



FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Automobile Engineering)

Semester: V

Course Code: 202010504

Course Title: Vehicle Body Engineering

Course Group: Professional Core Course

Course Objectives: This course will emphasis on gaining insight of automotive body structural behavior, the relationship to the vehicles, structural topology, constructional details & body styling, body materials, skills in the area of car, bus and commercial vehicle body design & features and occupant safety for the vehicle.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	0	0	3	50/18	NA	50/17	NA	100/35

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Automotive Chassis and Body: Vehicle Classification, History of body engineering, Body requirements, function of body, Description of the body types, Body Nomenclature, Frames: functions and types of frames & Body (Ladder, Cruciform, twin tube, backbone, monocoque, space frame, Platform structures), sub-frames, Load distribution of structure, Classification of motor vehicle, Location of power plant, Location of different chassis components.	8



2	Car Body and Styling: Different types of car body coach, Car body styles, Monocoque/integral body construction detail, Description and function of body components, sub-frame and underfloor structure, loads on the car body, Types of frame section, Design features of the car body, Body loads, Concept of body-in-white design, Basic global loads, basic proportion for styling, Calculation of loading cases Static loading case, Asymmetric loading case, Longitudinal loads, Side Loads, Combination of load cases. Car body materials.	10
3	Bus and Commercial vehicle body: Classification of bus body, coach and bus body styles, Bus and coach bodies: Layout, Floor height, Engine location, Entrance and Exit location, seating dimensions. Constructional details: Frame construction, Double skin construction, Types of metal section used, Bus body regulations- Conventional and Integral type construction. Commercial vehicle: Types of bodies such as Drop side, tanker, tipper, flat platform etc., coach construction, Dimension of driver cabin in relation to control, Cabin design. Body materials.	6
4	Vehicle Aerodynamics: Objectives, Vehicle drag and types, Various forces and moments, Effects of forces and moments, Wind Tunnel test, Body optimization techniques for minimum drag, Drag calculation.	5
5	Ergonomics and preliminary design: Introduction, Body structure topology, interior ergonomics and vehicle controls,, percentile correction, foot and hand controls, concept of referencing Hip point, Ball of Foot, Accelerator Heel Point, Seat Reference Point. Forward vision, measuring seat comfort, seat design, Truck cab ergonomics, Driver/seat/control relationship, Dashboard instruments.	8
6	Vehicular safety: Types, Concept of Air-bag and seat belt, Occupant protection safety features, various crash tests, Body alignment test.	3
7	Vehicle Customization: Introduction, Types of vehicle customization: Fabrication, performance, paint etc., Body Paint: Cleaning, Pretreatment, Priming, Finish coating, Internal corrosion and sealing. Painting process and Car protection methods.	5
	Total	45



List of Practicals / Tutorials:

1	To demonstrate and understand the importance of different Automotive Chassis.
2	To demonstrate and understand the importance of Automotive body.
3	To demonstrate about different types of car body styles.
4	Design and analysis of body loads.
5	Demonstration of bus body structure and regulations.
6	To demonstrate and understand about the Heavy vehicle structure.
7	To understand the effects of Aerodynamics.
8	To demonstrate about human anthropometrical considerations for vehicular body.
9	To understand the occupant safety provisions in Automotives.
10	To understand the vehicle customization methods.

Reference Books:

1	Vehicle Body Engineering, J. Pawlowski, Business books limited.
2	Fundamentals of Automobile Body Structure Design, Donald E. Malen, SAE International.
3	Handbook of Vehicle Design Analysis, John Fenton, Mechanical Engineering Publications Ltd.
4	Automotive Engineering: Powertrain, Chassis system & Vehicle Body, David Crolla, ELSEVEIR.
5	Chassis Handbook, Bernard Heibeing and Martin, Springer Fachmedien
6	Motor Vehicle Structures: Concepts and fundamentals, Jason Brown & Robertson, BUTTERWORTH HEINEMANN
7	Advanced vehicle technology, Heinz Heisler, BUTTERWORTH HEINEMANN
8	Body Construction and Design, J.G Giles, Vol. 6. Iife Books/Butterworth & Co. London
9	Automobile chassis and Body, P. L. Kohli.
10	Automobile Engineering: Vol-5 Paint Techniques, Anil Chikara, satya prakashan-New delhi.

Supplementary learning Material:

1	NPTEL Resources
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Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Industrial/ Field visits



Internal Evaluation :

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
25	25	25	15	5	5	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the automotive chassis and body layouts.	20
CO-2	Understand the car body and body styling.	20
CO-3	Understand the Bus and commercial vehicle body structure.	15
CO-4	Understand the aerodynamics and anthropometrical consideration.	25
CO-5	Understand the vehicular safety and vehicle customization.	20

Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2027