GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering
Level: Diploma
Branch: Automobile Engineering
Course / Subject Code: DI03002061
Course / Subject Name: Vehicle Body Engineering

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	PCC

Prerequisite:	Vehicle body construction, material, repair, techniques and painting process.
Rationale:	As a diploma graduate in automobile engineering, one is supposed to supervise fabrication and repair work of various vehicle bodies. The knowledge and skills of vehicle body technology is required for vehicle body fabrication and repair work. In the automotive field auto body repair is experiencing a faster growth than any other service area. Collision repair plus the normal upkeep of the automobile body requires increasing numbers of well- trained auto body technicians. This course is designed to provide students the required level of knowledge and skills of vehicle body technology.

Course Outcome:
After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain vehicle body construction.	U
02	Use various body repair tools and equipment with proper safety measures.	A
03	Select appropriate body material for specific body part considering sustainability.	A
04	Practice vehicle body repairs and replacement at different levels.	R
05	Plan different surface finishing processes and rectify the defects of painting.	R

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA (M)	PA(I)	ESE (V)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Fundamentals of Vehicle Body Construction:** 1.1 Introduction to chassis, frame and body with their classifications. 1.2 Different methods of vehicle body construction. Various vehicle body styles. Integral body construction (safety body cell & crumple zone) 1.3 Vehicle body interior and exterior parts, their location and function. 1.4 Classification of commercial vehicles with their types and uses.	06	20
2.	**Vehicle Body Repair Tools (Hand Tools, Power Tools, Measuring Tools and Body Aligners):** 2.1 Hand tools for vehicle body repairs (Hammers, Dolly blocks, Spoons, files, body pullers, Washer welder, Power lock stand, Door repair stand, Vise grip pliers, Body repair tool set, Body repair Mechanics stand). 2.2 Power tools for vehicle body repairs (Pneumatic cutting tools [Air chisel, Air saw], Grinders [Air chuck grinder, Power disc grinder, Air disc grinder, Sun form tools], Sanders [Air disc sander, Belt sander, Double action sander, Orbital action sander, Sander with guide, Straight line sander], Cutters and Drill. 2.3 Measuring tools for vehicle body repairs (Wheel Base Gauge, Tram Tracking Gauge, Centering gauge) 2.4 Vehicle body Aligners – Manual and Electronic Aligners (Bench type, Floor type, Platform type, Intermediate type) 2.5 Safety in vehicle body shop.	05	20
3.	**Vehicle Body Materials.** 3.1 Characteristics and types of body building material (Sheet Metal, Glass, Resins, Plastic parts, Composite materials, GRP (glass reinforced plastic), FRP (fiber reinforced plastic), Wood. 3.2 Automotive Glasses 3.3 Introduction to ecofriendly materials in vehicle body building-interiors and exteriors. 3.4 Sustainability in automobile industry by recycling and reusing body building materials.	03	10
4.	**Vehicle Body Repairs- Major, Minor and Miscellaneous Repairs:** 4.1 Types of collision and related damages. 4.2 Inspection of damaged body and chassis components to find out level of damage. 4.3 Repair procedures based on level of damage. 4.4 Planning of repair work. 4.5 Fiber glass repairs & replacement.	09	30

	4.6 Door service and miscellaneous repairs. 4.7 Panel filling with plastic body and filler-forming with solder. 4.8 Panel shrinking (drawing operation) 4.9 Body aligning and panel replacement. 4.10 Repair with hammer and dolly. 4.11 Upholstery work. 4.12 Interior trim, Exterior trim.		
5.	**Painting and Refinishing :** 5.1 Paint types & characteristics. 5.2 Painting equipment. 5.3 Painting methods & techniques (Spraying and Immersion). 5.4 Painting/repainting procedure with surface preparation. 5.5 Different types of paint defects occurring during painting & immediately after drying along with their causes & remedies. 5.6 Surface Refinishing processes. 5.7 Effect of corrosion and corrosion protection methods for rusted parts. 5.8 Requirements and application of Corrosion protection methods. 5.9 Introduction to Ecofriendly paints, its composition and benefits.	07	20
	Total	**30**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
35%	**37%**	**28%**	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Automobile Engineering-Body Repair Techniques Vol-IV Anil Chhikara Satya Prakashan, New Delhi ISBN-10: 8176840769 ISBN-13: 978-817684076
2. Automobile Engineering-Paint Techniques Vol-V Anil Chhikara Satya Prakashan, New Delhi ISBN-13: 9788176840774
3. Vehicle Body Engineering J. Powlowski Century ISBN-10: 0220689164 ISBN-13: 978-0220689162
4. Automotive Refinishing Harry T. Chudy Pearson; 3rd edition ISBN-10: 0130100730 ISBN-13: 978-0130100733
5. Vehicle body layout and analysis John Fanton Mechanical Engineering Publications (1980) ISBN:- 0852984456
6. The Principles of Auto body repairing and RepaintingAlexander Tait, Andre G. Deroche, Nicholas N. Hildebrand Pearson; 6th edition ISBN-10: 013440033X ISBN-13: 978-0134400334

7. The Haynes Automotive Body Repair & Painting Manual Haynes Delmar Cengage Learning; 1 Edition ISBN:- 1850104794
8. The Repair of Vehicle Bodies Andrew Livesey, Alan Robinson Routledge, 7th Edition ISBN-10: 081537870XISBN-13: 978-0815378709
9. Materials for Automobile Bodies Geoffrey Davies Elsevier Science ISBN: 9780080969794
10. Vehicle Body Engineering A. K. Babu Khanna Book Publishing ISBN-10: 9390779014 ISBN-13: 978-9390779017

(b) Open-source software and website:

1. https://www.howacarworks.com
2. https://swayam.gov.in
3. https://auto.howstuffworks.com
4. https://nptel.ac.in/courses
5. https://tinyurl.com/bdcm6a9e for video link
6. https://tinyurl.com/yc7s5evc for web link

Suggested Course Practical List:

1. Observe & identify body interior and exterior parts and explain their function.
2. Observe & identify and make a note on aerodynamic concepts and ergonomic concepts used in given four-wheeler.
3. Check & perform body dimensioning by using various Measuring tools.
4. Demonstrate Body Aligning process of deformed vehicle structure with the help of body aligners.
5. Observe any particular vehicle for its all body parts and make a list of alternate and ecofriendly material for that body parts.
6. Perform dent repair process with hand tools and power tools.
7. Perform door fitting and servicing.
8. Demonstrate minor damage repairs with washer welder method and panel shrinking method.
9. Demonstrate panel replacement method for damaged /rusted panels.
10. Perform Fiber Glass repairs for damaged bumpers.
11. Demonstrate dismantling of upholstery, accessories, electrical window and seat operating equipment of vehicle.
12. Demonstration of paint preparation and different paint techniques.
13. Demonstrate different body coating processes.

List of Laboratory/Learning Resources Required:

1. Latest car
2. Hand tools-Mallets, dolly blocks, files, spoons, picks /Power tools- Dent puller, sander, slide hammer T Bar Puller Tool Car Dent Remover and grinder.

3. Wheel Base Gauge, Tram Tracking Gauge, Centering gauge, Caroliner bench, inside/ outside micrometers, Vernier calipers, dial gauges, depth gauges, steel rulers, T-squares, flat edges, calipers, dividers and protractors.
4. Body aligners-Manual OR Electronic.
5. Door/Bumper stand, Door skin tool, hinge kit
6. Hot stapler welding gun, stapler or car bumper repair kit
7. Washer welder kit, heat torch.
8. Air saw, cutters, welding kit, metal cutting gun, Trim removal tools
9. Pick hammers and punches, caulking guns, adhesive brushes, and mallets, Holding tools: various clamps, holding jigs.
10. Power sanders, spray guns, air compressor.
11. Coating kit
12. Pre-used/Replaced/Salvage parts of vehicle parts for practical performance and demonstration.
13. Gloves, Safety shoes, goggles, ear plugs, boiler suits, Fire Extinguishers, First aid kit, safety ventilation equipment.

Suggested Project List:

1. Prepare chart according to classification of vehicle body shape with suitable images.
2. Charts on material used for different vehicle body part.
3. Small report on ergonomic principle used in designing vehicle body.
4. Small report on ergonomic principle used in designing vehicle body.
5. Prepare chart showing classification of commercial vehicles with suitable images.
6. Prepare chart demonstrating safety measures in body shop and paint shop.
7. Prepare charts showing different vehicle body tools with their function.
8. Collect data of recycled, reused vehicle body material from an authorized workshop.
9. Collect data of waste management from an authorized workshop.
10. Prepare a door service model with the help of old vehicle door.
11. Prepare a panel for surface preparation practice using an old body part.
12. Prepare a display board of paint tools in disassembled mode. (Use of old equipment suggested)

13. Arrange a group discussion on “Latest body repair trends”.
14. Observe and prepare a report on “Work Flow Rate in Body repair shop in 6days” based on extent of damage.

Suggested Activities for Students:

1. Collect data of vehicle body repair work an authorized workshop.
2. Collect data of vehicle body major repair work document for claim insurance company.
3. Arrange a visit for “Latest body repair trends” at authorized workshop.

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