



SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Automobile Engineering		LP: AE2408
B.E : Automobile Engineering Regulation: 2022		Rev. No: 00
PG Specialisation : NA		Date: 22.01.2024
Sub. Code / Sub. Name : AE22408 / AUTOMOTIVE CHASSIS COMPONENTS: THEORY AND PRACTICES		
Unit : I		

**Unit Syllabus: FRAME, FRONT AXLE AND STEERING SYSTEM**

Basic construction of chassis, Types of chassis layout with reference to power plant location and drive, various types of frames, Loads acting on vehicle frame, types of front axles and stub axles, Front wheel geometry. Condition for true rolling motion, Ackerman's and Davi's steering mechanisms, Steering linkages, Different types of steering gear boxes, Slip Angle, over-Steer and under-Steer, Reversible and Irreversible steering, Power Steering.

Practical –dismantling and assembling of front axle and steering system of automotive vehicle.

**Objective:**

To make the students learn about the basics of automotive chassis layout, frames, Front wheel geometry and Steering System

Session No.*	Topics to be covered	Ref	Teaching Aids
01	Basic construction of chassis	1-Ch 35, Pg 915-923 7-Ch 1, Pg 2-5	PPT
02	Types of Chassis layout, with reference to Power Plant location and drive	1-Ch 23, Pg 709-719 7-Ch , Pg 4-11	PPT
03	Various types of frames, Loads acting on vehicle frame	1-Ch 35, Pg 915-923 5-Ch 11, Pg 460-641	PPT
04	Types of Front Axles and Stub Axles	5-Ch 17, Pg 705-708	PPT
05	Front Wheel Geometry	5-Ch 17, Pg 710-714	PPT
06	Condition for True Rolling Motion, Ackerman's and Davis Steering Mechanisms	5-Ch 17, Pg 717-718	PPT
07	Steering Linkages, Different Types of Steering Gears	1-Ch 40, Pg 1046-1071 5-Ch 17, Pg 734-748 7-Ch 14, Pg 227-234	PPT
08	Slip Angle, Over-Steer and Under-Steer, Reversible and Irreversible Steering	1-Ch 36, Pg 947-952 1-Ch 40, Pg 1046 7-Ch 8, Pg 915-923	PPT
09	Power-Assisted Steering	1-Ch 40, Pg 1071 5-Ch 17, Pg 749-750	PPT
10,11	Practical – dismantling and assembling of front axle and stub axle of automotive vehicle		BB
12,13	Practical – dismantling and assembling of steering system of the commercial vehicle		BB
14,15	Practical –dismantling and assembling of steering gearbox of the steering system of automotive vehicle.		BB

Content beyond syllabus covered (if any):

\* Session duration: 50 minutes



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Unit : II

**Unit Syllabus :**

Driving thrust, Torque reactions and Side thrust and its effects, Hotchkiss drive, Torque tube drive, Radius rods and Stabilizers, Propeller shaft, Universal Joints, Constant velocity universal Joints. Final drive and its types, double reduction final drive, twin speed rear axle, Differential principle, constructional details of differential unit, differential housings, non-slip differential, differential locks. Practical – dismantling and assembling of driveline system of automotive vehicle.

**Objective:**

To make the students to be familiar with the components in the drive line.

Session No *	Topics to be covered	Ref	Teaching Aids
16	Driving Thrust and its effects, torque reactions and side thrust	1-Ch 32, Pg 894-896 7-Ch 6, Pg 156-158	PPT
17	Hotchkiss drive, Torque tube drive	1-Ch 32, Pg 896-898 7-Ch 6, Pg 158-159	PPT
18	Radius rods and stabilizers, Propeller Shaft	1-Ch 32, Pg 894-896 5-Ch 16, Pg 656-660	PPT
19	Universal Joints, Constant Velocity Universal Joints	1-Ch 30, Pg 864-875	PPT
20	Final drive, different types of final drive	5-Ch 16, Pg 149-150	PPT
21	Double reduction final drive, Twin speed rear axle	1-Ch 30, Pg 864-875	PPT
22	Differential principle, Constructional details of differential unit	6-Ch 34, Pg 733-736 7-Ch 34, Pg 907-912	PPT
23	Differential housings, Non-Slip differential	7-Ch 16, Pg 687-689	PPT
24	Differential locks	1-Ch 36, Pg 950 5-Ch 16, Pg 684	PPT
25,26	Practical – dismantling and assembling of Hatchkiss drive system of automotive vehicle		BB
27,28	Practical – dismantling and assembling of universal joint of automotive vehicle		BB
29,30	Practical – dismantling and assembling of final drive system of automotive vehicle		BB

Content beyond syllabus covered (if any):

\* Session duration: 50 mins



Sub. Code / Sub. Name: AE22408 / AUTOMOTIVE CHASSIS COMPONENTS: THEORY AND PRACTICES

Unit : III

**Unit Syllabus: REAR AXLES, WHEELS, RIMS AND TYRES**

Construction of rear axles, Types of Loads acting on rear axles, Full-Floating, Three-Quarter Floating and Semi-Floating Axles, Types, Multi axles vehicles. Wheels and Rims, Types of Tyres and their constructional details. Fifth wheel coupling and tow hitch.

Practical - dismantling and assembling of rear axle system of automotive vehicle.

**Objective:**

To make the students to design the drive axle and also know to about the different types of wheels, rims and tyres.

Session No *	Topics to be covered	Ref	Teaching Aids
31	Construction of rear axles	5-Ch 16, Pg 689-690 7-Ch 6, Pg 160-161	PPT
32	Types of Loads acting on rear axles	7-Ch 6, Pg 156-158	PPT
33	Full – Floating axle,	5-Ch 16, Pg 695-698 7-Ch 6, Pg 160	PPT
34	Three–Quarter Floating axle	5-Ch 16, Pg 695 7-Ch 6, Pg 160	PPT
35	Semi–Floating Axle,	5-Ch 16, Pg 690-694 7-Ch 6, Pg 160	PPT
36	Multi axles vehicles	7-Ch 6, Pg 160-161	PPT
37	Wheels and Rims	1-Ch 46, Pg 1088-1098 5-Ch 13, Pg 533-535	PPT
38	Types of Tyres and their constructional details.	1-Ch 46, Pg 1098-1106 5-Ch 13, Pg 535-554	PPT
39	Fifth wheel coupling and tow hitch.	1-Ch 46, Pg 1175-1180	PPT
40,41	Practical - dismantling and assembling of the semi floating type rear axle system		BB
42,43	Practical - dismantling and assembling of the full floating type rear axle system		BB
44,45	Practical - dismantling and assembling of the wheels of the passenger car		BB
<b>Content beyond syllabus covered (if any):</b>			

\* Session duration: 50 mins



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Unit : IV

**Unit Syllabus: SUSPENSION SYSTEM**

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi-Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro-elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details of Leaf and Coil Springs.

Practical - dismantling and assembling of suspension system of automotive vehicle.

**Objective:**

To make the students to be familiar with the suspension system & its types.

Session No *	Topics to be covered	Ref	Teaching Aids
46	Requirement of Suspension System	1-Ch 42, Pg 1109 5-Ch 12, Pg 481-483 7-Ch 7, Pg 168	PPT
47	Types of Suspension Springs	5-Ch 12, Pg 486-488 7-Ch 7, Pg 170	PPT
48	Constructional details and characteristics of Single Leaf, Multi-Leaf spring	1-Ch 42, Pg 1117-1125 5-Ch 12, Pg 489-492 7-Ch 7, Pg 170-171	PPT
49	Coil spring, Torsion bar springs	1-Ch 42, Pg 1125-1127 5-Ch 12, Pg 495-500 7-Ch 7, Pg 176	PPT
50,51	Rubber spring Pneumatic suspension system	1-Ch 42, Pg 1125-1131 5-Ch 12, Pg 500-501 7-Ch 7, Pg 177, 191	PPT
52	Hydro – elastic Suspension Spring Systems	1-Ch 42, Pg 1137-1141 7-Ch 7, Pg 192-193	PPT
53	Independent Suspension System	5-Ch 12, Pg 511-517 7-Ch 7, Pg 184-187	PPT
54	Shock Absorbers, Types and Constructional details	1-Ch 42, Pg 1112-1116 5-Ch 12, Pg 505-511	PPT
55,56,57	Practical - dismantling and assembling of the coil spring of the passenger car		BB
58,59,60	Practical - dismantling and assembling of the leaf spring of the passenger car		BB
<b>Content beyond syllabus covered (if any):</b>			
• Adaptive suspension system.			
* Session duration: 50 mins			



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Unit : V

**Unit Syllabus : BRAKE SYSTEMS**

Need for Brake systems, Stopping Distance, Braking Efficiency, Effect of Weight Transfer during Braking, Classification of brakes, Braking Torque, drum brake and disc Brake Theory, Types and Construction of Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power-Assisted Braking System, Servo Brakes, Retarders- Principles and its types – Antilock braking systems (ABS). Principle of Electronic Brake force distribution, Corner Stability Program. Practical -dismantling and assembling of braking system of automotive vehicle.

**Objective:**

To make the students to be familiar with the different types of automobile braking system.

Session No *	Topics to be covered	Ref	Teaching Aids
61	Need for Brake systems, Stopping Distance, Time and Braking Efficiency	1-Ch 37, Pg 956-958 5-Ch 18, Pg 755-759 7-Ch 10, Pg 309-310	PPT
62	Effect of Weight Transfer during Braking, Classification of brakes	1-Ch 37, Pg 956-959 7-Ch 10, Pg 310	PPT
63	drum brake and disc Brake Theory	5-Ch 18, Pg 770-789 7-Ch 10, Pg 314	PPT
64	Types and Construction of Hydraulic Braking System	1-Ch 37, Pg 977-982 5-Ch 18, Pg 791-796 7-Ch 10, Pg 328-339	PPT
65	Mechanical Braking System, Pneumatic Braking System	5-Ch 18, Pg 801 7-Ch 10, Pg 324-327 7-Ch 10, Pg 355-366	PPT
66	Power-Assisted Braking System, Servo Brakes	7-Ch 10, Pg 347-349	PPT
67	Retarders- Principles and its types	1-Ch 37, Pg 959-962	PPT
68	Antilock braking systems (ABS).	7-Ch 10, Pg 380	PPT
69	Principle of Electronic Brake force distribution, Corner Stability Program	1-Ch 39, Pg 1015-1035	PPT
70,71,72	Practical - dismantling and assembling of the drum brake assembly of the passenger car		BB
73,74,75	Practical - dismantling and assembling of the disc brake assembly of the passenger car		BB
<b>Content beyond syllabus covered (if any):</b>			
<ul style="list-style-type: none"> <li>Adaptive braking system</li> </ul>			

\* Session duration: 50 mins

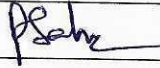
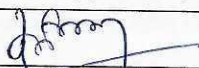




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**REFERENCES:**

- 1) Newton Steeds and Garret, "Motor Vehicles" 13th Edition, Butterworth, London, 2005.
- 2) Heinz Heisler, "Modern Vehicle Technology", Butterworth, London, 2005.
- 3) Devaradjane. Dr. G., Dr. M. Kumaresan, "Automobile Engineering", AMK Publishers, 2013.
- 4) Heldt P.M., "Automotive Chassis", Chilton Co., New York, 1990
- 5) Giri. N.K., "Automotive Mechanics", Khanna Publishers, New Delhi, 2005.
- 6) Milliken & Milliken, "Race Car Vehicle Dynamics", SAE, 1995
- 7) Kirpal Singh, "Automobile Engineering", A.K. Janin Standard Publishers, Delhi, 2011.

	Prepared by	Approved by
Signature		
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Designation	Assistant Professor	Professor & Head
Date	22-01-2024	22-01-2024
Remarks *:		
Remarks *:		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD