COURSE TITLE : AUTOMOBILE CHASSIS
COURSE CODE : 4032
COURSE CATEGORY : A
PERIODS/WEEK : 4
PERIODS/SEMESTER : 72
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Introduction Chassis Frame, Front Axle	17
	Test I	1
2	Suspension system Shock Absorbing Devices	17
	Test II	1
3	Steering system and Wheel alignment	17
	Test III	1
4	Brake System	17
	Test IV	1
	Total	**72**

OBJECTIVES

Upon the completion of the course the student should be able to
1.1.0 Recognize different types of Chassis Frames and Front Axles
1.1.1 Understand 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 Distinguish various sections used in automobile chassis frames
1.1.5 Outline the different materials used for construction of chassis frame
1.1.6 Describe the method of testing the chassis frame alignment with using plumb bob
1.1.7 Identify front axle of a vehicle
1.1.8 Identify various types of front axles
1.1.9 Explain the construction details such as materials, cross section and process
1.1.10 Defend the checking of alignment of front axle using mandrels and protractor
1.1.11 Distinguish stub axles, wheel assembly and different arrangements of stub axles such as Elliot types, Reverse Elliot, Lamoine Reverse Lamoine
1.1.12 Appreciate suspension system and shock conventional and independent

2.1.0 Describe various type of independent suspensions used in absorbing devices
2.1.1 Outline the importance of suspension
2.1.2 Describe two types of front suspension system – two wheeler and three wheeler and other vehicle suspensions parallel link, wish born arc, McPherson – torsion bar – air suspension system
2.1.3 Explain types of rear suspension system - conventional method – independent suspension
2.1.4 State the function of spring as shock absorber device

2.1.5 Explain different types 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 Identify spring shackles and pins and their functions
2.1.8 State the function of shock absorbers as vibration damper
2.1.9 Demonstrate different types of shock absorbers – hydraulic, direct acting and indirect acting
2.1.10 Explain air suspension and hydro – elastic suspension

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 Predict instantaneous center and turning angle
3.1.3 Explain different types of steering gas boxes – worm and roller, worm and sector, re-circulating balll 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 Defend collapsible type steering column
3.1.7 Analyse wheel alignment – castor, camber, king pin inclination and toe – in and toe – out

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 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 break system
4.1.4 Explain different types, working principle of master cylinder, wheel cylinder and brake shoe
4.1.5 Explain 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 constructional details and working of disc brake
4.1.9 Describe fail safe brake, dual brake and anti lock brake system
4.1.10 State function and different arrangements of hand brake
4.1.11 Explain application and working of exhaust brake
4.1.12 Defend testing of brakes and brake efficiency

CONTENT OUTLINE

MODULE – I

Chassis -Introduction, Constructional details, Types of frame. Frame for 2 wheeler, 3wheelers,and 4 wheeler , frame sections, bumbers, sub frames. Materials used, Testing of chassis -Front Axle- Introduction, Types – dead & live axle, 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, 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 brake brake efficiency.

REFERENCES

1. Automobile Chassis & body - P.L.Kohli
2. Automobile Engg - Kirpal Singh
3. Automotive Chassis - P.M.Holdt
4. Automobile Engineering - Anil Chhikara
5. Automotive technology - Aehell