

COURSE TITLE : AUTOMOBILE CHASSIS
COURSE CODE : 6051
COURSE CATEGORY : A
PERIODS/WEEK : 5
PERIODS/SEMESTER: 75
CREDITS : 5

TIME SCHEDULE

Module	Topic	Periods
1	Chassis Frame Construction and Front Axles	18
2	Suspension system of a vehicle; conventional and independent	17
3	Steering system	20
4	Different braking systems used in automobiles	20
TOTAL		75

GENERAL COURSE OUTCOME

After the completion of the course

Sl. No.	Sub	Student Will be able to
	1	Understand the different types and construction of Chassis Frames and Front Axles
	2	Understand the method of testing the chassis frame
	3	Understand the types and components of front axle of a vehicle
	4	Appreciate suspension system of a vehicle; conventional and independent
	5	Analyse the parts and working of steering system
	6	Comprehend the details of braking systems used in automobiles
	7	Understand various methods of testing brakes

SPECIFIC COURSE OUTCOME

MODULE I

- 1.1.0 Understand the different types and construction of Chassis Frames and Front Axles**
- 1.1.1 Identify the different parts of automobile chassis
 - 1.1.2 Explain the constructional details of a typical chassis frame
 - 1.1.3 Describe different types of frames used in two-wheelers, three-wheelers, and others
 - 1.1.4 Describe the various sections used in automobile chassis frames
 - 1.1.5 List the different materials used for construction of chassis frame

1.2.0 Understand the method of testing the chassis frame

1.2.1 Describe the method of testing the chassis frame alignment with using plumb bob

1.3.0 Understand the types and components of front axle of a vehicle

1.3.1 Identify front axle of a vehicle

1.3.2 Identify various types of front axles, Trans axles

1.3.3 Explain the construction details such as materials, cross section and process

1.3.4 Describe the checking of alignment of front axle using mandrels and protractor

1.3.5 Distinguish stub axles, wheel assembly and different arrangements of stub axles such as Elliot types, Reverse Elliot, Lamoine Reverse Lamoine

MODULE II

2.1.0 Appreciate suspension system of a vehicle; conventional and independent

2.1.1 Outline the importance of suspension

2.1.2 Describe the types of front suspension system – two wheeler and three wheeler and other vehicle suspensions; parallel link, wish born arc, McPherson ,torsion bar

2.1.3 Explain types of rear suspension system - conventional method – independent suspension

2.1.4 Describe the function of spring as shock absorber device

2.1.5 Explain different types of spring used in automobiles - leaf and coil springs

2.1.6 Describe different type of leaf springs used in Automobiles, quarter elliptic, half elliptic, three quarter elliptic, cantilever, helper spring

2.1.7 Explain the spring shackles and pins and their functions

2.1.8 State the function of shock absorbers as vibration damper

2.1.9 Explain the different types of shock absorbers – hydraulic, direct acting and indirect acting

2.1.10 Explain air suspension and hydro – elastic suspension

MODULE III

3.1.0 Analyse the parts and working of steering system

3.1.1 Describe the steering system Define steering geometry and directional stability and study the principles of steering system, a clear time – Davis fifth wheel steering

3.1.2 Determine instantaneous centre and turning angle

3.1.3 Explain different types of steering gear boxes – worm and roller, worm and sector, re-circulating ball type, rack and pinion

3.1.4 Distinguish different arrangements of steering linkages – and their components such as tie rod, tie rod ends

3.1.5 Explain power steering and its types, integral and linkage type

3.1.6 Explain collapsible type steering column

3.1.7 Analyse wheel alignment – castor, camber, king pin inclination and toe – in and toe – Out

MODULE IV

4.1.0 Comprehend the details of braking systems used in automobiles

- 4.1.1 Describe the function of the brake and brake system
- 4.1.2 Explain the type of brakes and braking system – mechanical, hydraulic, pneumatic servo brake system, air brake – vacuum brake, fail safe brake, dual brake, and anti-lock brake system. Drum and disk brake system – internal expanding and bend brake systems
- 4.1.3 Reproduce the layout of brake system
- 4.1.4 Explain different types, working principle of master cylinder, wheel cylinder and brake shoe
- 4.1.5 Explain the constructional details and working of components of air brake
- 4.1.6 Describe servo brake, types of servo brakes, vacuum and air working of servo brakes
- 4.1.7 Explain mechanical brake and its types of arrangements
- 4.1.8 Describe the constructional details and working of a disc brake
- 4.1.9 Describe fail safe brake, dual brake and anti lock brake system
- 4.1.10 Explain the function and different arrangements of hand brake
- 4.1.11 Explain application and working of exhaust brake
- 4.1.12 Describe the testing of brakes and brake efficiency

CONTENT DETAILS

MODULE I

Chassis -Introduction, Constructional details, Types of frame. Frame for 2 wheeler, 3 wheelers, and 4 wheeler, frame sections, sub frames. Materials used, Testing of chassis -Front Axle- Introduction, Types – dead & live axle, trans axles, Construction – material – cross section-Checking the alignment of front axle, Stub axle – different arrangements

MODULE II

Introduction to Suspension systems, Types of front suspension for Two, three & four wheeler. Air suspension, Hydro-elastic suspension. Rear Suspension system, Types-.Introduction to springs and Shock absorbing devices, Types leaf coil, springs & their arrangements, Helper spring, Spring shackle – shackle pin , Telescopic type
Shock – absorber, Hydraulic, gas filled type, Mono tube and Twin tube type, Basic suspension movements pitching, bouncing, rolling etc.

MODULE III

Introduction to Steering system & steering geometry, Principles of steering, Ackerman , Davis fifth wheel , Steering gear box – types, Worm & roller, worm & sector, Re-circulating ball, Rack & pinion, Steering linkages – arrangement – components Power steering – integral – linkage type, Collapsible type steering column. Wheel alignment –Factors affecting wheel alignment.

MODULE IV

Introduction to Brake Systems , principle of operation, weight transfer principle, types of brakes– mechanical, hydraulic, pneumatic, servo brake, Air brake – vacuum brake – fail safe brake – dual brake – anti lock brake, Drum and disc brake system – Internal expanding and externally contracting- Layout of brake system, mechanical Components, hydraulic – master cylinder, types– working principle – wheel cylinder – brake bleeding, brake shoe. Air brake – construction details – working – details components – servo brakes -working of servo brake – types, vacuum and air - disc brake – constructional details and working of engine exhaust brake –testing of braking efficiency

REFERENCES

1. P.L.Kohli - Automobile Chassis & body – Tata McGraw-hill
2. Kirpal Singh - Automobile Engg vol 1 – Standard Publication
3. W H Crouse - Automotive Chassis - Tata McGraw-hill
4. Anil Chhikara - Automobile Engineering – Satya Prakasan
5. Aehell - Automotive technology
6. Jack Erjvac - A Systems Approach to Automobile Engineering – Cengage Learning