

**16AE201****AUTOMOTIVE CHASSIS**

Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P	W/RA	SSH/HS	CS	SA	S	BS
30	-	30	2	40	2	5	2	2

**Course Description and Objectives :**

This course aims at offering the fundamental concepts of different types of chassis frame construction and to gain knowledge about different types of steering geometry and types of front axle. The objective of the course is to offer knowledge on various components of a automobile chasis such as axles, frames, braking system and suspension systems. This course will help to learn the concepts regarding the ergonomics of an automobile and to educate about modern drive line.

**Course Outcomes:**

The student will be able to:

- understand the different types of chassis frames.
- gain knowledge about different steering geometry and types of front axle.
- understand constructional features and working of various suspension systems
- gain knowledge on the concepts of modern drive line.
- learn about the different braking systems like power assisted brakes, disc brakes.

**SKILLS:**

- ü *Testing of frames.*
- ü *Choose and design an axle according to requirement*
- ü *Identify various steering systems*
- ü *Select a proper test type for brakes*
- ü *Identify different suspension systems in automotive*

**UNIT-1****L-9**

**INTRODUCTION** : Layout with reference to power plant, Steering location and drive, Frames, Frameless constructional details, Materials, Testing of frames, Integral body construction.

**UNIT-2****L-10**

**FRONT AXLE STEERING SYSTEMS** :Front axle type, Rigid axle and split axle, Constructional Details, Materials, Front wheel geometry viz., Camber, Castor, Kingpin inclination, Toe-in and toe-out. Condition for true rolling motion of road wheels during steering. Steering geometry. Ackermann and Davis steering. Construction details of steering linkages. Different types of steering gear box. Steering linkages layout for conventional and independent suspensions. Turning radius, Instantaneous centre, Wheel wobble and shimmy. Over-steer and under-steer. Power and power assisted steering.

**UNIT-3****L-9**

**DRIVE LINE STUDY** : Effect of driving thrust and torque –reaction. Hotchkiss drives. Torque tube drive, radius rods. Propeller shaft. Universal joints. Final drive- different types. Two speed rear axle. Rear axle construction-full floating, three quarter floating and semi-floating arrangements. Differential-conventional type, Non-slip type, Differential locks and differential housing.

**UNIT-4****L-9**

**BRAKING SYSTEM** :Type of brakes, Principles of shoe brakes. Constructional details – materials, braking torque developed by leading and trailing shoes. Disc brake, drum brake theory, constructional details, advantages, Brake actuating systems. Factors affecting brake performance, Exhaust brakes, Power and power assisted brakes. Testing of brakes.

**UNIT-5****L-8**

**SUSPENSION SYSTEM** : Types of suspension, Factors influencing ride comfort, Types of suspension springs-independent suspension- front and rear. Rubber, Peumatic, Hydro- elastic suspension. Shock absorbers. Types of wheels. Construction of wheel assembly. Types of tyres and constructional details. Static and rolling properties of pneumatic tyres, Tubeless tyres and aspect ratio of tubed tyres.

**ACTIVITIES:**

- *Hand-on experience various chassis frames for long trailers*
- *Identify type of axle*
- *Case study of modern high end cars.*
- *Conduct tests on different types of brakes*
- *Case study of suspension system on automotive*

**LIST OF EXPERIMENTS**

Time: 30hours

**Measurement of the following chassis frames:**

1. Light duty vehicle frame (Ambassador, Maruthi van etc)
2. Heavy duty vehicle frame (Leyland, Tata etc)

**Dismantling and assembling of**

3. Front Axle
4. Rear Axle
5. Differential
6. Steering systems along with any two types of steering gear box
7. Braking systems – hydraulic servo vacuum, compressed air power brakes.
8. Leaf spring, coil spring, torsion bar spring, Hydraulic shock absorber

**Dismantling and Assembling of**

9. Clutch assembly of different types
10. Gear Box
11. Transfer case

**TEXT BOOKS:**

1. K. Newton, W. Steeds and T. K. Garret, "The Motor Vehicle", 13<sup>th</sup> edition, Butterworth Heinemann, India, 2004.
2. W. Steed, "Mechanics of Road Vehicles", Iliffe Books Ltd., 1992.

**REFERENCES:**

1. Harban Singh Rayat, "The Automobile", S. Chand and Co. Ltd, 2000.
2. G. J. Giles, "Steering Suspension and Tyres", Iliffe Books Ltd., 1975.
3. Kirpal Singh, "Automobile Engineering", Standard publishers, Distributors, 1999
4. G. B. S. Narang, "Automobile Engineering", Khanna Publishers, Twelfth reprint, 2005.
5. R. P. Sharma, "Automobile Engineering", Dhanpat Rai and Sons, 2000