

1151AU214

AUTOMOTIVE CHASSIS

L T P C
3 0 2 4**1. Preamble**

This course provides an introduction to the various types of chassis, frames, front axle, universal joint, propeller shaft, torque tube drive, final drives, suspension, brakes and steering.

2. Pre-requisite

1151AU101	Engineering Mechanics
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3. Links to other courses

- Automotive Transmission
- Engine Design and Development

4. Course Educational Objectives

Students undergoing this course are expected to

- To understand different types of chassis.
- To gain knowledge about different types of steering geometry and types of front axle.
- To educate the students regarding the ergonomics of an automobile.
- Educate about modern drive line and braking systems.

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
C01	List out the types of chassis layouts, frames and materials used for heavy duty, light duty, three wheeler and two-wheeler construction and examine their specification with standards.	K3, S2
C02	Illustrate and verify the concepts, construction, material related to front axle and steering system for a typical heavy duty, light duty, three and two wheeled vehicles.	K2, S2
C03	List and verify the concepts, construction and material used for clutch, gearbox, rear axle, differential, multi-axle and propeller shaft by inspecting the heavy and light duty vehicles.	K2, S2
C04	Consolidate the concepts, types, construction and operation of different suspension systems for heavy duty, light duty, three wheeler and two-wheeled vehicles.	K2, S2
C05	Classify and inspect the different braking system used in heavy duty, light duty, three wheeler and two-wheeled vehicles on the basis of theory, construction and application.	K3, S2

6. Correlation of COs with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H	H	M	L					M		H	H

CO2	H	H	H	H	M	L					M		H	H
CO3	H	H	H	H	M	L					M		H	H
CO4	H	H	H	H	M	L					M		H	H
CO5	H	H	H	H	M	L					M		H	H

H- High; M-Medium; L-Low

7. Course Content

UNIT – I: INTRODUCTION TO FRAMES

L-9 P-6

Types of Chassis Layout With Reference to Power Plant Locations and Drives, Vehicle Frames, Various Types of Frames, Constructional Details, Materials, Testing of Vehicle Frames, Unitized Frame Body Construction, Articulated Vehicle

UNIT – II: FRONT AXLE AND STEERING SYSTEM

L-9 P-6

Types of Front Axles, Construction Details, Front Wheel Geometry: Castor, Camber, King Pin Inclination, Toe-In. Conditions for True Rolling Motion of Wheels During Steering, Steering Geometry, Ackerman's and Dave's Steering System, Constructional Details of Steering Linkages, Different Types of Steering Gear Boxes, Turning Radius, Wheel Wobble, Power Assisted Steering, Steering of Crawler Tractors, Electronic Steering Systems - Drive by Wire.

UNIT – III: DRIVE LINE

L-9 P-6

Effect of Driving Thrust and Torque Reactions - Hotchkiss Drive, Torque Tube Drive and Radius Rods, Panhard Rods, Propeller Shaft, Universal Joints, Front Wheel Drive, CV Joints, Different Types of Final Drives, Double Reduction and Twin Speed Final Drives, Differential Principle, Construction Details of Differential Unit, Non-Slip Differential, Differential Locks, Differential Housings, Construction of Rear Axles, Types of Loads Acting on Rear Axles, Fully Floating, Three Quarter Floating and Semi Floating Rear Axles, Rear Axle Housing, Construction of Different Types of Axle Housings, Multi Axle Vehicles.

UNIT – IV: SUSPENSION SYSTEM

L-9 P-6

Need of Suspension System, Types of Suspension-Active and Passive Suspension, Constructional Details And Characteristics of Leaf, Coil and Torsion Bar Springs, Independent Suspension, Pneumatic Suspension, Shock Absorbers, Recent Advancements in Suspension System, Wheels and Tires - Suspension by Wire.

UNIT – V: BRAKING SYSTEM

L-9 P-6

Classification of Brakes, Drum Brakes and Disc Brakes-Constructional Details, Theory of Braking, Concept of Dual Brake System, Parking Brake, Material, Hydraulic System, Vacuum Assisted System, Air Brake System, Antilock Braking, Retarded Engine Brakes, Eddy Retarders.Recent Advancements in Braking System, Traction Control and Stability Control – Brake by Wire.

Total: 75 Periods

8. Practical's

List of Experiments

Study and measurement of the following chassis frames

1. Heavy Duty Vehicle Chassis (Leyland, Tata Etc.)
2. Light Duty Vehicle Chassis (Ambassador, Marti Van Etc.)
3. Three Wheeler Chassis
4. Two Wheeler Chassis (Bike And Scooter)

Study, dismantling and assembling of

5. Front Axle
6. Rear Axle
7. Differential
8. Steering Systems Along with Steering Gear Box
9. Braking Systems – Hydraulic Servo Vacuum, Compressed Air Power Brakes.
10. Leaf Spring, Coil Spring, Torsion Bar Spring, Hydraulic Shock Absorber
11. Testing of Shock Absorber, Wheel Chain of Two Wheeler
12. Different Types of Gear Box
13. Transfer Case
14. Clutch Assembly of Different Types

Study, Dismantling and Assembling of Engine Components

15. Multi-Cylinder Petrol Engine
16. Multi-Cylinder Diesel Engine
17. Petrol Engine Fuel System
18. Diesel Engine Fuel System
19. Cooling System
20. Lubrication System

Total : 30 Periods

TOTAL (45 + 30 Practical):75 periods

9. Text Books

1. Kirpal Singh _ "Automobile Engineering"-Standard Publishes Distributors-Delhi-2012
2. Heldt.P.M.- "Automotive Chassis"- Chilton Co., New York- 1990

10. Reference Books

1. Steed W - "Mechanics of Road Vehicles"- Illiffe Books Ltd., London- 1960
2. Newton Steeds and Garrot- "Motor Vehicles"- Butterworths, London- 2000.
3. Judge A.W- "Mechanism of the Car"- Chapman and Halls Ltd., London- 1986
4. Giles.J.G- "Steering, Suspension and tyres"- Iiiffe Book Co., London- 1988.
5. Crouse W.H- "Automotive Chassis and Body"- McGraw-Hill, New York- 1971.