damp high and low frequency waves.

D. Lesson planning

<u>SR. NO.</u>	<u>DATE/WEEK</u>	<u>UNIT NO.</u>	<u>%WEIGHTAGE</u>	<u>TOPIC NO.</u>
1	1 ST , 2 ND , 3 RD	1, 2, 3	20	1, 2, 3
2	4 TH , 5 TH , 6 TH	4, 5	20	4, 5
3	7 TH , 8 TH , 9 TH	6, 7	20	6, 7
4	10 TH , 11 TH , 12 TH	8, 9, 10	20	8, 9, 10
5	13 TH , 14 TH , 15 TH	11, 12	20	11, 12

E. Instructional Method & Pedagogy

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
8. **Practical / Oral:** Term work shall be carried out to fulfill the practical credits related to course contents.

F. Students Learning Outcomes

- The student can identify different areas of Automobile Engineering.
- Can find the applications of all the areas in day to day life.

G. Recommended Study Materials

Text & Reference Books:

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